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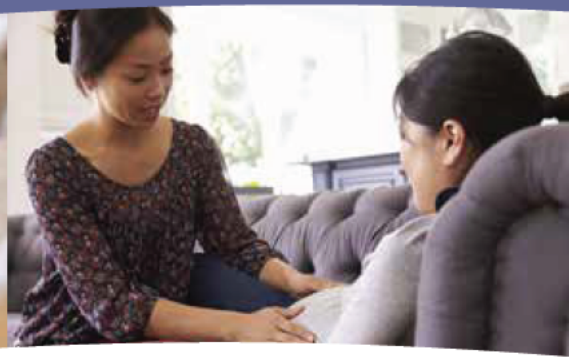
CLINICAL PRACTICE GUIDELINES

Pregnancy Care

2018 Edition







Australian Government

Department of Health

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Disclaimer

This is a general guide to appropriate practice, to be followed subject to the relevant clinician's judgement in each individual case. The Commonwealth has taken all reasonable steps to ensure that the Guidelines are based on, and accurately represent, the best available published evidence on key areas of antenatal care. However, the Commonwealth does not accept any legal liability for any loss, damage costs or expenses that may result from reliance on the information and recommendations contained in these Guidelines.

Suggested citation

Department of Health (2018) *Clinical Practice Guidelines: Pregnancy Care*. Canberra: Australian Government Department of Health.

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Publication approval

Australian Government
National Health and Medical Research Council

The recommendations in these Guidelines were approved under Section 14A of the *National Health and Medical Research Council Act 1992* at different times. NHMRC approval is valid for a period of 5 years and the relevant approval period is noted in the summary of recommendations (pages 10 to 26).

In approving guideline recommendations, NHMRC considers that they meet the NHMRC standard for clinical practice guidelines and is satisfied that the guideline recommendations are systematically derived, based on the identification and synthesis of the best available scientific evidence, and developed for health professionals practising in an Australian health care setting.

This publication reflects the views of the authors and not necessarily the views of the Australian Government.

Clinical Practice Guidelines: Pregnancy care

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2018 edition

Foreword

The *Clinical Practice Guidelines: Pregnancy Care* (the Guidelines) continue the process of providing high quality evidence-based guidance to maternity service providers and the consumers of their care. This process started in 2008 with the development of Module I (Clinical Practice Guidelines: Antenatal Care), and its subsequent release in 2012. This was followed by Module II, which was released in 2014.

This edition brings together the two previous modules and contains updates of a number of topics from them, including weight and body mass index (weight monitoring reviewed), fetal growth and wellbeing, risk of preterm birth, risk of pre-eclampsia (risk factors and prediction reviewed), family violence, hyperglycaemia (early testing reviewed), hepatitis C, thyroid dysfunction, vitamin D status and chromosomal anomalies (cell-free DNA testing reviewed). The new topic substance use has also been incorporated.

The Guidelines were developed to help ensure that women in Australia are provided with consistent, high-quality, evidence-based maternity care. The Guidelines are intended for all health professionals who contribute to pregnancy care including midwives, obstetricians, general practitioners, Aboriginal and Torres Strait Islander health workers and allied health professionals.

The next challenge is to facilitate the uptake of the Guidelines and their incorporation into routine care so that the women of Australia receive the highest possible quality of maternity care. To assist with this uptake, the Australian Government Department of Health is funding the development of health professional and consumer summary sheets and the development of an electronic version of the guidelines that has intuitive navigation and is mobile device accessible.

We acknowledge the contributions of the Expert Advisory Committee together with the Secretariat and Project Management provided by the Department of Health and, in particular, the expertise of the methodologist (Philippa Middleton, South Australian Health and Medical Research Institute) and technical writer and expert evidence reviewer (Jenny Ramson, Ampersand Health Science Writing), who prepared this edition.

The recommendations in these Guidelines have been endorsed by the National Health and Medical Research Council as meeting the Council's standards for the preparation of evidence-based recommendations.

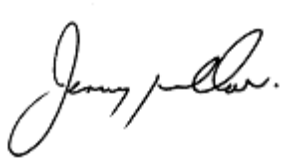
We commend this latest edition of the Pregnancy Guidelines, a process that started in 2008 and is continuing in 2018 with the support of the Department of Health with the preparation of additional chapters and review of previous topics.

We trust that the Guidelines will contribute to greater consistency in pregnancy care and improve the experience and outcomes of pregnancy care for women and their families.

Prof Caroline Homer AO



Prof Jeremy Oats



On behalf of the Expert Advisory Committee

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Summary

Antenatal care is a usual part of pregnancy for most women who give birth in Australia. Women receive antenatal care in community and hospital-based settings and see a range of health professionals. Effective models of antenatal care have a focus on the individual woman's needs and preferences, collaboration and continuity of care. These national Clinical Practice Guidelines on Pregnancy Care provide evidence-based recommendations to support high quality, safe antenatal care in all settings. This document combines Module I, published in 2012 and Module II, published in 2014. Some chapters were reviewed and updated in 2016-17.

Within the diversity of women that make up the Australian population, some face greater disadvantage, experience difficulties in accessing health services and may experience poorer outcomes. The broader context of a woman's life should be considered in planning and providing pregnancy care. Taking a woman-centred approach also ensures that a woman's social, emotional, physical, psychological, spiritual and cultural needs and expectations are considered and respected. Throughout the pregnancy, women should be given information in an appropriate form to support them to make choices about their care.

This document highlights specific approaches to pregnancy care for a range of groups, with a focus on improving the experience of antenatal care for Aboriginal and Torres Strait Islander women, migrant and refugee women and women with severe mental illness.

The topics covered in these Guidelines cover core practices in antenatal care that are relevant to antenatal care for healthy pregnant women (ie those who do not have identified pre-existing conditions or are at higher risk of complications such as in multiple pregnancy). This includes:

- discussing health and wellbeing during pregnancy (eg nutrition, physical activity)
- providing information to support parents to prepare for the rest of pregnancy, childbirth and parenthood
- promoting and supporting breastfeeding
- assessing fetal wellbeing (eg offering an 18-20 week ultrasound scan, discussing fetal movements and assessing fetal growth)
- assessing the health of the woman, in particular factors indicating that additional care may be required (eg for women at increased risk of preterm birth or pre-eclampsia)
- assessing for any condition that may affect the health of the woman or the unborn baby (eg anaemia, diabetes, sexually transmitted infections, mental health disorders)
- providing advice on symptoms that are common during pregnancy (eg reflux and haemorrhoids)
- discussing and offering testing for chromosomal anomalies
- providing opportunities for women to raise any issues they wish to discuss
- providing ongoing support
- enabling consultation and referral when required.

A planned schedule of antenatal visits should be agreed early in pregnancy, based on the individual woman's needs. Assessment of a woman's risk and any requirement for additional care continues throughout pregnancy.

These Guidelines are not intended as a textbook of antenatal care but rather. A process of prioritisation was used to decide which topics were relevant to the Australian context. While many of these topics involve clinical assessment and maternal health testing, the management of any conditions identified is not generally discussed. Health professionals are directed to appropriate resources or other relevant guidelines where available.

The Guidelines provide a reliable and standard reference for health professionals providing antenatal care. By providing a summary of the currently available evidence on many aspects of antenatal care, they aim to promote consistency of care and improve the experience and outcomes of pregnancy care for all families.

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Summary of recommendations and practice points

The recommendations in these Guidelines were developed by the Expert Advisory Committees (EACs) (see Appendices A and B) based on systematic reviews of the available evidence. Sets of systematic reviews were conducted in 2010-2011, 2012-2013 and 2016-2017. Where sufficient evidence was available, this was graded according to the National Health and Medical Research Council (NHMRC) *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* (2009) (see below) for the 2010-2011 and 2012-2013 reviews and using GRADE methods for the 2016-2017 reviews. Recommendations were approved by the NHMRC in December 2011, June 2014 and October 2017, respectively. Topics prioritised for future review are included in Appendix C and marked as under review in this summary of recommendations.

For all reviews, where evidence was limited or lacking, consensus-based recommendations (CBRs) were developed. Some recommendations and CBRs from other national guidelines have also been included, where these were based on systematic review of the evidence.

For areas beyond the scope of the systematic reviews, practice points (PPs) were developed by the EAC, the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and/or the Working Group for Migrant and Refugee Women's Antenatal Care (see Appendices A and B).

The evidence-based recommendations and practice points focus on core practices in antenatal care, lifestyle considerations, and clinical and physical aspects of care. This care is provided following principles that endorse the protection, promotion and support necessary for effective antenatal care as outlined in Chapter 1. These include taking a holistic approach that is woman-centred, culturally sensitive and enables women to participate in informed decision-making at all stages of their care.

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Definition of grades of recommendations (2010-11 and 2012-13 reviews)

Type	Definition
Grade A:	Body of evidence can be trusted to guide practice
Grade B:	Body of evidence can be trusted to guide practice in most situations
Grade C:	Body of evidence provides some support for recommendation(s) but care should be taken in its application
Grade D:	Body of evidence is weak and recommendation must be applied with caution
CBR:	Recommendation formulated in the absence of quality evidence (where a systematic review of the evidence was conducted as part of the search strategy)
PP:	Area is beyond the scope of the systematic literature review and advice was developed by the EAC

Source: Adapted from NHMRC (2009) *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* and NHMRC (2011) *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*.

Definition of grades of recommendations (2016-17 reviews)

Type	Definition
Evidence-based recommendation (EBR)	Body of evidence can be trusted to guide practice
Qualified evidence-based recommendation (QEBR)	Body of evidence can be trusted to guide practice in most situations
CBR	Recommendation formulated in the absence of quality evidence (where a systematic review of the evidence was conducted as part of the search strategy)
PP	Area is beyond the scope of the systematic literature review and advice was developed by the EAC

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Recommendations and practice points[1]

Recommendation/practice point		Grade	Chapter	Approval
Optimising pregnancy care				
Pregnancy care for Aboriginal and Torres Strait Islander women				
A	Adopt a respectful, positive and supportive approach in providing antenatal care to Aboriginal and Torres Strait Islander women, working in partnership with women, Aboriginal and Torres Strait Islander health professionals and communities. This should be informed by cultural safety training for health professionals.	PP	3	10/2017-10/2022
Pregnancy care for migrant and refugee women				
B	The care needs of migrant and refugee women can be complex. The first point of contact (eg first antenatal visit) is important and care should be undertaken with an accredited health interpreter. Wherever possible, antenatal care should involve a multicultural health worker.	PP	4	6/2014-6/2019
C	Health professionals should take the initiative in organising for an accredited health interpreter wherever necessary, and reassure the woman of the benefits if she is reluctant.	PP	4	6/2014-6/2019
Pregnancy care for women with severe mental health illness[2]				
D	For women with borderline personality disorder who have often experienced complex trauma, trauma-informed care and specific support for health professionals in dealing with challenging behaviours is a priority.	PP	5	10/2017-10/2022
E	For women with schizophrenia, bipolar disorder or borderline personality disorder, a multidisciplinary team approach to care in the antenatal period is essential, with clear communication, advance care planning, a written plan, and continuity of care across different clinical settings.	PP	5	10/2017-10/2022
F	Where possible, health professionals providing care in the antenatal period should access training to improve their understanding of care for women with schizophrenia, bipolar disorder and borderline personality disorder.	PP	5	10/2017-10/2022
Core practices in antenatal care				
Antenatal visits				
1	Determine the schedule of antenatal visits based on the individual woman's needs. For a woman's first pregnancy without complications, a schedule of ten visits should be adequate. For subsequent uncomplicated pregnancies, a schedule of seven visits should be adequate.	B	8	12/2011-12/2016

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1 Recommendations are numbered using Arabic numerals (eg 1, 2, 3), consensus-based recommendations using Roman numerals (eg I, II, III) and practice points using letters (eg A, B, C).

2 Adapted from Austin M-P, Highet N, Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

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Recommendation/practice point		Grade	Chapter	Approval
I	At the first contact with a woman during pregnancy, make arrangements for the first antenatal visit, which requires a long appointment and should occur within the first 10 weeks.	CBR	8	12/2011-12/2016
II	Early in pregnancy, provide women with information in an appropriate format about the likely number, timing and content of antenatal visits associated with different options of care and the opportunity to discuss this schedule.	CBR	8	12/2011-12/2016
Preparing for pregnancy, childbirth and parenthood				
2	Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.	B	9	6/2014-6/2019
3	Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.	B	9	6/2014-6/2019
G	Assisting parents to find an antenatal education program that is suitable to their learning style, language and literacy level may improve uptake of information.	PP	9	6/2014-6/2019
Preparing for breastfeeding				
4	Routinely offer education about breastfeeding as part of antenatal care.	C	10	6/2014-6/2019
Lifestyle considerations				
Nutrition (under review)				
H	Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy and breastfeeding.	PP	11.2	6/2014-6/2019
5	Reassure women that small to moderate amounts of caffeine are unlikely to harm the pregnancy.	C	11.2	6/2014-6/2019
I	For women who are underweight, additional serves of the five food groups may contribute to healthy weight gain.	PP	11.2	6/2014-6/2019
J	For women who are overweight or obese, limiting additional serves and avoiding energy-dense foods may limit excessive weight gain. Weight loss diets are not recommended during pregnancy.	PP	11.2	6/2014-6/2019
Nutritional supplements (under review)				
6	Inform women that dietary supplementation with folic acid, from 12 weeks before conception and throughout the first 12 weeks of pregnancy, reduces the risk of having a baby with a neural tube defect and recommend a dose of 500 micrograms per day.	A	11.3	12/2011-12/2016
K	Specific attention needs to be given to promoting folic acid supplementation to Aboriginal and Torres Strait Islander women of childbearing age and providing information to individual women at the first antenatal visit.	PP	11.3	12/2011-12/2016

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Recommendation/practice point		Grade	Chapter	Approval
7	Advise women that taking vitamin A, C or E supplements is not of benefit in pregnancy and may cause harm.	B	11.3	12/2011-12/2016
III	Advise women who are pregnant to take an iodine supplement of 150 micrograms each day. Women with pre-existing thyroid conditions should seek advice from their medical practitioner before taking a supplement.	CBR	11.3	12/2011-12/2016
8	Do not routinely offer iron supplementation to women during pregnancy.	B	11.3	12/2011-12/2016
9	Advise women with low dietary iron intake that intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.	B	11.3	6/2014-6/2019
L	Women at high risk of iron deficiency due to limited access to dietary iron may benefit from practical advice on increasing intake of iron-rich foods.	PP	11.3	6/2014-6/2019
Physical activity (under review)				
10	Advise women that low- to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes.	B	11.4	6/2014-6/2019
Tobacco smoking				
11	At the first antenatal visit: • assess the woman's smoking status and exposure to passive smoking • give the woman and her partner information about the risks to the unborn baby associated with maternal and passive smoking • if the woman smokes, emphasise the benefits of quitting as early as possible in the pregnancy and discuss any concerns she or her family may have about stopping smoking.	A	12	12/2011-12/2016
12	Offer women who smoke referral for smoking cessation interventions such as cognitive behavioural therapy.	B	12	12/2011-12/2016
M	At each antenatal visit, offer women who smoke personalised advice on how to stop smoking and provide information about available services to support quitting, including details on when, where and how to access them.	PP	12	12/2011-12/2016
13	If, after other options have been explored, a woman expresses a clear wish to use nicotine replacement therapy, discuss the risks and benefits with her.	B	12	12/2011-12/2016
N	If nicotine replacement therapy is used during pregnancy, intermittent-use formulations (gum, lozenge, inhaler and tablet) are preferred to continuous-use formulations (nicotine patches).	PP	12	12/2011-12/2016

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O	Smoking status should be monitored and smoking cessation advice, encouragement and support offered throughout pregnancy.	PP	12	12/2011-12/2016
P	Health care professionals involved in the care of Aboriginal and Torres Strait Islander women should be aware of the high prevalence of smoking in some communities, and take account of this social norm when discussing smoking and supporting women to quit.	PP	12	12/2011-12/2016
Q	Culturally appropriate smoking cessation services should be offered.	PP	12	12/2011-12/2016
R	In discussing smoking and supporting Aboriginal and Torres Strait Islander women to quit smoking, health professionals should draw on the expertise of anti-tobacco workers where available.	PP	12	12/2011-12/2016
Alcohol[3]				
IV	Advise women who are pregnant or planning a pregnancy that not drinking is the safest option as maternal alcohol consumption may adversely affect the developing fetus.	CBR	13	12/2011-12/2016
Medicines				
V	Advise women that use of prescription and over-the-counter medicines should be limited to circumstances where the benefit outweighs the risk as few medicines have been established as safe to use in pregnancy.	CBR	14	12/2011-12/2016
VI	Therapeutic Goods Administration Category A medicines have been established to be safe in pregnancy.	CBR	14	12/2011-12/2016
S	Health professionals should seek advice from a tertiary referral centre for women who have been exposed to Category D or X medicines during pregnancy.	PP	14	12/2011-12/2016
T	Few herbal preparations have been established as being safe and effective during pregnancy. Herbal medicines should be avoided in the first trimester.	PP	14	12/2011-12/2016
Substance use				
VII	Early in pregnancy, assess a woman's use of illicit substances and misuse of pharmaceuticals and provide advice about the associated harms.	CBR	15	10/2017-10/2022
U	Asking about substance use at subsequent visits is important as some women are more likely to report sensitive information only after a trusting relationship has been established.	PP	15	10/2017-10/2022

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3 Adapted from NHMRC (2009) *Australian Guidelines to Reduce Health Risks from Drinking Alcohol*. Canberra: National Health and Medical Research Council (currently under review).

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Recommendation/practice point		Grade	Chapter	Approval
Oral health				
14	At the first antenatal visit, advise women to have oral health checks and treatment, if required, as good oral health is important to a woman's health and treatment can be safely provided during pregnancy.	B	16	12/2011-12/2016
Sexual activity				
15	Advise pregnant women without complications that safe sexual activity in pregnancy is not known to be associated with any adverse outcomes.	B	17	6/2014-6/2019
Travel				
16	Inform pregnant women about the correct use of seat belts; that is, three-point seat belts 'above and below the bump, not over it'.	B	18	6/2014-6/2019
17	Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis and pulmonary embolism, although it is unclear whether there is additional risk during pregnancy.	C	18	6/2014-6/2019
V	Pregnant women should be advised to discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas.	PP	18	6/2014-6/2019
18	If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.	B	18	6/2014-6/2019
W	Beyond the first trimester, mefloquine is approved for use to prevent malaria. Neither malarone nor doxycycline are recommended for prophylaxis at any time during pregnancy. Chloroquine (or hydroxychloroquine) plus proguanil is safe but less effective so seldom used. For areas where only vivax is endemic, chloroquine or hydroxychloroquine alone is appropriate.	PP	18	6/2014-6/2019
Clinical assessments				
Weight and body mass index (under review)				
VIII	Measure women's weight and height at the first antenatal visit and calculate their body mass index (BMI) to inform gestational weight gain.	CBR	19	12/2011-12/2016
IX	Give women advice about appropriate weight gain during pregnancy in relation to their pre-pregnancy BMI (if recorded) or their BMI at the first antenatal visit.	CBR	19	12/2011-12/2016
X	Adopting a respectful, positive and supportive approach and providing information about healthy eating and physical activity in an appropriate format may assist discussion of weight management. This should be informed by appropriate education for health professionals.	PP	19	12/2011-12/2016
X	At every antenatal visit, offer women the opportunity to be weighed and encourage self-monitoring of weight gain.	CBR	19	10/2017-10/2022

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Recommendation/practice point		Grade	Chapter	Approval
XI	At every antenatal visit, discuss weight change, diet and level of physical activity with all women.	CBR	19	10/2017-10/2022
Gestational age				
19	Provide information and offer pregnant women who are unsure of their conception date an ultrasound scan between 8 weeks 0 days and 13 weeks 6 days to determine gestational age, detect multiple pregnancies and accurately time fetal anomaly testing.	B	20	12/2011-12/2016
20	Use crown-rump length (CRL) measurement to determine gestational age. If the CRL is above 84 mm, estimate the gestational age using head circumference.	B	20	12/2011-12/2016
Y	The timeframe for ultrasound assessment of gestational age overlaps with that for assessment of nuchal translucency thickness as part of testing for fetal chromosomal anomalies (11 weeks to 13 weeks 6 days), which may enable some women to have both tests in a single scan. This should only occur if women have been provided with an explanation of the purpose and implications of the tests and have given their informed consent to both tests.	PP	20	12/2011-12/2016
Z	The agreed due date should not be changed without advice from another health professional with considerable experience in antenatal care.	PP	20	12/2011-12/2016
AA	Ultrasound assessment of gestational age should only be performed by a person who has had specific training.	PP	20	12/2011-12/2016
BB	Repeated ultrasound assessments should only be used when clinically indicated.	PP	20	12/2011-12/2016
Fetal development and anatomy				
21	Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.	B	21	6/2014-6/2019
CC	Timing of the ultrasound will be guided by the individual situation (eg for women who are obese, visualisation may improve with gestational age).	PP	21	6/2014-6/2019
DD	Repeated ultrasound assessment may be appropriate for specific indications but should not be used for routine monitoring.	PP	21	6/2014-6/2019
EE	Ultrasound assessment should only be performed by healthcare professionals with appropriate training and qualifications, within the appropriate scope (eg diagnostic or point of care).	PP	21	6/2014-6/2019
Fetal growth restriction[4]				
FF	Early in pregnancy, assess women for risk factors for having a small-for-gestational-age fetus/newborn.	PP	22	10/2017-10/2022

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4 Adapted from RCOG (2014) *The Investigation and Management of the Small-For Gestational Age Fetus: Green-Top Guideline 31*. London: Royal College of Obstetricians and Gyneacologists.

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Recommendation/practice point		Grade	Chapter	Approval
XII	When women are identified as being at risk of having a small-for-gestational-age fetus/newborn, provide advice about modifiable risk factors.	CBR	22	10/2017-10/2022
XIII	Refer women with a major risk factor or multiple other factors associated with having a small-for-gestational-age fetus/newborn for ultrasound assessment of fetal size and wellbeing at 28-30 and 34-36 weeks gestation.	CBR	22	10/2017-10/2022
XIV	Do not assess fetal growth based solely on abdominal palpation.	CBR	22	10/2017-10/2022
XV	At each antenatal visit from 24 weeks, measure fundal height in centimetres.	CBR	22	10/2017-10/2022
GG	Refer women after 24 weeks gestation with a fundal height ≥3cm less than expected, a single fundal height which plots below the 10th centile or serial measurements that demonstrate slow or static growth by crossing centiles for ultrasound measurement of fetal size.	PP	22	10/2017-10/2022
HH	Refer women in whom measurement of fundal height is inaccurate (for example: BMI >35, large fibroids, polyhydramnios) for serial assessment of fetal size using ultrasound.	PP	22	10/2017-10/2022
Fetal movements[5]				
XVI	Early in pregnancy provide women with verbal and written information about normal fetal movements. This information should include a description of the changing patterns of movement as the fetus develops, normal wake/sleep cycles and factors that may modify the mother's perception of fetal movements.	CBR	22	10/2017-10/2022
XVII	Advise women with a concern about decreased fetal movements to contact their health professional immediately.	CBR	22	10/2017-10/2022
II	Emphasise the importance of maternal awareness of fetal movements at every antenatal visit.	PP	22	10/2017-10/2022
XVIII	Do not advise the use of kick charts as part of routine antenatal care.	CBR	22	10/2017-10/2022
JJ	Maternal concern about decreased fetal movements overrides any definition of decreased fetal movements based on numbers of fetal movements.	PP	22	10/2017-10/2022
Fetal heart rate				
XIX	If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and either Doppler or a Pinard stethoscope from 28 weeks.	CBR	22	10/2017-10/2022

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5 Adapted from Gardener G, Daly L, Bowring V et al (2017) *Clinical Practice Guideline for the Care of Women with Decreased Fetal Movements*. Brisbane: The Centre of Research Excellence in Stillbirth.

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Recommendation/practice point		Grade	Chapter	Approval
XX	Do not routinely use electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy.	CBR	22	10/2017-10/2022
Risk of preterm birth				
XXI	When women are identified as being at risk of giving birth preterm based on the presence of risk factors, provide advice about modifiable risk factors.	CBR	23	10/2017-10/2022
Blood pressure				
22	Measure blood pressure at a woman's first antenatal visit to identify existing high blood pressure.	B	24	12/2011-12/2016
Proteinuria				
XII	Routinely offer testing for proteinuria at the first antenatal visit, regardless of stage of pregnancy.	CBR	25	12/2011-12/2016
23	For point-of-care testing, use an automated analyser if available, as visual inspection of a urinary dipstick is the least accurate method to detect true proteinuria.	B	25	12/2011-12/2016
Risk of pre-eclampsia (under review)				
24	Early in pregnancy, assess all women for clinical risk factors for pre-eclampsia.	EBR	26	10/2017-10/2022
25	Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.	A	26	6/2014-6/2019
KK	If a woman has a low dietary calcium intake, advise her to increase her intake of calcium-rich foods.	PP	26	6/2014-6/2019
26	Advise women at moderate-high risk of pre-eclampsia that low-dose aspirin from early pregnancy may be of benefit in its prevention.	B	26	6/2014-6/2019
27	Advise women that vitamins C and E are not of benefit in preventing pre-eclampsia.	B	26	6/2014-6/2019
XXIII	Routinely measure blood pressure to identify new onset hypertension.	CBR	26	6/2014-6/2019
XXIV	Recommend testing for proteinuria at each antenatal visit if a woman has risk factors for or clinical indications of pre-eclampsia, in particular, raised blood pressure.	CBR	26	10/2017-10/2022
LL	Give women information about the urgency of seeking advice from a health professional if they experience: headache, visual disturbance (such as blurring or flashing before the eyes), epigastric pain (just below the ribs), vomiting and/or rapid swelling of the face, hands or feet.	PP	26	6/2014-6/2019

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Recommendation/practice point		Grade	Chapter	Approval
Social and emotional screening				
Depression and anxiety[6]				
28	Use the Edinburgh Postnatal Depression Scale (EPDS) to screen women for a possible depressive disorder.	EBR	27	10/2017-10/2022
29	Arrange further assessment of woman with an EPDS score of 13 or more.	EBR	27	10/2017-10/2022
XXV	Conduct screening as early as practical in pregnancy and repeat at least once later in pregnancy.	CBR	27	10/2017-10/2022
XXVI	For a woman with an EPDS score between 10 and 12, monitor and repeat the EPDS in 4-6 weeks as her score may increase subsequently.	CBR	27	10/2017-10/2022
XXVII	Repeat the EPDS at any time in pregnancy if clinically indicated.	CBR	27	10/2017-10/2022
XXVIII	For a woman with a positive score on Question 10 on the EPDS, undertake or arrange immediate further assessment and, if there is any disclosure of suicidal ideation, take urgent action in accordance with local protocol/policy.	CBR	27	10/2017-10/2022
XXIX	When screening Aboriginal and Torres Strait Islander women, consider language and cultural appropriateness of the tool.	CBR	27	10/2017-10/2022
XXX	Use appropriately translated versions of the EPDS with culturally relevant cut-off scores.	CBR	27	10/2017-10/2022
XXXI	Be aware that anxiety disorder is very common in the perinatal period and should be considered in the broader clinical assessment.	CBR	27	10/2017-10/2022
XXXII	As part of the clinical assessment, use anxiety items from other screening tools (eg EPDS items 3, 4 and 5; Depression Anxiety Stress Scale anxiety items; and Kessler Psychological Distress Scale items 2, 3, 5 and 6) and relevant items in structured psychosocial assessment tools (eg the Antenatal Risk Questionnaire [ANRQ]).	CBR	27	10/2017-10/2022
Psychosocial factors affecting mental health[6]				
MM	Assess psychosocial risk factors as early as practical in pregnancy.	PP	28	10/2017-10/2022
30	If using a tool to assess psychosocial risk, administer the ANRQ.	EBR	28	10/2017-10/2022
XXXIII	Undertake psychosocial assessment in conjunction with a tool that screens for current symptoms of depression/anxiety (eg the EPDS).	CBR	28	10/2017-10/2022
NN	Ensure that health professionals receive training in the importance of psychosocial assessment and the use of a psychosocial assessment tool.	PP	28	10/2017-10/2022

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6 Recommendations and practice points are based on Austin M-P, Highet N, Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

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Recommendation/practice point		Grade	Chapter	Approval
OO	Ensure that there are clear guidelines around the use and interpretation of the psychosocial tool/interview in terms of threshold for referral for psychosocial care and/or ongoing monitoring.	PP	28	10/2017-10/2022
PP	Discuss with the woman the possible impact of psychosocial risk factors (she has endorsed) on her mental health and provide information about available assistance.	PP	28	10/2017-10/2022
XXXIV	Consider language and cultural appropriateness of any tool used to assess psychosocial risk.	CBR	28	10/2017-10/2022
Family violence				
31	Explain to all women that asking about family violence is a routine part of antenatal care and enquire about each woman's exposure to family violence.	EBR	29	10/2017-10/2022
XXXV	Ask about family violence only when alone with the woman, using specific questions or the tool used in your state/territory.	CBR	29	10/2017-10/2022
XXXVI	Undertake and encourage regular and repeat training of health professionals, as training programs improve confidence and competence in identifying and caring for women experiencing family violence.	CBR	29	10/2017-10/2022
QQ	Be aware of family and community structures and support, and of community family violence and sexual assault services that can be called for urgent and ongoing support.	PP	29	10/2017-10/2022
RR	Responses to assisting Aboriginal and Torres Strait Islander women who are experiencing family violence need to be appropriate to the woman and her community.	PP	29	10/2017-10/2022
Routine maternal health tests				
Anaemia (under review)				
XXXVII	Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.	CBR	30	6/2014-6/2019
SS	In areas where prevalence of iron-deficiency anaemia is high, consider testing ferritin at the first antenatal visit.	PP	30	6/2014-6/2019
TT	Further investigation is required for women with a low haemoglobin concentration for their gestational stage. Repeat testing at 36 weeks may also be required for women who have symptoms or risk factors for anaemia or who live in or have come from an area of high prevalence.	PP	30	6/2014-6/2019
32	Advise iron supplementation for women identified as having iron-deficiency anaemia.	B	30	6/2014-6/2019

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Recommendation/practice point		Grade	Chapter	Approval
UU	Oral iron remains first-line treatment for iron-deficiency anaemia identified in the antenatal period. Intravenous iron should be offered to women who do not respond to oral iron or are unable to comply with therapy. In some remote settings, intramuscular iron may be administered by a health professional who does not have intravenous endorsement or where intravenous iron cannot be accessed.	PP	30	6/2014-6/2019
33	Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.	B	30	6/2014-6/2019
Haemoglobin disorders				
XXXVIII	As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer testing (full blood count).	CBR	31	6/2014-6/2019
VV	Consider offering ferritin testing and haemoglobin electrophoresis as part of initial testing to women from high-risk population groups.	PP	31	6/2014-6/2019
Hyperglycaemia (under review)				
34	In the first trimester, assess a woman's risk of hyperglycaemia including: her age, body mass index, previous gestational diabetes or high birth weight baby, family history of diabetes, presence of polycystic ovarian syndrome and whether she is from an ethnic group with high prevalence of diabetes, such as Aboriginal and Torres Strait Islander peoples.	EBR	32	6/2014-6/2019
35	Advise women that physical activity and healthy eating during pregnancy help to reduce excessive weight gain but do not appear to directly reduce the risk of diabetes in pregnancy.	QEBR	32	6/2014-6/2019
XXXIX	When a woman has risk factors for hyperglycaemia in the first trimester, suitable tests are glycated haemoglobin (HbA1c) or fasting blood glucose.	CBR	32	10/2017-10/2022
XL	Between 24 and 28 weeks gestation, advise testing for hyperglycaemia to all women who have not previously been tested in the current pregnancy. Advise repeat testing to women who were tested early in pregnancy due to risk factors and who had a normal result on an initial test.	CBR	32	6/2014-6/2019
XLI	Use the World Health Organization/International Association of Diabetes and Pregnancy Study Groups tests and criteria to diagnose diabetes and gestational diabetes in pregnancy.	CBR	32	6/2014-6/2019
Human immunodeficiency virus (HIV)				
36	Routinely offer and recommend HIV testing at the first antenatal visit as effective interventions are available to reduce the risk of mother-to-child transmission.	B	33	12/2011-12/2016

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Recommendation/practice point		Grade	Chapter	Approval
WW	A system of clear referral paths ensures that pregnant women who are diagnosed with an HIV infection are managed and treated by the appropriate specialist teams.	PP	33	12/2011-12/2016
Hepatitis B				
37	Routinely offer and recommend hepatitis B virus testing at the first antenatal visit as effective postnatal intervention can reduce the risk of mother-to-child transmission.	A	34	12/2011-12/2016
Hepatitis C				
XLII	At the first antenatal visit, recommend testing for hepatitis C.	CBR	35	10/2017-10/2022
XX	For women who have not previously been tested and who are having a planned invasive procedure (eg chorionic villus sampling), recommend testing for hepatitis C before the procedure.	PP	35	10/2017-10/2022
Syphilis (under review)				
38	Routinely offer and recommend syphilis testing at the first antenatal visit as treating syphilis benefits both mother and baby.	B	36	12/2011-12/2016
YY	Because syphilis is a rare condition in most parts of Australia and a positive result does not necessarily mean that a woman has syphilis, expert advice regarding the care of women who test positive and their partners should be sought. Assessment/testing for other sexually transmitted infections in women with positive serology is advisable.	PP	36	12/2011-12/2016
Rubella				
39	Routinely offer and recommend testing for rubella immunity at the first antenatal visit to identify women at risk of contracting rubella and enable postnatal vaccination to protect future pregnancies.	B	37	12/2011-12/2016
40	Inform women who have been vaccinated against rubella before they were aware of the pregnancy that the baby is highly unlikely to have been affected by the vaccine.	A	37	12/2011-12/2016
ZZ	Women identified as non-immune to rubella antenatally should be advised to avoid contact with people experiencing possible symptoms of rubella.	PP	37	12/2011-12/2016
Asymptomatic bacteriuria				
41	Routinely offer and recommend testing for asymptomatic bacteriuria early in pregnancy as treatment is effective and reduces the risk of pyelonephritis.	A	38	12/2011-12/2016
42	Use urine culture testing wherever possible as it is the most accurate means of detecting asymptomatic bacteriuria.	A	38	12/2011-12/2016
AAA	Where access to pathology services is limited, dipstick tests may be used to exclude infection, with positive results confirmed by urine culture. Appropriate storage of dipsticks is essential to the accuracy of these tests.	PP	38	12/2011-12/2016

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Recommendation/practice point		Grade	Chapter	Approval
Group B streptococcus (under review)				
43	Offer either routine antenatal testing for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy.	C	39	6/2014-6/2019
44	If offering antenatal testing for Group B streptococcus, arrange for testing to take place at 35-37 weeks gestation.	B	39	6/2014-6/2019
45	Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this.	C	39	6/2014-6/2019
Targeted maternal health tests				
Chlamydia (under review)				
46	Do not routinely offer chlamydia testing to all women as part of antenatal care.	C	40	12/2011-12/2016
47	Routinely offer chlamydia testing at the first antenatal visit to pregnant women younger than 25 years.	C	40	12/2011-12/2016
BBB	Testing for chlamydia and other sexually transmitted infections regardless of age should be considered for women who live in areas where their prevalence is high. An understanding of local prevalence will inform planning for population screening when this is indicated.	PP	40	12/2011-12/2016
Gonorrhoea				
XLIII	Do not routinely offer gonorrhoea testing to all women as part of antenatal care. Offer gonorrhoea testing to pregnant women who have known risk factors or who live in or come from areas where prevalence is high.	CBR	41	6/2014-6/2019
Trichomoniasis				
48	Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women.	B	42	6/2014-6/2019
Toxoplasmosis				
49	Do not routinely offer testing for toxoplasmosis to pregnant women.	C	43	6/2014-6/2019
50	Advise pregnant women about measures to avoid toxoplasmosis infection such as: • washing hands before handling food • thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating • thoroughly cooking raw meat and ready-prepared chilled meals • wearing gloves and thoroughly washing hands after handling soil and gardening • avoiding cat faeces in cat litter or in soil.	C	43	6/2014-6/2019

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Recommendation/practice point		Grade	Chapter	Approval
Cytomegalovirus (under review)				
XLIV	Only offer testing for cytomegalovirus to pregnant women if they come into frequent contact with large numbers of very young children (eg child care workers).	CBR	44	6/2014-6/2019
XLV	Advise pregnant women about hygiene measures to prevent cytomegalovirus infection such as frequent hand washing, particularly after exposure to a child's saliva or urine.	CBR	44	6/2014-6/2019
Asymptomatic bacterial vaginosis				
51	Do not routinely offer pregnant women testing for bacterial vaginosis.	B	45	12/2011-12/2016
CCC	Early treatment (before 20 weeks pregnancy) of proven bacterial vaginosis may be beneficial for women with a previous preterm birth.	PP	45	12/2011-12/2016
Thyroid dysfunction				
52	Do not routinely test pregnant women for thyroid dysfunction.	EBR	46	10/2017-10/2022
XLVI	Recommend thyroid testing to pregnant women who are at increased risk of thyroid dysfunction.	CBR	46	10/2017-10/2022
Vitamin D status				
53	Do not routinely recommend testing for vitamin D status to pregnant women in the absence of a specific indication.	EBR	47	10/2017-10/2022
XLVII	If testing is performed, only recommend vitamin D supplementation for women with levels lower than 50 nmol/L.	CBR	47	10/2017-10/2022
Human papilloma virus (under review)				
XLVIII	Offer women cervical screening as specified by the National Cervical Screening Program.	CBR	48	6/2014-6/2019
Testing for fetal chromosomal anomalies				
Tests for probability of chromosomal anomalies				
XLIX	In the first trimester, give all women/couples information about the purpose and implications of testing for probability of chromosomal anomalies to enable them to make informed choices.	CBR	50	12/2011-12/2016
L	If a woman chooses to have the combined test (nuchal translucency thickness, free beta-human chorionic gonadotrophin, pregnancy-associated plasma protein-A), make arrangements so that blood for biochemical analysis is collected between 9 weeks and 13 weeks 6 days gestation and ultrasound assessment takes place between 11 weeks and 13 weeks 6 days gestation.	CBR	50	12/2011-12/2016
DDD	Provide information about chromosomal anomalies and the tests used to identify their probability in a way that is appropriate and accessible to the individual woman.	PP	50	12/2011-12/2016

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Recommendation/practice point		Grade	Chapter	Approval
Diagnostic testing				
54	If a woman chooses to have a diagnostic test for chromosomal anomaly, base the choice of test on gestational age (chorionic villus sampling before 14 weeks pregnancy and amniocentesis after 15 weeks) and the woman's/ couple's preferences.	B	51	12/2011-12/2016
LI	Offer rapid access to appropriate counselling and ongoing support by trained health professionals to women who receive a diagnosis of fetal chromosomal anomaly.	CBR	51	12/2011-12/2016
EEE	Refer women with a high-probability test result but negative diagnostic test for further specialist assessment because of the increased likelihood of other fetal anomalies.	PP	51	12/2011-12/2016
Other considerations in testing for fetal chromosomal anomalies				
FFF	Support all women to access testing for chromosomal anomalies in a timely manner.	PP	52	12/2011-12/2016
Common conditions during pregnancy				
Nausea and vomiting				
GGG	Women who experience nausea and vomiting in pregnancy can be advised that, while it may be distressing, it usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with a poor pregnancy outcome.	PP	54	12/2011-12/2016
HHH	Discontinuing iron-containing multivitamins for the period that women have symptoms of nausea and vomiting may improve symptoms.	PP	54	12/2011-12/2016
Constipation				
55	Offer women who are experiencing constipation information about increasing dietary fibre intake and taking bran or wheat fibre supplementation.	C	55	12/2011-12/2016
56	Advise women who choose to take laxatives that preparations that stimulate the bowel are more effective than those that add bulk but may cause more adverse effects such as diarrhoea and abdominal pain.	C	55	12/2011-12/2016
Reflux (heartburn)				
LII	Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.	CBR	56	6/2014-6/2019
57	Give women who have persistent reflux information about treatments.	C	56	6/2014-6/2019
Haemorrhoids				
LIII	Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.	CBR	57	6/2014-6/2019

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Recommendation/practice point		Grade	Chapter	Approval
Varicose veins				
LIV	Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.	CBR	58	6/2014-6/2019
Pelvic girdle pain				
58	Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.	C	59	6/2014-6/2019
Carpal tunnel syndrome				
LV	Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited and symptoms may resolve after the birth.	CBR	60	6/2014-6/2019
Clinical assessments in late pregnancy				
Fetal presentation				
59	Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.	C	61	6/2014-6/2019
III	Suspected non-cephalic presentation after 36 weeks should be confirmed by an ultrasound assessment.	PP	61	6/2014-6/2019
60	Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.	B	61	6/2014-6/2019
LVI	Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.	CBR	61	6/2014-6/2019
JJJ	External cephalic version should be performed by a health professional with appropriate expertise.	PP	61	6/2014-6/2019
Prolonged pregnancy (under review)				
61	Consider offering membrane sweeping to women scheduled for formal induction of labour for prolonged pregnancy.	C	62	6/2014-6/2019
KKK	It may be advisable to avoid membrane sweeping before 40 weeks or in women at greater risk of Group B streptococcus.	PP	62	6/2014-6/2019
LLL	Women should be advised to be vigilant of a change (reduction) in fetal movements between 41 and 42 weeks.	PP	62	6/2014-6/2019
MMM	From 41 weeks, it may be reasonable to offer twice weekly cardiotocography and ultrasound to assess amniotic fluid index for surveillance of fetal well-being.	PP	62	6/2014-6/2019

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Introduction

These Guidelines provide evidence-based recommendations to support high quality, safe pregnancy care and contribute to improved outcomes for all mothers and babies. The lengthy process of reviewing the evidence on the numerous aspects of antenatal care necessitated completion of the project in three stages, all of which are included in this document.

Australian *Clinical Practice Guidelines on Antenatal Care* were released in two stages in 2012 (Module I) (Australian Health Ministers' Advisory Council 2012) and 2014 (Module II) (Australian Health Ministers' Advisory Council 2014). The Modules were developed in collaboration with State and Territory governments and sponsored by the Maternity Services Inter-Jurisdictional Committee (MSIJC), a subcommittee of the Community Care Population Health Principal Committee (CCPHPC) of the Australian Health Ministers' Advisory Council (AHMAC). In 2015-16, the MSIJC received funds through AHMAC to review certain topics in the Guidelines. The Australian Government Department of Health managed the review of the Guidelines on behalf of MSIJC and took responsibility for the project following the conclusion of MSIJC on 30 June 2016.

The development of this document has followed the key principles and processes outlined in *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines* (NHMRC 2011). This involved convening a multidisciplinary committee, the membership of which included a range of health professionals with expertise in providing, developing and researching antenatal care, a consumer representative with experience of antenatal care and a methodology expert. Input was also sought from a Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and a Working Group for Migrant and Refugee Women's Antenatal Care. The content of the Guidelines was developed by these groups and was not influenced by the funding body.

More detail on the guideline development process is included in the Administrative Report, published separately.

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Application of the Guidelines

Objective of the Guidelines

The Guidelines aim to improve the health and experience of antenatal care of pregnant women and their babies by promoting consistency of care. They provide a summary of the current evidence on aspects of care. It is expected that implementation of these Guidelines will improve maternal and fetal outcomes in the short and longer terms.

Scope

The Guidelines cover the antenatal care of healthy pregnant women (ie those who do not have identified pre-existing conditions or are at higher risk of complications such as in multiple pregnancy). They are intended for use in all settings where antenatal care is provided, including primary care, obstetric and midwifery practice and public and private hospitals.

The Guidelines do *not* include:

- information on the additional care that some women will require (eg while they discuss tests to identify clinical signs of pre-eclampsia, they do not give information about its management); resources providing guidance in these areas are listed where relevant
- discussion of specific topics where a practice is established (eg testing of blood group and rhesus D status) or where the topic was not considered a priority for inclusion in these Guidelines and advice is given by other organisations (eg vaginal discharge, backache).

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Intended audience

The Guidelines are intended for all health professionals who contribute to antenatal care, including midwives, general practitioners (GPs), obstetricians, maternal and child health nurses,[7] Aboriginal and Torres Strait Islander Health Practitioners; Aboriginal and Torres Strait Islander Health Workers, multicultural health workers, practice nurses, allied health professionals and childbirth and parenting educators.
The way in which different professionals use these Guidelines will vary depending on their knowledge, skills and role, as well as the setting in which care is provided.

These Guidelines will be of interest and relevance to pregnant women in Australia. In addition, it is expected that policy makers will be able to draw on the Guidelines in the development of policy and health services.

How to use the Guidelines

Part A of the Guidelines outlines the basics of providing woman-centred care and includes information on optimising antenatal care for specific groups of women: Aboriginal and Torres Strait Islander women, migrant and refugee women and women with serious mental health disorders, adolescent women and women in rural and remote settings.

Parts B to J of the Guidelines discuss lifestyle considerations, clinical assessments, social and emotional screening, maternal health testing, fetal chromosomal anomalies, common conditions during pregnancy and clinical assessments in late pregnancy. Within these parts, each chapter provides background information about the topic, discusses the available evidence and highlights points to include when discussing the topic with women. A practice summary is included for each topic. These provide information on when during pregnancy a topic is relevant and who may be involved in providing care and/or information.

The appendices include details on the membership of the EACs and working groups, terms of reference and topics under review. Separate documents outline the process of developing the guidelines (administrative report), linking evidence to recommendations (including specific research questions, search strategies and findings) and the economic analyses conducted to inform the Guidelines.

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Dissemination and review

A web-based approach has been taken to dissemination of the Guidelines. They are available in portable document format (PDF) from the Australian Government Department of Health website and accessible to health professionals and the broader community. The Guidelines are also listed on the *NHMRC portal* and accessible by searching the portal.

Due to the number of topics considered in the combined document, the EAC has prioritised topics for future reviews. Additional topics have also been identified for future consideration. It is anticipated that the online version of the Guidelines will be updated as revised or new chapters are developed and that most topics will be reviewed over the next 5 years.

References

Australian Health Ministers' Advisory Council (2012) *Clinical Practice Guidelines: Antenatal care — Module I*. Canberra: Australian Government Department of Health.

Australian Health Ministers' Advisory Council (2014) *Clinical Practice Guidelines: Antenatal care — Module II*. Canberra: Australian Government Department of Health.

NHMRC (2011) *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines*. Melbourne: National Health and Medical Research Council.

7 Also referred to as child and family health nurses in some jurisdictions.

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PART A: OPTIMISING PREGNANCY CARE



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I Principles of care

In 1998, the World Health Organization (WHO) proposed a set of principles of perinatal care (WHO 1998) that endorse the protection, promotion and support necessary for effective antenatal and postnatal care (Chalmers et al 2001). These principles are embedded in the approach to care outlined in these Guidelines and are included in Table A1.

Table A1: WHO principles of perinatal care

Care for women with a normal pregnancy and birth should promote normal reproductive processes and women's inherent capabilities
Pregnancy and birth should be viewed as a natural process in life and essential care should be provided to women with the minimum set of interventions necessary.
Care should be based on the use of appropriate technology
Sophisticated or complex technology should not be applied when simpler procedures may suffice or be superior.
Care should be evidence-based
Care should be supported by the best available research, and by randomised controlled trials where possible and appropriate.
Care should be local
Care should be available as close to the woman's home as possible and based on an efficient system of referral from primary care to tertiary levels of care.
Care should be multidisciplinary
Effective care may involve contributions from a wide range of health professionals, including midwives, general practitioners, obstetricians, neonatologists, nurses, childbirth and parenthood educators.
Care should be holistic
Care should include consideration of the intellectual, emotional, social and cultural needs of women, their babies and families, and not only their physical care.
Care should be woman-centred
The focus of care should be meeting the needs of the woman and her baby. Each woman should negotiate the way that her partner and significant family or friends are involved. Care should be tailored to any special needs a woman may have.
Care should be culturally appropriate and culturally safe
Care should consider and allow for cultural variations in meeting these expectations.
Care should provide women with information and support so they can make decisions
Women should be given evidence-based information that enables them to make decisions about care. This should be provided in a format that the woman finds acceptable and can understand.
Care should respect the privacy, dignity and confidentiality of women
All women have the right to be treated with respect and dignity, have their privacy respected, and be assured that all their health information is confidential.

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2 Providing woman-centred care

Woman-centred care focuses on the woman's unique needs, expectations and aspirations; recognises her right to self-determination in terms of choice, control and continuity of care; and addresses her social, emotional, physical, psychological, spiritual and cultural needs and expectations (NMBA 2006). It also acknowledges that a woman and her unborn baby do not exist independently of the woman's social and emotional environment, and incorporates this understanding in assessment and provision of health care.

2.1 Understanding the woman's context

"An individualised approach to care should be offered at all times rather than routine practice. Care provision needs to be flexible, friendly and non-threatening, making it accessible to all women, including young women." (Chalmers et al 2001)

Every woman has a right to antenatal care that considers her individual social and emotional situation. While many Australian women experience high levels of economic prosperity, educational attainment and good health, many live in poverty, subsist on inadequate pensions, are restricted by under-employment or low-income occupations, experience racism and violence and have poor health outcomes (AWHN 2008). Gender inequalities persist, with women economically less secure, maintaining the primary carer role, and subject to violence (including physical and sexual assault, as well as emotional, psychological and financial abuse) (AWHN 2008).

The experience of pregnancy, especially in the early stages, differs for each woman. The stability of a woman's relationships and social environment will influence her experience. In addition, if the pregnancy is unplanned or results from sexual assault, the woman may experience uncertainty about whether to proceed with the pregnancy.

Although addressing all of these factors is beyond the scope of antenatal care, taking them into account will lead to a fuller understanding of an individual woman's situation and the environment for the developing baby. This provides the opportunity for early intervention to reduce any risk to the woman and her baby. Referral to other services (eg housing, social services) should also be considered, in partnership with the woman.

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2.2 Cultural safety in antenatal care

"Cultural safety puts the woman at the centre of care by identifying her needs and establishing a partnership built on trust." (Phiri et al 2010)

Cultural safety is based on the basic human rights of respect, dignity, empowerment, safety and autonomy (Phiri et al 2010). The concept of 'cultural safety' comes from an approach that incorporates culture within a wider structural framework, focusing on social position to explain health status rather than on the 'values, beliefs and traditions' of a particular group (Williamson & Harrison 2010). This approach considers the dynamic nature of culture and the diversity within groups, avoids stereotyping and identifies the needs of the individual receiving care.

Cultural safety is defined by the individual attending health care. It builds on the concepts of cultural awareness (appreciating cultural, social and historical differences and reflecting on one's own culture, biases and tendency to stereotype) and cultural sensitivity (acknowledging differences and exploring self attitudes) (Thomson 2005). For example, if a woman prefers to see a female health professional, identifying this need is culturally aware, planning the woman's care around that need is culturally sensitive and ensuring that the

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woman is not seen by a male health professional is culturally safe (Phiri et al 2010). Embedding this into routine care may contribute to a culturally responsive service (Reibel & Walker 2010).

Strategies to ensure culturally safe care include optimising communication (eg through the use of interpreters), building sound relationships, acknowledging women's cultural preferences (Phiri et al 2010) and reflecting on and analysing how power relationships and history have affected the health of individuals (Kruske et al 2006). It is also important to acknowledge that the interaction between the 'culture' of the health professional and the culture of the woman (regardless of ethnicity) may result in a power imbalance (Kruske et al 2006). Women from vulnerable and marginalised groups may feel particularly disempowered in healthcare settings. This can be reduced through (Kruske et al 2010):

- mindfulness about symbols of power (eg uniform, stethoscope) and the way the room is structured (eg avoiding sitting behind a desk)
- *positioning*: sitting alongside, not opposite, quiet or shy women and families
- *showing genuine respect for the woman*: the woman will be more likely to feel trust, tell more of her experience and accept advice.

2.3 Providing information and support so that women can make decisions

"Women should be provided with evidence-based information and encouraged to participate in decisions about care." (Chalmers et al 2001)

In any health interaction, a woman has the right to (adapted from Charter of Health Consumer Rights [CHF 2004]):

- determine what treatment she accepts or chooses not to accept
- be given easily understandable explanations in her first language of the details of her specific health concerns, any proposed treatments or procedures and the results of any tests performed
- have access to all health information about herself and her baby
- have her privacy respected, be treated with respect and dignity and know that all her own health information is confidential.

Health professionals and women need to communicate and collaborate in a team approach (Kryzanauskas 2005; NZ MOH 2008). The woman's input (and her family's when she chooses) is an important part of this process (NHMRC 2010). Consistency of information, especially if this is provided by different professionals, is very important (Jones et al 1999; Price et al 2005).

Making a choice or consenting should be an ongoing process of discussion between a woman and the health professionals involved in her care. Factors that may assist women in decision-making include:

- determining how much prior knowledge the woman has (Kruske et al 2010)
- asking open-ended questions and listening to the answers
- attending to verbal and non-verbal cues
- clarifying the information provided by the woman
- clarifying the woman's understanding of the information provided to her
- providing easy to understand verbal explanation and written or audiovisual information in the woman's preferred language (where available)
- where appropriate, using accredited interpreters to ensure effective communication.

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Women have the right to decline care or advice if they choose, or to withdraw consent at any time and have these choices respected (UNESCO 2005). It is important that the level of care provided does not alter because of this choice (FPA Health & Read 2006; Faunce 2008; NHMRC 2010).

2.3.1 Documenting discussions and decisions

Documenting discussions and decisions should include clear and consistent records of (NHMRC 2010):

- information provided to the woman and indications that the messages have been understood
- informed consent, responsibility and accountability for decisions
- the woman's understanding of risk and her responsibility for her own choices and decisions about care, especially if these decisions are in conflict with professional advice (in such circumstances it must be clearly documented that the woman is aware of and has accepted a certain level of risk).[8]

Shared and reciprocal documentation, including some form of woman-held record, ensures that all members of the collaboration are aware of essential information throughout maternity care. Several jurisdictions in Australia regularly use woman-held records, which have been found to be an excellent way to improve communication (NHMRC 2010). A woman-held record means the woman has a better chance of controlling her health information, encouraging respectful language and, as a result, enabling her to feel more in control during her maternity care (NHMRC 2010).

Electronic (eg web-based or e-health) or triplicate records allow sharing of accurate documentation and reduce duplication of effort, enabling more streamlined care for women (NHMRC 2010).

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2.4 Involving the woman's family

> "Women and their families should be assisted to prepare for pregnancy, birth and parenthood. Fathers have needs of their own as individuals and not simply as companions or supports for their partner." (Chalmers et al 2001)

Woman-centred care encompasses the needs of the baby, the woman's family, significant others and community, as identified and negotiated by the woman herself (NMBA 2006). Each woman should be asked about whom she would like to be involved in her care; some women may only want their partner involved while others may wish to involve a wider family or social network. A minority of women may have limited control over the family members who are involved in their antenatal care or the social environment in which the baby develops (eg exposure to passive smoking or domestic violence).

Involving fathers/partners enables them to participate in decision-making and be informed about the care pathway and environmental factors that may influence the health of the baby during pregnancy (eg maternal passive smoking) and after the birth (eg infectious diseases such as pertussis). Education and information about pregnancy and childbirth should be provided using the principles outlined in Chapter 1. Assessment and intervention for fathers/partners may also be a consideration (eg mental health, smoking cessation, immunisation).

Involvement of fathers/partners in antenatal care may also enable early intervention (eg family support) for families requiring additional assistance (COAG 2009).

8 Several Australian States and Territories have schedules in their health legislation that outline health professionals' obligations and protections if treatment is refused. These include refusal of treatment certificates, which may help in recording decisions and avoiding confusion if care is transferred.

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3 Pregnancy care for Aboriginal and Torres Strait Islander women

While the diversity of circumstances and experiences is acknowledged, this chapter highlights general considerations in providing antenatal care for Aboriginal and Torres Strait Islander women.[9]

While many Aboriginal and Torres Strait Islander women experience healthy pregnancies, poor health and social complexity contribute to worse overall perinatal outcomes than those experienced by non-Indigenous women.

3.1 Background to culturally safe antenatal care

> "Cultural respect is achieved when the health system is a safe environment for Aboriginal and Torres Strait Islander peoples and where cultural differences are respected." (AHMAC 2004)

History and politics have shaped and continue to shape the lives and health of Aboriginal and Torres Strait Islander peoples. Social complexity and family disruption are continuing effects of government policies that have contributed to Aboriginal and Torres Strait Islander peoples having by far the worst health status of any identifiable group in Australia and the poorest access to services (Couzos & Murray 2008). This is reflected in the overall health of Aboriginal and Torres Strait Islander women and their babies.

In 2014, among registered births in Australia, 5.3% of babies had one or two parents who identified as Aboriginal and Torres Strait Islander peoples and 4.2% had mothers who identified as Aboriginal and Torres Strait Islander peoples (AIHW 2016b). While this chapter focuses on the care of Aboriginal and Torres Strait Islander women during pregnancy, it is important to remember that pregnancies in which the father of the baby is of Aboriginal or Torres Strait Islander background may have similar issues in terms of perinatal outcomes (Clarke & Boyle 2014).

There is a disproportionate burden of adverse perinatal outcomes for Aboriginal and Torres Strait Islander mothers and their babies compared to non-Indigenous mothers and babies, including increased maternal mortality (13.8 vs 6.6 deaths per 1,00,000 women who gave birth in 2008-2012) (Humphrey et al 2015), preterm birth (140 vs 80 per 1,000 births), low birth weight (118 vs 62 per 1,000 births) and perinatal deaths (14 vs 9 per 1,000 births) (AIHW 2016a). Aboriginal and Torres Strait Islander women are also less likely to attend an antenatal visit in the first trimester compared to non-Indigenous women (53 vs 60%) or to attend five or more antenatal visits (86% vs 95%)(AIHW 2016a).

All health professionals need to be aware of these disparities and have a role in optimising the care of Aboriginal and Torres Strait Islander pregnant women to aid in 'closing the gap' in health outcomes between Aboriginal and Torres Strait Islander and other peoples (Clarke & Boyle 2014).

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9 These Guidelines use 'Aboriginal and Torres Strait Islander women' as an umbrella term while acknowledging the great diversity within this group and that "Aboriginal' or 'Torres Strait Islander' may be more appropriate in some contexts. Where literature is cited, the term used in the literature is used.

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3.2 Providing woman-centred care

"Have a good chat with them, gain their trust, make 'em feel secure ... words, the way you talk to them means a lot ... especially young ones, that's what they're looking for." (Older Aboriginal woman from remote community, Central Australia as quoted in Wilson 2009)

This section discusses issues specific to providing appropriate antenatal care for Aboriginal and Torres Strait Islander women. The cultural beliefs, practices and needs of Aboriginal and Torres Strait Islander women vary, both between and within culturally defined groups, and respect for the views and beliefs of individual women and of local communities is needed (Hunt 2008).

3.2.1 Understanding the woman's context

Many Aboriginal and Torres Strait Islander women experience healthy pregnancies. The women having babies are generally younger and, on average, have more children during their reproductive life than non-Indigenous women (Clarke & Boyle 2014). Aboriginal and Torres Strait Islander culture takes a more holistic view of wellbeing and has many strengths that provide a positive influence on well-being and resilience for Aboriginal and Torres Strait Islander women and their families. These include a supportive extended family network and kinship, connection to country, and active cultural practices in language, art and music.

For women who experience adverse events in their pregnancies, the reasons are diverse and occur throughout the life course (Clarke & Boyle 2014):

- *socioeconomic factors*: lower income, higher unemployment, lower educational levels, inadequate infrastructure (eg affordable housing, water supply), increased rates of incarceration
- *health factors*: diabetes mellitus, cardiovascular disease (including rheumatic heart disease), respiratory disease, kidney disease, communicable infections, injuries, poor mental health, overweight and underweight
- *lifestyle factors*: lack of physical activity, poor nutrition, harmful levels of alcohol intake, smoking, higher psychosocial stressors (deaths in families, violence, serious illness, financial pressures, contact with the justice system).

In addition, "racism constitutes a 'double burden' for Aboriginal and Torres Strait Islander Australians, encumbering their health as well as access to effective and timely health care services" (Kildea et al 2016).

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3.2.2 Cultural safety

Although maternity services in Australia are designed to offer women the best care, they largely reflect western medical values and perceptions of health, risk and safety. Achieving culturally safe maternity services is critical to improving health for Aboriginal and Torres Strait Islander mothers and babies (Kildea et al 2016) and this is underpinned by cultural awareness among health professionals.

Cultural safety acknowledges that health consumers feel safest when health professionals have considered power relations, cultural differences and individuals' rights (NT Health 2016). Cultural safety is defined by the individual's experience of health care they receive, ability to access services and to raise concerns. Part of this process requires health professionals to examine their own realities, beliefs and attitudes. Cultural safety incorporates cultural awareness which is defined as 'an understanding of how a person's culture may inform their values, behaviours, beliefs and basic assumptions, recognising that we are all shaped by our cultural background, which influences how we interpret the world around us, perceive ourselves and relate to other people (RACGP 2011).

The provision of culturally safe care requires a willingness to gain the knowledge, understanding and skills to communicate sensitively and effectively with Aboriginal and Torres Strait Islander people and to acknowledge and respect cultural differences. Cultural safety is also relevant to Aboriginal and Torres Strait Islander health professionals.

An emerging area in developing a culturally responsive workforce is trauma-informed care, in which health professionals understand the ongoing impact of intergenerational trauma resulting from historical injustices, colonisation, removal from and dispossession of land, and continuing racism (Kildea et al 2016). This is particularly important given that Aboriginal and Torres Strait Islander children are over-represented in out-of-home care compared with non-Indigenous children (9.5 times more likely), with some women encountering the child protection system during pregnancy, leading to removal of their babies soon after birth.

While further developments in cultural safety education are required (Kildea et al 2016), a recent study found that providing cultural safety training as an assessable component of practice and recognising that it is as important as the physical aspects of care for the women would improve the experiences of women and support midwives in practice (Brown et al 2016).

Cultural awareness education programs and tools for evaluating individual and organisational cultural responsiveness have been developed (see Section 3.7).

Practice point	
A	Adopt a respectful, positive and supportive approach in providing antenatal care to Aboriginal and Torres Strait Islander women, working in partnership with women, Aboriginal and Torres Strait Islander health professionals and communities. This should be informed by cultural safety training for health professionals.
	Approved by NHMRC in October 2017; expires October 2022

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3.2.3 Improving women's experience of antenatal care

Taking an individualised approach

Factors that may improve a woman's experience of antenatal care include (Clarke & Boyle 2014):

- creating a comfortable and welcoming physical space
- taking time to establish rapport and trust
- providing continuity of carer
- ensuring privacy and confidentiality
- involving her partner/the father of the baby, where this is agreed by the woman
- having some knowledge about the woman's community
- endeavouring to have flexible scheduling of appointments.

Ideally a nominated person within a practice should be able to ensure the woman is receiving appropriate care from other healthcare team members and to assist to coordinate services if required.

Providing information and support so that women can make decisions

There is indirect evidence that, in some settings, Aboriginal and Torres Strait Islander women have fewer opportunities to make decisions about their care than non-Indigenous women, or fewer than is desirable (Hunt 2003). This may be improved through providing information to women and their partners in a culturally appropriate way and providing strategies to help them achieve positive change (Clarke & Boyle 2014) and by working in partnership with Aboriginal health professionals, women and communities.

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Aboriginal community worker involvement

Where available, assistance from Aboriginal and/or Torres Strait Islander health workers, community workers or Aboriginal and/or Torres Strait Islander liaison officers should be sought as they can facilitate understanding between the woman and her healthcare provider and provide assistance for attending appointments and coordinating care (Clarke & Boyle 2014). This may be particularly important when English is not the woman's first language.

3.3 Successful models of antenatal care

"Aboriginal peoples and Torres Strait Islanders should access services and health care not just at a level enjoyed by other Australians (principle of equality) but at one that reflects their much greater level of health care need (principle of equity)." (Couzos & Murray 2008)

A range of programs have been implemented around the country to improve the delivery of antenatal services to Aboriginal and Torres Strait Islander women. Evaluations have shown their success in improving uptake of care earlier in the pregnancies, for the duration of the pregnancy and often postnatally, which allows other opportunistic healthcare interventions, such as family planning, cervical screening and improving breastfeeding rates (Clarke & Boyle 2014). This shows that if services cater for their needs, women will utilise them.

Evaluated programs include:

- *Midwifery group practice*: A midwifery group practice (staffed by midwives, Aboriginal Health Workers, Aboriginal midwifery students and an Aboriginal 'senior woman') was introduced in a regional centre in the Northern Territory to provide continuity of care for women from remote communities transferred to the centre for antenatal care and birth (Barclay et al 2014). There were improvements in antenatal care (fewer women had no antenatal care and more had more than five visits), antenatal screening and smoking cessation advice and a reduction in fetal distress in labour. The experiences of women, midwives and others during the establishment and the first year of the midwifery group practice were also reported positively and women's engagement with the health services through their midwives improved. Cost-effective improvements were made to the acceptability, quality and outcomes of maternity care.
- *Midwifery continuity of care*: A meta-synthesis of qualitative studies undertaken in Australia and Canada found that overall the experience of midwifery services was valuable for Indigenous women, with improved cultural safety, experiences and outcomes in relation to pregnancy and birth (Corcoran et al 2017). The most positive experiences for women were with services that provided continuity of care, had strong community links and were controlled by Indigenous communities (Corcoran et al 2017). Continuity of midwifery care can be effectively provided to remote dwelling Aboriginal women and appears to improve outcomes for women and their infants (Lack et al 2016). However, there are barriers preventing the provision of intrapartum midwifery care in remote areas (Corcoran et al 2017). A study among midwives in a large tertiary hospital in South Australia found that communication and building support with Aboriginal health workers and families were important to midwives working with Aboriginal women and identified the following barriers to provision of care (Brown et al 2016):
  - time constraints in a busy hospital
  - lack of flexibility in the hospital protocols and polices
  - the system whereby women were required to relocate to birth
  - lack of continuity of care
  - lack of support 24 h a day from the Aboriginal workforce
  - the speed at which women transitioned through the service.

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The midwives had some difficulty differentiating the women's physical needs from their cultural needs and the concept of cultural safety was not well understood. The midwives also determined that women who were living in metropolitan areas had lesser cultural needs than the women who were living in rural and remote areas. Stereotyping and racism was also identified within the study.

- *Aboriginal Maternity Group Practice Program (AMGPP)*: The AMGPP employed Aboriginal grandmothers, Aboriginal Health Officers and midwives working in partnership with existing antenatal services to provide care for pregnant Aboriginal women residing in south metropolitan Perth (Bertilone & McEvoy 2015). Babies born to women in the program were significantly less likely to be born preterm (9.1% vs 15.9% in historical controls [aOR 0.56; 95%CI 0.35 to 0.92]; vs 15.3% in contemporary controls [aOR 0.75; 95%CI 0.58 to 0.95]); to require resuscitation at birth (17.8% vs 24.4% in historical controls [aOR 0.68; 95%CI 0.47 to 0.98]; vs 31.2% in contemporary controls [aOR 0.71; 95%CI 0.60 to 0.85]) or to have a hospital length of stay greater than 5 days (4.0% vs 11.3% in historical controls [aOR 0.34; 95%CI 0.18 to 0.64]; vs 11.6% in contemporary controls [aOR 0.56; 95%CI 0.41 to 0.77]) (Bertilone & McEvoy 2015). Analysis of qualitative data from surveys and interviews found that the model had a positive impact on the level of culturally appropriate care provided by other health service staff, particularly in hospitals. Two-way learning was a feature. Providing transport, team home visits and employing Aboriginal staff improved access to care. Grandmothers successfully brought young pregnant women into the program through their community networks, and were able to positively influence healthy lifestyle behaviours for women (Bertilone et al 2016).
- *Aboriginal Family Birthing Program (AFBP)*: The AFBP provides culturally competent antenatal, intrapartum and early postnatal care for Aboriginal families in some parts of South Australia, with women cared for by an Aboriginal Maternal and Infant Care worker and a midwife in partnership. The Aboriginal Maternal and Infant Care worker has a clinical role. Compared with women attending mainstream public antenatal care, women attending metropolitan and regional AFBP services were more likely to report positive experiences of pregnancy care (aOR 3.4, 95%CI 1.6 to 7.0 and aOR 2.4, 95%CI 1.4 to 4.3, respectively). Women attending Aboriginal Health Services were also more likely to report positive experiences of care (aOR 3.5, 95%CI 1.3 to 9.4) (Brown et al 2015). Even with greater social disadvantage and higher clinical complexity, pregnancy outcomes were similar for AFBP and Aboriginal women attending other services (Middleton et al 2017).
- *Aboriginal Maternal and Infant Health Service (AMIHS)*: the AMIHS was established in New South Wales to improve the health of Aboriginal women during pregnancy and decrease perinatal morbidity and mortality for Aboriginal babies (Murphy & Best 2012). The AMIHS is delivered through a continuity-of-care model, where midwives and Aboriginal Health Workers collaborate to provide a high-quality maternity service that is culturally sensitive, women-centred, based on primary health-care principles and provided in partnership with Aboriginal people.

  An evaluation of the AMIHS found:

  - the proportion of women who attended their first antenatal visit before 20 weeks increased (65 vs 78% in 2004, OR 1.2; 95%CI 1.01 to 1.4; p=0.0.03)
  - the rate of low birthweight babies decreased (13 vs 12%, not statistically significant)
  - the proportion of preterm births decreased (20 vs 11%; OR 0.5 95%CI 0.4–0.8–1.4; p=0.001)
  - perinatal mortality decreased (from 20.4 per 1,000 births in 1996–2000 to 14.4 per 1,000 births in 2001–2003; not statistically significant owing to small numbers)
  - breastfeeding rates improved (from 67% initiating breastfeeding and 59% still breastfeeding at 6 weeks in 2003, to 70% initiating breastfeeding and 62% still breastfeeding at 6 weeks in 2004).

While these programs have been identified as beneficial, not all Aboriginal and Torres Strait Islander women have access to these types of programs and many still rely on mainstream services such as GPs and public hospital clinics (Clarke & Boyle 2014). Hence, it is important that mainstream services embed cultural competence into continuous quality improvement. Participation in a continuous quality improvement initiative

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by primary health care centres in Aboriginal and Torres Strait Islander communities is associated with greater provision of pregnancy care regarding lifestyle-related risk factors (Gibson-Helm et al 2016b). For example, screening for cigarette smoking increased from 73% at baseline to 95% (OR 11, 95%CI 4.3 to 29) after four cycles (Gibson-Helm et al 2016b).

3.4 Birthing on country

There is a strong relationship between distance to maternity services and poorer clinical and psychosocial outcomes (Kildea et al 2016). For some Aboriginal and Torres Strait Islander women, the social risks of not birthing on country include cultural risk (eg the belief that birthing away from country may be the cause of ill health as it breaks the link between strong culture, strong health and the land) and emotional risks (having to spend weeks removed from family and other children while awaiting the birth) (Kildea et al 2016). These factors cause distress to women and families and increase clinical and medical risks (eg women not attending antenatal care, or presenting late in labour, to avoid being flown out of their community for birth).

In a study of birthing services in rural and remote areas, very remote communities were least likely to have a local birthing facility (Rolfe et al 2017). In addition, services were influenced by jurisdictional policy rather than identified need.

3.5 Adolescent mothers

Adolescent motherhood occurs more often within communities where poverty, Aboriginal and Torres Strait Islander status and rural/remote location intersect (Marino et al 2016). Adolescent pregnancy has been typically linked to a range of adverse outcomes for mother and child. In Australia, the proportion of births among adolescent women is higher among Aboriginal and Torres Strait Islander women than among non-Indigenous women (17 vs 2%) (AIHW 2016a) and the risk of poorer psychosocial and clinical outcomes is greater if these women are not well supported during pregnancy and beyond (Reibel et al 2016). However, a study in the NT suggests that problems usually associated with Aboriginal adolescent births (such as low birth weight) are not due to maternal age but are related to the underlying poor health, socioeconomic disadvantage and a system that is challenged to support these young women, both culturally and medically (Barclay et al 2014).

Drawing on existing literature and consultations with young Aboriginal women and health professionals supporting pregnant Aboriginal women, a West Australian study found that engagement with the health system is encouraged and health outcomes for young mothers and their babies improved through destigmatising of young parenthood and providing continuity of caregiver in culturally safe services with culturally responsive health professionals (Reibel et al 2016). Another study noted the critical role of general practitioners in identifying at-risk adolescent women, preventing unintended adolescent pregnancy, clinical care of pregnant adolescents and promoting the health and wellbeing of adolescent mothers and their children (Marino et al 2016).

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3.6 Improving outcomes

System-wide strategies to strengthen health centre and health system attributes that support best-practice antenatal health care for Aboriginal and Torres Strait Islander women are needed. Some strategies can be implemented within health centres while others need partnerships with communities, external services and policy makers (Gibson-Helm et al 2016a).

Approaches to improving the health outcomes for Aboriginal and Torres Strait Islander women and their babies in pregnancy include the following:

- systems-based approaches to address socioeconomic disadvantage, education and health literacy (Boyle & Eades 2016)

- health services approaches to provide trusted, welcoming and culturally appropriate health services in both community-controlled and government sectors, facilitate better communication between primary and hospital-based services and utilise initiatives such as continuous quality improvement practices that lead to improved services, particularly where staff turnover is high (Boyle & Eades 2016)
- families-based approaches, to address social and lifestyle factors (eg smoking prevention and quitting (Boyle & Eades 2016), drinking alcohol, social and emotional wellbeing and nutrition) (Gibson-Helm et al 2016a)
- clinical guidelines to address specific needs of Aboriginal and Torres Strait Islander women in pregnancy (eg screening for infection in young women and women from areas where risk is high) (Boyle & Eades 2016)
- supports for the particular needs of rural and remote women in accessing care (eg access to ultrasound services) (Boyle & Eades 2016)
- strengthened systems to ensure workforce support, retention and recruitment; patient-centred care; and community capacity, engagement and mobilisation (Gibson-Helm et al 2016a).

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HealthInfoNet

Closing the Gap

Birthing Business in the Bush

Maternity care in the bush

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4 Pregnancy care for migrant and refugee women

While many migrant and refugee women experience healthy pregnancies, issues associated with resettlement can contribute to poorer perinatal outcomes than those experienced by women in general. While the diversity of circumstances and experiences is acknowledged, this chapter highlights general considerations in improving the experience of antenatal care for migrant and refugee women.

The term 'migrant and refugee' is used in these Guidelines to refer both to women who are voluntary migrants and women who come to Australia as refugees, humanitarian entrants or asylum seekers. Migrants and refugees are also often referred to as people of culturally and linguistically diverse background, people from non-English-speaking backgrounds or people who speak a language other than English.

4.1 Background to culturally safe antenatal care

> "Caring for individuals from diverse backgrounds is a daily reality for nurses and midwives, who are expected to provide care which is both clinically safe and culturally sensitive." (Williamson & Harrison 2010)

Although a third of women who gave birth in Australia in 2014 were not born in Australia (AIHW 2016), there is little specific information on the pregnancy outcomes of migrant and refugee women. National data suggest similar rates of perinatal death among babies of women born in Australia and those born overseas (Li et al 2012). However, retrospective studies suggest that outcomes vary with country of birth (Drysdale et al 2012) and use of interpreters, but not refugee status (Thomas et al 2010).

There is significant heterogeneity among migrant and refugee women and their experience of antenatal care. Women bring with them the knowledge and practices from their home countries. Expectations of early antenatal attendance vary between countries. For example, more than half (57%) of women giving birth in New South Wales in 2004 who were originally from a developing country first attended for antenatal care later than 12 weeks in the pregnancy (Trinh & Rubin 2006). In New South Wales in 2006, 64.9% of mothers born in Melanesia, Micronesia and Polynesia and 72.8% of mothers born in the Middle East and Africa commenced antenatal care before 20 weeks gestation, compared with 89.6% of mothers born in English-speaking countries (CER 2007). Expectations of the birth experience are also strongly influenced by cultural views and practices (Hoang et al 2009).

An increasing proportion of refugee and humanitarian entrants to Australia come from Africa, the Middle East and South-east Asia; about 30% are women aged 12-44 years (Correa-Velez & Ryan 2012). Refugee women are more likely than other women to have complex medical and psychosocial problems and may face additional barriers in accessing antenatal care (Correa-Velez & Ryan 2012).

4.1.1 Factors affecting uptake of antenatal care

Migrant and refugee women are diverse, and have differing issues and outcomes. As well as cultural background, women's experiences differ with migration status, educational level and prior experience of pregnancy and birth. However, there are some common issues that can affect uptake of antenatal care by migrant and refugee women. These include (McCarthy & Barnett 1996; Carolan & Cassart 2010; Phiri et al 2010; Murray et al 2011; Boerleider et al 2013):

- *migration factors*: lack of knowledge of or information about the Western healthcare system (including rights in relation to tests and treatments); arriving in the new country late in pregnancy; history of grief, loss and/or trauma in addition to migration

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- *cultural factors*: adherence to cultural and religious practices, poor language proficiency, lack of assertiveness, partner/family perception of antenatal care, perceiving pregnancy as not requiring health professional involvement, belief that antenatal care is more a burden than a benefit, belief that antenatal classes are not necessary, fear of coming into contact with government agencies
- *position in host country*: financial problems, unemployment, low or intermediate educational level, social inequality (education, economic resources and residence [rural or urban]), lack of time, lack of childcare, no medical leave from work
- *social network*: lack of usual female family and community support systems, isolated community
- *accessibility:* inappropriate timing and incompatible opening hours, transport and mobility problems, indirect discrimination, lack of suitable resources (eg female interpreters)
- *expertise*: health professional lacking knowledge of cultural practices
- *personal treatment and communication*: poor communication, perception of having been badly treated by a health professional.

Health care costs and access to health services can be an issue for some women. Women who are asylum seekers may be ineligible for either Medicare or Centrelink Health Care Cards. Women who are skilled migrants and international students may also have restricted health care access because they don't have Medicare entitlements. While overseas students are required to maintain Overseas Student Health Cover for the duration of their time in Australia, pregnancy-related services may not be covered in the first 12 months of membership.

Even when care can be accessed, women who have no previous experience with a western health care system may have limited understanding of reasons for antenatal visits, medical procedures and use of technology. They may not feel confident to ask questions or participate in discussions about their care plan or birth options. Different cultural beliefs may also influence aspects of antenatal care such as involvement of the father in pregnancy and childbirth, acceptance of tests and interventions, willingness to be cared for by a midwife rather than a doctor or a woman rather than a man, understanding of dates and times of appointments, and knowledge about medical aspects of pregnancy.

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4.1.2 Issues affecting women from specific groups

Different groups of migrant and refugee women face specific issues that may affect their experience of pregnancy and birth. Increased awareness of such issues and the differences between groups will help to promote better antenatal care of women from migrant and refugee backgrounds.

- *Women who arrive in Australia as refugees:* Prior to migration, many refugees experience poor health (including oral health, co-existing health issues and inadequate nutrition) and experience poverty, discrimination, trauma and violence in their countries of origin and in countries of displacement. These experiences cause significant psychological distress, manifesting in symptoms of anxiety, depression, post-traumatic stress, poor sleep and concentration. These symptoms can continue to affect women's lives as they face further emotional challenges in the resettlement period. Early intervention and referral to appropriate counselling services should always be offered and assistance in accessing services provided. Refugee women may fear authority figures, including health professionals, due to past experiences and may also have financial, employment and housing issues. Women in this situation will require reassurance and explanation of the care offered to them, including tests, procedures and pregnancy risks. More time may be needed, and specific strategies used (often in collaboration with other services and migrant agencies) to build necessary confidence and trust.

- *Women affected by Female Genital Mutilation/Cutting (FGM/C)*: FGM/C is the collective term used to describe the cultural practice of cutting or removal of either a part, or the whole external female genitalia. Some of these procedures are minor, while others involve significant change and have an impact during the antenatal period. Depending on the degree of FGM/C, women may require referral to services offering specialised care and support. Some women may need to be deinfibulated to enable ongoing clinical assessment and avoid complications; this is usually performed in the second trimester but the first trimester is the optimum time to discuss the procedure.
- *Women in higher risk groups:* Some migrant and refugee groups have higher rates of risk factors such as gestational diabetes, smoking in pregnancy and vitamin D deficiency. Lifestyle advice should take cultural issues into account (eg giving culturally relevant nutritional advice on managing gestational diabetes and educating both women and men about passive smoking, as it may be men rather than women who smoke). Domestic violence is high among some communities, and may be hidden within the family structure and/or the community. Screening for conditions endemic in the woman's country of origin may also be a consideration.

Health professionals are encouraged to develop an understanding of the issues facing families from the migrant and refugee groups that they regularly work with and to use this information to improve the care they provide.

4.2 Providing woman-centred care

"Establishing effective communication between a woman and her midwife [or other health professional] is essential for determining how culturally safe care can be instituted." (Carolan & Cassar 2008)

The fundamentals of providing care discussed in Chapter 2 apply to all women. This section discusses issues specific to providing appropriate antenatal care for migrant and refugee women.

4.2.1 Improving women's experience of antenatal care

Taking an individualised approach

Factors that may improve the experience of antenatal care for migrant and refugee women include:

- taking the time to establish rapport and trust with each woman
- being conscious of the need to avoid making assumptions based on a woman's culture, ethnic origin or religious beliefs
- explaining the woman's entitlement to antenatal care and options for accessing it (eg community clinic or hospital-based setting)
- considering issues that may influence attendance at appointments, such as transport, cost considerations (access to Medicare rebates, need to attend a service that offers bulk billing, cost of procedures such as ultrasounds)
- considering a woman's support network (eg support from partner, family and friends, and family dynamics)
- consulting the woman about whom she would like to involve in her care and, if necessary, advocating on her behalf so that she receives appropriate care throughout pregnancy
- respectfully exploring cultural and personal understanding and experience of pregnancy and appropriate self-care in pregnancy, and encouraging the woman to discuss anything she is worried or unsure about

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- explaining frequently used terms that the woman is likely to hear at antenatal appointments with different health professionals
- explaining confidentiality and that the woman's privacy will be respected
- checking the woman's understanding of what has been discussed.

Practice point	
B	The care needs of migrant and refugee women can be complex. The first point of contact (eg first antenatal visit) is important and care should be undertaken with an accredited health interpreter. Wherever possible, antenatal care should involve a multicultural health worker.
	Approved by NHMRC in June 2014; expires June 2019

Multicultural health workers

In many states and territories, roles such as multicultural health workers have been developed. Multicultural health workers (also known as bicultural health workers) assist people from migrant and refugee communities to access health services. For example, a multicultural health worker might support a woman to attend antenatal appointments by booking or confirming appointments, helping to fill out forms and questionnaires, assisting with transport and finding clinic locations. They may also provide services that are appropriate to women's culture and language, such as referral, group work, health education and community development. While the multicultural health worker may communicate with the woman in her preferred language, the role differs from that of an interpreter in that a wider range of services is provided, and a continuing relationship is generally formed between the health worker and the woman and her family. While there is little evidence specific to antenatal care, a systematic review of the literature on culturally appropriate interventions to manage or prevent chronic disease in migrant and refugee communities found that the use of multicultural health workers can promote greater uptake of disease prevention strategies by migrant and refugee communities and translate into greater knowledge and awareness about services (Henderson et al 2011).

Providing information and support so that women can make decisions

It may be necessary to use a variety of means to communicate effectively with women from migrant and refugee backgrounds. Information should be explained carefully and clearly, with the assistance of an accredited health interpreter.

Some words cannot be interpreted easily, and the health professional may need to explain the concept or give examples. It is important to agree on a set of terms that are mutually understood and if necessary use pictures. For example, using charts and models to demonstrate particular body parts can reduce misinterpretation. Acronyms and abbreviations should be avoided, as these can be confusing.

Written information should also be provided; this can serve as a prompt or can be shown to other health professionals who can then remind the woman or explain the information again. Literacy levels in the woman's own language should not be assumed. Video or audio resources may also be appropriate.

Interpreters

It is the responsibility of the health professional to make sure that communication is clear. Accredited health care interpreters assist by translating the discussion between the health professional and the woman, communicating with the woman in her preferred language either in person or through a telephone service. Involving an accredited interpreter, preferably with training in medical terminology, is recommended for all antenatal appointments if the health professional and the woman have difficulty communicating.

Interpreters accredited by NAATI (National Association of Accreditation for Translators and Interpreters) have been assessed as having a high level of technical competence in both English and one or more other languages and are bound by a code of ethics including strict confidentiality. However, there is a shortage of accredited

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interpreters, particularly for languages of new and emerging communities. While involvement of female interpreters is preferable in antenatal care, their availability may also be limited.

Non-accredited interpreters, including partners, family and friends, should not be used as they are less able to convey complex medical information in an accurate and non-emotive way. Their involvement may also discourage the woman from disclosing information fully, out of embarrassment or fear of breach of confidentiality. In emergency situations where the timing of decision-making is crucial, it may be necessary for non-accredited interpreters to assist with communication but it is not appropriate to involve people younger than 18 years of age in this role. Staff members who speak the relevant language may provide language assistance but should not be asked to act as interpreters. Organisational policy should be followed at all times and an accredited interpreter (in person or through a telephone service) sought as quickly as possible. Any decision to involve a non-accredited interpreter should be documented in the woman's antenatal record.

Women may not request an interpreter as they believe there is a cost involved or be unaware that such a service exists. Women may also be sensitive about their level of English proficiency and may have concerns about confidentiality. However, it is important that the onus for using an interpreter is not on the woman.

Practice point	
C	Health professionals should take the initiative in organising for an accredited health interpreter wherever necessary, and reassure the woman of the benefits if she is reluctant.
	Approved by NHMRC in June 2014; expires June 2019

The use of interpreters can be promoted by (CEH 2009):

- having translated information in community languages in the reception area, stating that accredited interpreters are available and free of charge
- advising individual women verbally that interpreters are available and free of charge
- including information about the code of ethics of accredited interpreters regarding confidentiality, accuracy and the procedure for working with interpreters.

Table A2: Involving an interpreter

Suggest the use of an interpreter and, if the woman wants an interpreter, provide a female interpreter where possible
Do not use the woman's partner, friends or relatives to act as interpreters unless absolutely necessary
Ask the woman simple questions about her personal details to assess her ability to communicate in English
A telephone interpreter could be introduced at this point if communication is difficult
Ask the woman what main language she speaks at home
Check if a dialect is spoken or if the woman is of a particular ethnicity
Explain that the use of an interpreter is just as important for your understanding as for her own
Decide which type of interpreter is going to be most suitable (eg telephone or onsite)
Consider confidentiality (eg in small communities, the woman may know the interpreter)
Consider ethnicity of the interpreter (eg when the woman and interpreter come from countries where there has been political or civil unrest)

Source: Adapted from CEH (2009).

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4.3 Service delivery issues for migrant and refugee women

"Pregnant women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English, may not make full use of antenatal care services. This may be because of unfamiliarity with the health service or because they find it hard to communicate with healthcare staff." (National Collaborating Centre for Women's and Children's Health 2010)

Experiences of antenatal care among migrant and refugee women may be improved through (State Perinatal Reference Group 2008):

- social support, for example through ethnic-specific cultural liaison officers and women's groups, to maintain cultural connections with the traditions, birthing ceremonies and rituals of women's countries of origin
- individualised care, informed by cultural awareness and understanding among health professionals, including knowledge of cultural traditions and practices relevant to pregnancy and birth and associated expectations of women, especially of groups in the local community
- a cross-cultural approach to communication based on recognition of the culture of the woman and the health professional
- cultural brokerage, for example through maternity liaison officers/multicultural health workers who can help women understand and navigate the health system, provide education and resources in relation to maternity care, act as a patient advocate and liaise between women and maternity staff, or through partnerships between English-speaking health professionals and multicultural resource centres
- education, including linguistically appropriate information, parenting education workshops, education about accessing the health system, the different models of care available, and education for fathers/ partners on antenatal issues
- culturally appropriate resources, including materials available in the woman's own language, resources in spoken format for women who lack literacy in their own languages, visual resources specifically designed to support antenatal care and access to accredited interpreter services during appointments or important events.

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At a local level, individual services can assist health professionals by (National Collaborating Centre for Women's and Children's Health 2010):

- monitoring changing local needs and adjusting services accordingly
- maintaining accurate information about each woman's current address and contact details during her pregnancy
- offering flexible services in the number and length of antenatal appointments when interpreting services are used
- assisting women to book in for their first antenatal appointment, particularly in areas where they are required to telephone a central service and be allocated an appointment at a specific hospital
- ensuring continuity of care wherever possible
- disseminating information about pregnancy and antenatal services, including how to find and use services, in a variety of formats, settings and languages.

4.4 Resources

4.4.1 Consumer resources

Multicultural Health (Queensland Health): *Pregnancy and postnatal topics*

Network of Immigrant and Refugee Women Australia Inc

NSW Multicultural Health Communication Service: *Pregnancy and postnatal topics*

4.4.2 Health professional resources

Hach M (2012) *Common Threads: The Sexual and Reproductive Health Experiences of Immigrant and Refugee Women in Australia*. MCWH: Melbourne.

Family Planning Victoria *Female Genital Mutilation/Cutting resources*

Mental Health in Multicultural Australia

Victorian Transcultural Psychiatry Unit (VTPU)

4.4.3 Interpreters

- *Telephone Interpreting Service*: Free interpreting services for non-English speaking Australian citizens and permanent residents communicating with general practitioners and medical specialists in private practice and their reception staff. 131 450
- *Doctors Priority Line*: A free telephone interpreting service for general practitioners and specialists providing services that are claimable under Medicare, delivered in private practices and provided to non-English speakers who are Australian citizens or permanent residents. The Doctors Priority Line is available 24 hours a day, seven days a week.
- NSW Health Standards Procedures for Working with Health Care Interpreters PD2006_053.
- Overseas Student Health Cover

4.5 References

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5 Pregnancy care for women with severe mental illness[10]

This Chapter discusses considerations in providing antenatal care for women with low prevalence mental health conditions (bipolar disorder, schizophrenia and borderline personality disorder). Screening for high prevalence conditions (depression and anxiety) is discussed in Chapter 27. Resources to assist in management of serious mental health disorders in the antenatal period are included in Section 5.4.

5.1 Impact of severe mental illness in pregnancy

"Mental health conditions in their more severe form are often associated with impaired functioning, especially in relation to a woman's ability to care for her infant and the formation of secure infant attachment, which may in turn be associated with poorer social, cognitive, and behavioural outcomes in the child." (1st 1001 Days APPG 2015)

5.1.1 Bipolar disorder and schizophrenia

Bipolar disorder is characterised by intense and sustained mood shifts usually between episodes of depression and mania. Schizophrenia is a complex condition of brain function with wide variation in symptoms and signs, and in the course of the illness. The experiential 'core' of schizophrenia has been described as a disturbance involving the most basic functions that give the person a feeling of individuality, uniqueness and self-direction (Galletly et al 2016).

The prevalence of schizophrenia and bipolar disorder in the general population is around 1 in 100 (Mitchell et al 2013; Galletly et al 2016). People with schizophrenia or bipolar disorder (in the general population) suffer from high rates of other mental health conditions, including depression and anxiety disorders (Merikangas et al 2011; Galletly et al 2016).

Relapse of these conditions during pregnancy is common, with 22.5% of diagnosed women in one study being admitted to a psychiatric hospital during pregnancy (38.6% of women with schizophrenia and 10.7% of women with bipolar disorder) (Nguyen et al 2013).

Women with bipolar disorder or schizophrenia are more likely than women in the general pregnant population to experience pregnancy complications (pre-eclampsia, gestational diabetes) (Nguyen et al 2013) and women with bipolar disorder may also be more likely to experience gestational hypertension, antepartum haemorrhage, severe fetal growth restriction (<2nd–3rd centile) (although this may be related to smoking) and neonatal morbidity (Rusner et al 2016).

5.1.2 Borderline personality disorder

Borderline personality disorder is characterised by emotional dysregulation (poorly modulated emotional responses); efforts to overcome fear of abandonment; intense and unstable relationships; engaging in impulsive activities (eg substance use); talking about or engaging in self-harm and/or suicidal behaviours; inappropriate, intense anger or difficulty controlling anger; and transient, stress-related paranoid ideation or severe dissociative symptoms. Women who have borderline personality disorder have often experienced sexual, physical or emotional abuse or neglect in childhood. Estimated prevalence among women aged 25 years or more is 2.7% (95%CI 1.4 to 4.0) (Quirk et al 2016).

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10 The information in this Chapter is largely based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence, with permission from the Centre for Perinatal Excellence.

Women with borderline personality disorder during pregnancy have been found to be at increased risk of gestational diabetes, premature rupture of the membranes, chorioamnionitis, venous thromboembolism, caesarian section and preterm birth (Pare-Miron et al 2016). They may experience distress when touched, anticipate birth as traumatic and frequently request early delivery, comorbidity with substance abuse is common and rates of referral to child protective services high (Blankley et al 2015). Continuity of carer (the same person or small group of people) is likely to be helpful for women with this condition.

Practice point	
D	For women with borderline personality disorder who have often experienced complex trauma, trauma-informed care and specific support for health professionals in dealing with challenging behaviours is a priority.
	Approved by NHMRC in October 2017; expires October 2022

The label 'borderline personality disorder' should be used with caution as it often has negative connotations (especially for health professionals) and may be associated with substantial stigma. Conversely, it is important to identify women with such a condition, as they, their families and treating health professionals will need additional resources and support over the antenatal period and beyond.

5.2 Planning antenatal care for women with severe mental illness

"While women with pre-existing severe mental illness may already be under the care of a GP and/or psychiatrist, specific consideration must be given to planning their antenatal care due to the complexity of these conditions and the substantial challenges for primary care professionals involved in their management." (Austin et al 2017)

When planning antenatal care for women with severe mental illness, priority needs to be given to ensuring that health professionals involved in their care consider the complexity of these conditions and the challenges of living with them. Where available, involvement of specialist perinatal mental health services is advisable.

Key considerations in providing antenatal care to women with severe mental illness include:

- monitoring for early signs of relapse, particularly as medication is often ceased before or during pregnancy
- education about nutrition and ceasing smoking, substance use and alcohol intake in pregnancy
- monitoring for excessive weight gain and gestational diabetes in women taking antipsychotics, with consideration given to referral to an appropriate health professional if excessive weight gain is identified
- referral for multi-dimensional care planning early enough in the pregnancy (particularly if the pregnancy is unplanned) to build trusting relationships and develop a safety net for mother, baby and significant others.

Practice points	
E	For women with schizophrenia, bipolar disorder or borderline personality disorder, a multidisciplinary team approach to care in the antenatal period is essential, with clear communication, advance care planning, a written plan, and continuity of care across different clinical settings.
F	Where possible, health professionals providing care in the antenatal period should access training to improve their understanding of care for women with schizophrenia, bipolar disorder and borderline personality disorder.
	Approved by NHMRC in October 2017; expires October 2022

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5.3 Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

beyondblue (undated) *Perinatal Mental Health of Women from Culturally and Linguistically Diverse (CALD) Backgrounds. A Guide for Primary Care Health Professionals*. Melbourne: *beyondblue: the national depression initiative*.

5.3.1 Consumer websites

Centre of Perinatal Excellence (COPE)

beyondblue

Black Dog institute

Children of Parents with a Mental Illness (COPMI)

Mindhealthconnect

Perinatal Anxiety and Depression Australia (PANDA)

5.3.2 Mental health referral and advice

The beyondblue website includes a directory of health professionals in mental health, including psychologists, social workers and mental health nurses.

The headspace Knowledge Centre provides information about treatment interventions and models of care for young people with mental health and substance use issues.

The Black Dog Institute offers education and training programs, resources and online learning for health professionals with a focus on depression and bipolar disorder.

square (Suicide, Questions, Answers and Resources) is an integrated suicide prevention resource that is part of the National Suicide Prevention Strategy.

The GP Psych Support service provides GPs with patient management advice from psychiatrists within 24 hours. Phone: 1800 200 588; Fax: 1800 012 422.

Government funding to receive treatment from psychiatrists, psychologists and GPs, social workersis available through the Better Access initiative (Medicare items).

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Quirk SE, Berk M, Pasco JA et al (2016) The prevalence, age distribution and comorbidity of personality disorders in Australian women. *Aust N Z J Psychiatry*.

Rusner M, Berg M, Begley C (2016) Bipolar disorder in pregnancy and childbirth: a systematic review of outcomes. *BMC Pregnancy Childbirth* 16(1): 331.

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6 Other population groups with specific care needs

Within the diversity of women that make up the Australian population, some face greater disadvantage in terms of access to health services and may experience poorer perinatal outcomes (AWHN 2008). These include adolescent women and women living in rural and remote areas. This chapter discusses considerations in providing optimal antenatal care for these groups of women.

6.1 Adolescent women

> While a higher risk of poor birth outcomes such as low birth weight is seen for births to teenage women, this is likely to be related more to the social circumstances of these young women, rather than their age." (Middleton 2009)

The number of births to women aged younger than 20 years in Australia accounted for around 2% of non-Indigenous births and 17% of Aboriginal and Torres Strait Islander births (AIHW 2016a). Women younger than 20 years experience higher rates of stillbirth and neonatal deaths than Australian women in general (14.2 vs 9.6 per 1,000 births) (AIHW 2016a).

Adolescent women are likely to seek antenatal care later in pregnancy. In 2014, 47% of women aged younger than 20 attended antenatal care before 14 weeks of pregnancy, compared with 66% of women aged between 30 and 34 years (AIHW 2016b).

The high levels of social disadvantage, higher incidence of domestic violence, higher rates of smoking in pregnancy, lack of social supports and lower socioeconomic and education status of these women contribute to poorer outcomes. Young women still have their own developmental needs that should be addressed in addition to the needs related to the pregnancy. Whether the pregnancy is planned, unplanned or unwanted, and the need for reporting of sexual activity in a minor at risk, are also considerations.

6.1.1 Improving perinatal outcomes for adolescent women and their babies

In the context of growing recognition of young people's need for services that are sensitive to their unique stage of biological, cognitive and psychosocial transition into adulthood (Tylee et al 2007), the World Health Organization identified that youth-friendly services need to be equitable, accessible, acceptable, appropriate, comprehensive, effective and efficient (WHO 2002). Key features of youth-friendly care include (WHO 2002; Tylee et al 2007):

- health professionals and support staff who are non-judgemental and considerate, treat each young person with equal care and respect, are competent, motivated and well supported
- health services that have an appealing ambience, convenient working hours, offer privacy and avoid stigma, and aim for short waiting times and (when needed) swift referral.

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6.2 Women in rural and remote areas

"While it is generally accepted that women should have access to safe maternity care, consistent with their assessed level of risk, as close as possible to where they live, the options available to women differ according to where they live." (DoHA 2008)

Women living in outer regional, remote or very remote areas may have difficulties accessing appropriate antenatal health care due to distance and limited availability of services. They may be required to give birth away from their communities, which can lead to extra financial costs, lack of practical and emotional support, isolation, lack of integrated care between systems, inappropriate or culturally unsafe health care, and temporary separation from older children (Perinatal Mental Health Consortium 2008).

Rates of neonatal death are significantly higher among women living in rural areas and rates of fetal death are higher among women living in remote areas (AIHW 2005). Rural and remote families also experience higher rates of maternal death. For example, the rate of direct maternal deaths is high in rural and remote areas (8% of direct maternal deaths in locations inhabited by 3% of the population) and proportionately high in outer regional areas (Sullivan et al 2008).

6.2.1 Providing integrated care in rural and remote areas

Care pathways in rural, remote and very remote Australia are different to those in urban settings and options can be limited. This has a particular impact on women and families living in these areas, a significant proportion of whom (23% in 2014) are Aboriginal and Torres Strait Islander women (AIHW 2016a).

In rural and remote settings, care is largely provided by the local primary care health professionals: midwives, nurses, Aboriginal and Torres Strait Islander health workers, GPs, or a combination of these. It is important that these health professionals have access to specialist advice and support. Contemporary approaches including telemedicine, support lines and online services are becoming increasingly available and will be extremely valuable in rural and remote areas. Innovative models of care (eg specialist outreach services and caseload midwifery care) may also expand women's possibilities to have care as close to home as possible. It is also important for health professionals in these areas to use family and community networks where possible and explore community initiatives and existing programs to improve pathways to care for women in their region.

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6.3 References

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AWHN (2008) Women's Health: The New National Agenda: AWHN Position Paper March 2008. Melbourne: Australian Women's Health Network.

DoHA (2008) *Improving Maternity Services in Australia*. A Discussion Paper from The Australian Government. Canberra: Commonwealth of Australia.

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Perinatal Mental Health Consortium (2008) National Action Plan for Perinatal Mental Health 2008-2010 Full Report. Melbourne: *beyondblue: the national depression initiative*.

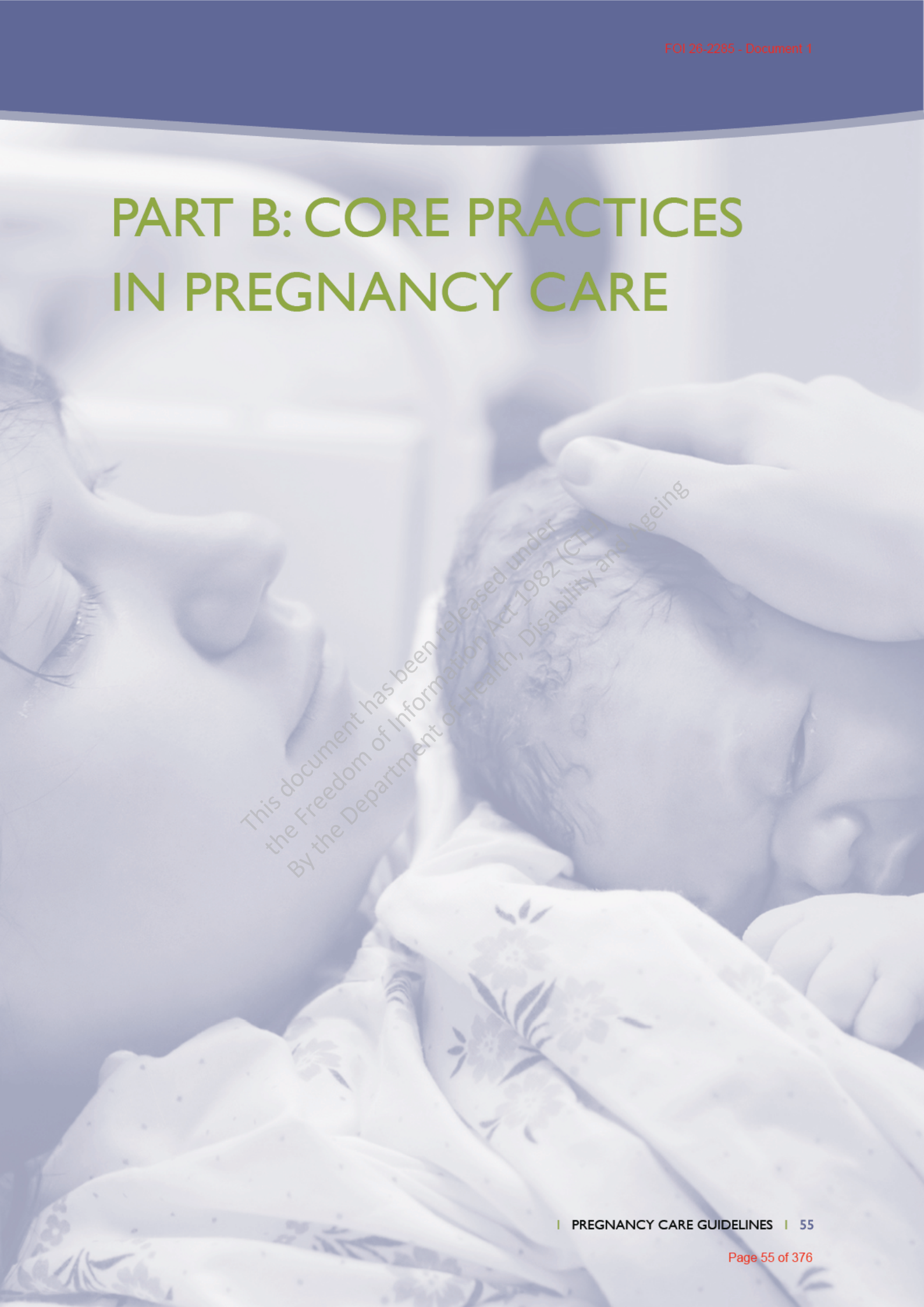
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PART B: CORE PRACTICES IN PREGNANCY CARE



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7 Providing pregnancy care services

Different women have different needs in relation to pregnancy and childbirth and require access to appropriate levels of care (AHMAC 2008). The level of care determines whether the woman is at the right place, at the right time, with the right health professional, for her clinical needs. Models of care should, as far as possible, provide a range of options at the same time as closely matching quality services to clinical needs (AHMAC 2008).

7.1 Approaches to antenatal care

> "A highly trained, qualified and effective primary maternity service workforce, working collaboratively, to use increasingly scarce respective skills efficiently, is the key to developing and sustaining quality primary maternity services." (AHMAC 2008)

Australian women are likely to receive antenatal care in primary and hospital settings and to see a range of health professionals. Existing models of care include (Donnolley 2015):

- *public hospital care*: the woman attends the hospital for all aspects of her antenatal care and receives care from hospital doctors and midwives
- *GP care*: the woman sees her GP throughout her pregnancy
- *private obstetrician or private midwife care*: the woman sees her private obstetrician or midwife throughout her pregnancy
- *private obstetrician and private GP*: the woman sees her GP regularly during the antenatal period with specific visits to an obstetrician
- *shared care*: several health professionals are involved in the care of a woman during pregnancy, often in the context of a formal arrangement; health professionals involved may include GPs, midwives, other primary care health professionals, specialist obstetricians and hospital practitioners
- *midwife care*: midwives are the primary providers of care for the woman; this may be through a team of midwives being responsible for care of a small number of women (team midwifery) or a woman receiving care from one midwife or his/her practice partner (caseload midwifery).

As well as these health professionals, others who may have an integral role in the antenatal care team where available include Aboriginal health workers, maternity liaison officers, bilingual or multicultural health workers and sonographers. Child and family health workers, psychologists, nutritionists and drug and alcohol workers may also play a role in a woman's antenatal care.

7.1.1 Collaborative practice

Findings from several comprehensive Australian maternity reviews have confirmed the need for maternity services to work within collaborative and consultative frameworks, to more closely match services to women's needs, preferences and expectations (AHMAC 2008). Midwives, obstetricians and GPs can all make valuable contributions to collaborative antenatal care (AHMAC 2008).

In maternity care, collaboration is a dynamic process of facilitating communication, trust and pathways that enable health professionals to provide safe, woman-centred care. Collaborative maternity care enables women to be active participants in their care (NHMRC 2010). It includes clearly defined roles and responsibilities for everyone involved in the woman's care, especially for the person the woman sees as her maternity care coordinator (NHMRC 2010).

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Collaboration also involves working within established clinical networks and systems to facilitate timely referral and transfer to appropriate services when required (AHMAC 2008). Collaborative networks within these systems are critical for enabling access to safe effective quality services (AHMAC 2008).

7.1.2 Continuity of care and carer

The benefits of midwifery continuity of care when providing maternity services are well documented (Sandall et al 2016; Homer 2016). Continuity of care is a common philosophy and involves shared understanding of care pathways by all professionals involved in a women's care, with the aim of reducing fragmented care and conflicting advice. Continuity of carer is when a health professional who is known by the woman provides all her care, thus enabling the development of a relationship.

Factors that may improve continuity of care include:

- *sharing of information* (eg through documenting of all assessments): this reduces the need for a woman to repeatedly "tell her story"
- *collaborative development of management plans*: this ensures that they are matched to locally available resources
- developing linkages and networks
- adapting approaches to care that are locally successful.

7.1.3 Providing antenatal care for women with complex social needs

For women with complex social needs, maternity care may be provided in partnership with other agencies including children's services, domestic violence teams, illegal substance use services, drug and alcohol teams, youth and adolescent pregnancy support services, learning disability services and mental health services (UK Dept Health 2007; cited in Homer et al 2008).

7.1.4 Antenatal groups

A model of antenatal education and support where women set the agenda (as opposed to being told what their health professionals decide they should know) can provide women with the opportunity to learn from each other and build their own support network (Catling et al 2015). Women may learn and retain knowledge more readily through hearing other women's stories or experiences.

Antenatal groups may provide a sustainable alternative to the delivery of antenatal care for health services experiencing significant demand and limited resources. Antenatal groups can also be used to meet the needs of specific groups of women, such as adolescent women, Aboriginal and Torres Strait Islander women, women from specific cultural and language backgrounds, refugee women and women experiencing social isolation. However, the WHO guidelines on antenatal care (WHO 2016) found that further research on the benefits of antenatal groups is required.

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7.2 Resources

AHMAC (2008) *Primary Maternity Services in Australia: a Framework for Implementation*. Prepared by NSW Health, on behalf of the Maternity Services Inter-jurisdictional Committee. Sydney: NSW Health.

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WHO (2016) *WHO recommendations on antenatal care for a positive pregnancy experience*. Geneva: World Health Organization.

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8 Antenatal visits

Each antenatal visit should be structured around specific content that is based on the woman's needs. Incorporating assessments and tests into visits minimises inconvenience to the woman.

While antenatal visits are well established as a means of improving perinatal outcomes, the number and timing of visits has been less studied (NICE 2008). Systematic reviews and observational studies tend to show an association between number of antenatal visits and/or gestational age at first antenatal visit and pregnancy outcomes (Dowswell et al 2015), although there are many differences in sociodemographic and risk profiles of women attending for antenatal care that may contribute to these findings (Hueston et al 2003).

8.1 Background

Almost all women (99.9%) who gave birth in Australia in 2014 had at least one antenatal visit (AIHW 2016):

- 95% had five or more visits
- 87% had seven or more visits
- 57% had ten or more visits (excludes data from Victoria).

Nationally, in 2014 (AIHW 2016):

- 43% of women attended at least one antenatal visit in the first 10 weeks of pregnancy
- 62% of women attended in the first trimester (less than 14 weeks)
- around one in eight women (12%) did not begin antenatal care until after 20 weeks' gestation.

Women living in the lowest socioeconomic status (SES) areas began antenatal care later in pregnancy; just over half (55%) of women living in the lowest SES areas attended antenatal care in the first trimester compared with 68% in the highest SES areas in 2014 (AIHW 2016).

The proportion of women attending five or more antenatal visits varied slightly by remoteness and socioeconomic disadvantage (data exclude very preterm births and data from Victoria) (AIHW 2016):

- 96% of women living in major cities compared with 90% in very remote areas
- 96% of women living in the highest SES areas compared with 93% in the lowest SES areas.

Indigenous women were less likely to attend either an antenatal visit in the first trimester (53% compared with 60% of non-Indigenous women) or to attend five or more visits (86% compared with 95% of non-Indigenous women) (age-standardised) (AIHW 2016).

8.2 Number and timing of antenatal visits

A Cochrane review (Dowswell et al 2015), which included studies in high-, middle- and low-income countries, found no strong evidence of differences in the number of preterm births or low birth weight babies between groups receiving a reduced number of antenatal visits (eight visits in high-income countries and fewer than five visits in low-income countries) compared with standard care. However, there was some evidence that in low- and middle-income countries perinatal mortality may be increased with reduced visits. The number of inductions of labour and caesarean sections were similar in women receiving reduced visits compared with standard care.

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Evidence concerning women's preferences about the number of antenatal visits suggests that:

- for some women, the gap between visits was perceived as too long when the number of visits was lower than that traditionally offered (Dowswell et al 2015)
- women who were satisfied with a reduced number of antenatal visits were more likely to have a caregiver who both listened and encouraged them to ask questions than women who were not satisfied with reduced schedules (Clemet et al 1996)
- women who were over 35 years of age, had previous pregnancies, were less educated or had more than two children preferred fewer appointments, whereas women who were less than 25 years of age, single or had a prior adverse pregnancy history indicated a preference for more appointments than the standard schedule (Hildingsson et al 2002).

Recommendation	Grade B
1. Determine the schedule of antenatal visits based on the individual woman's needs. For a woman's first pregnancy without complications, a schedule of ten visits should be adequate. For subsequent uncomplicated pregnancies, a schedule of seven visits should be adequate.	
Approved by NHMRC in December 2011; expires December 2016	

8.2.1 Timing of initiation of antenatal care

The NICE guidelines suggest that the first antenatal visit occur before 10 weeks pregnancy due to the high information needs in early pregnancy. This also allows arrangements to be made for tests that are most effective early in the pregnancy (eg gestational age assessment, testing for chromosomal anomalies).

Consensus-based recommendation
I At the first contact with a woman during pregnancy, make arrangements for the first antenatal visit, which requires a long appointment and should occur within the first 10 weeks.
Approved by NHMRC in December 2011; expires December 2016

8.2.2 Economic considerations

The NICE guidelines found inconclusive evidence regarding the cost-effectiveness of a reduced number of antenatal visits. Most of the existing research in developed countries is based on women assessed as at low risk of poor perinatal outcomes at first contact. The available evidence found that:

- providing routine antenatal care through five compared with eight visits did not affect maternal and perinatal outcomes and therefore was more cost effective (Villar et al 2001)
- reduced costs associated with six or seven versus thirteen visits were offset by the greater number of babies requiring special or intensive care, although maternal satisfaction and psychological outcomes were poorer in women attending fewer visits (Henderson et al 2000)
- although the average number of antenatal visits was lower in France than in England and Wales in 1970-80, there was no difference in pregnancy outcomes, suggesting that fewer visits would be more cost effective if only these outcomes are considered (Kaminski et al 1988)
- there was no significant difference in the monetary value women placed on different providers of antenatal care (Ryan et al 1997).

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8.3 Discussing the schedule of antenatal visits with women

The first or another early contact with a woman provides an opportunity to assess the appropriate number of visits for her pregnancy. Considerations include:

- any conditions that may affect the pregnancy or the woman's health and social and emotional wellbeing
- whether this is the first or a subsequent pregnancy
- the woman's preferences for how antenatal care is provided.

This contact should be used to provide women with much of the information they need in early pregnancy. This includes explanation and appropriate written or other form of information about the different types of maternity care available and what each option entails. Information on each option of care should include:

- who the primary carer or carers will be and how they will care for the woman (one-to-one, as part of a team etc)
- the likely number, timing and content of antenatal visits
- place of labour and birth
- postnatal care and support.

Consensus-based recommendation	
II	Early in pregnancy, provide women with information in an appropriate format about the likely number, timing and content of antenatal visits associated with different options of care and the opportunity to discuss this schedule.
	Approved by NHMRC in December 2011; expires December 2016

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8.4 Content of the first antenatal visit

The first contact with a woman in the antenatal period may be when she attends primary care to confirm the pregnancy. Women will either start antenatal care at that point or be referred to a maternity care provider or service; for example, the local hospital, midwife, obstetrician, GP or Aboriginal health service. Women intending to give birth in hospital will attend a booking visit. This may be their first visit at the hospital if they are receiving care through this service or later in pregnancy if they are receiving care through a private provider.

The first antenatal visit should be longer than most later visits because of the volume of information that needs to be exchanged in early pregnancy. If there is insufficient time in the first antenatal visit, another appointment can be arranged to cover "first visit" activities or these can be incorporated into care as the pregnancy progresses.

Women should be seen alone at least once during pregnancy, particularly during the first antenatal visit, as the presence of the woman's partner may be a barrier to disclosure of domestic violence or other aspects of the woman's personal history.

The need to discuss the many assessments and tests that are offered to women in the first trimester contributes to the length of the first visit. It is important to explain that no assessment or test is compulsory and that women have the right to make informed decisions.

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Additional time may be required for the first antenatal visit for women who have:

- *limited experience of the health system or a limited understanding of health care processes*: clear explanation of the reasons for antenatal visits, the need for tests and screening and the use of technology is needed
- *limited understanding of English*: accredited interpreters should be involved and time for interpretation taken into consideration (see Section 4.2.1)
- *hearing impairment*: use of Auslan (Australian Sign Language) should be used to facilitate communication
- *past experiences that affect their trust in authorities or health professionals*: reassurance and explanation of the care being offered and collaboration with other services may be required to build necessary confidence and trust
- psychosocial circumstances that may mean they need more intensive psychosocial support (eg young women, women with vulnerabilities); or
- other conditions that usually require additional care (see Table B2).

Table B1: Content of first antenatal visit

Woman-centred care
Seek woman's thoughts, views and opinions
Ask open-ended questions and provide an opportunity to discuss issues and ask questions
Offer verbal information supported by written or other appropriate form of information (on topics such as diet and lifestyle, available pregnancy care services, maternity benefits, screening and tests, breastfeeding)
Discuss involvement of the woman's partner/family in antenatal care, using gender neutral language until the gender of the partner is established
Provide emotional support and empathy
Discuss any costs that may be involved in a woman's antenatal care
Undertake a comprehensive history
Current pregnancy (planned, unplanned, wishes to proceed with or terminate the pregnancy)
Medical (history, medicines, family history [high blood pressure, diabetes, genetic conditions], cervical smears, immunisation, breast surgery)
Obstetric (previous experience of pregnancy and birth)
Infant feeding experiences
Nutrition and physical activity
Smoking, alcohol and other substance misuse
Expectations, partner/family involvement, cultural and spiritual issues, concerns, knowledge, pregnancy, birth, breastfeeding and infant feeding options
Factors that may affect the pregnancy or birth (eg female genital mutilation/cutting)
Psychosocial factors affecting the woman's emotional health and wellbeing
The woman's support networks and information needs

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Clinical assessment
Discuss conception and date of last menstrual period and offer ultrasound scan for gestational age assessment (carried out between 8 and 14 weeks of pregnancy)
Measure height and weight and calculate body mass index and provide advice on appropriate weight gain
Measure blood pressure
Test for proteinuria
Delay auscultation of fetal heart until after 12 weeks gestation if using a Doppler and 28 weeks gestation if using Doppler or a Pinard stethoscope
Assess risk of pre-eclampsia and advise women at risk that low-dose aspirin from early pregnancy may be helpful in its prevention
Assess risk of preterm birth and provide advice on risk and protective factors
Administer the EPDS at this visit or as early as practical in pregnancy
Ask questions about psychosocial factors that affect mental health
Maternal health testing
Check blood group and antibodies, full blood count and haemoglobin concentration and consider testing ferritin in areas where prevalence of iron-deficiency anaemia is high
Assess risk of diabetes and offer testing to women with risk factors
Recommend testing for HIV, hepatitis B, hepatitis C, rubella non-immunity, syphilis, and asymptomatic bacteriuria
Offer testing for gonorrhoea to women with identified risk factors
Offer chlamydia testing to all women who are younger than 25 years
In areas with a high prevalence of sexually transmitted infections, consider offering chlamydia and gonorrhoea testing to all pregnant women
Offer testing for trichomoniasis to women who have symptoms
Offer cytomegalovirus testing to women who have frequent contact with large numbers of very young children
Offer thyroid function testing to women who have symptoms or high risk of thyroid dysfunction
Only offer testing for vitamin D deficiency if there is a specific indication
Offer testing for chromosomal anomalies
Offer cervical screening to women who have not had a screen in the recommended period
Advise women about measures to avoid toxoplasmosis or cytomegalovirus infection
Assessment
Estimated date of birth/gestational age
Risk factors: physical, social, emotional
Need for referral
Need for further investigation/ treatment/ preventive care
Actions
Advice on options for antenatal care and place of birth
Referral if required
Further investigation as required
General advice (also for the partner/family): pregnancy symptoms, supplements, smoking, nutrition, alcohol, physical activity, substance use, dental visits
If required, access to counselling and termination (where permitted under jurisdictional legislation)
Preventive interventions: folate, iodine, others as needed (eg iron supplement)
Specific vaccinations including influenza and pertussis[11]

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11 See Part 3 of the *Australian Immunisation Handbook* 10th edition for discussion of specific vaccinations during pregnancy.

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These Guidelines include recommendations on baseline clinical care for women with low-risk pregnancies but do not include information on the additional care that some women will require. Pregnant women with the conditions listed in Table B2 usually require care additional to that detailed in these Guidelines. Some resources that may assist in providing appropriate care are listed in Section 8.6.

Table B2: Women who may require additional care

Existing conditions
Overweight or underweight
Cardiovascular disease (eg hypertension, rheumatic heart disease)
Other conditions (eg kidney disease; type 1 or type 2 diabetes; thyroid, haematological or autoimmune disorders; epilepsy; malignancy; severe asthma; HIV, hepatitis B or hepatitis C infection)
Mental health disorders
Disability
Female genital mutilation/cutting
Experiences in previous pregnancies
Termination of pregnancy
More than two miscarriages
Preterm birth
Pre-eclampsia or eclampsia
Rhesus isoimmunisation or other significant blood group antibodies
Uterine surgery (eg caesarean section)
Antenatal or postpartum haemorrhage
Postpartum psychosis
Four or more previous births
A stillbirth or neonatal death
Gestational diabetes
Small or large-for-gestational-age baby
Baby with a congenital anomaly (structural or chromosomal)
Previous major surgery
Cardiac (including correction of congenital anomalies)
Gastrointestinal (eg bowel resection)
Bariatric (gastric bypass, lap-banding)
Gynaecological (eg myomectomy, cone biopsy, large loop excision of the transformation zone [LLETZ])
Lifestyle considerations
History of alcohol misuse
Use of recreational drugs such as marijuana, heroin, cocaine (including crack cocaine), amphetamines (eg 'ice') and ecstasy
Psychosocial factors
Developmental delay or other disabilities
Vulnerability or lack of social support
Previous experience of violence or social dislocation

Source: Adapted from NICE (2008).

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8.5 Planning for subsequent antenatal visits

Determining the pattern of visits and the activities that are undertaken at each visit requires flexibility. Care should be collaboratively planned with the woman based on the needs identified through assessments, with a focus on continuity of care wherever possible. Planning should also take into account the involvement of the woman's partner/family. For women who start antenatal care late in pregnancy, arrangements will be needed to 'catch up' on information and assessments that are usually offered earlier in pregnancy.

At all visits, opportunities should be provided for the woman to share her expectations and experiences as well as discuss any issues and/or concerns that may have arisen since her last visit, including psychosocial support and mental health issues. Women should also be offered information on aspects of health in pregnancy and early parenthood (eg nutrition, alcohol, smoking, symptom relief if conditions common in pregnancy are being experienced, breastfeeding, reducing the risk of sudden and unexpected death in infancy [SUDI]). A woman's confidence in her ability to labour, give birth and look after her new baby should be supported throughout antenatal care and antenatal education should also support her in preparing for changes to her life and her relationship with her partner and understanding the physical and emotional needs of the baby. The woman's needs should dictate the type of information and support provided (eg while many women will benefit from written information, other forms of information such as audio or video are sometimes more suitable). The woman should also direct the type of issues and questions discussed.

Table B3 indicates appropriate stages of gestation for screening, tests and clinical assessments, although flexibility is needed. Different women will need different aspects of care at different times. If any assessments or tests identify a need for follow-up, additional visits may be required.

Table B3: Additional specific activities at subsequent antenatal visits

16-19 weeks
Review, discuss and record the results of all tests undertaken
Reassess planned pattern of care for the pregnancy and identify whether additional care or referral is needed
Assess fetal growth
Offer fetal anatomy scan to be carried out at 18-20 weeks gestation
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
20-27 weeks
Assess fetal growth
Discuss fetal movements: timing, normal patterns etc
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Test for hyperglycaemia between 24 and 28 weeks gestation
Repeat ferritin testing if levels were identified as low in the first trimester

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28 weeks
Assess fetal growth
Discuss fetal movements
Test for anaemia, blood group and antibodies
Recommend Anti-D to rhesus-negative non-isoimmunised women
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Test for hyperglycaemia if this has not already been tested
Enquire about mental health and administer the EPDS
29-34 weeks
Assess fetal growth
Discuss fetal movements
Review, discuss and record the results of tests undertaken at 28 weeks
Reassess planned pattern of care for the pregnancy and identify women who need additional care, arranging referral if required
Give information, with an opportunity to discuss issues and ask questions on preparation for labour and birth, including the birth plan, recognising active labour and positively managing the pain of normal labour (this may need to take place earlier in remote areas)
Discuss breastfeeding (eg skin-to-skin contact at birth, early feeding, rooming-in, attachment, exclusive breastfeeding, feeding on demand, partner support); discuss safe infant formula feeding if a woman chooses to formula feed
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Offer repeat ultrasound at 32 weeks to women whose placenta extended over the internal cervical os (the opening of the cervix into the vagina) in the 18-20 week scan
Recommend a second dose of Anti-D to rhesus-negative non-isoimmunised women at 34 weeks
35-37 weeks
Assess fetal growth
Discuss fetal movements
Give information, including care of the new baby, reducing risk of sudden and unexpected death in infancy (SUDI), newborn screening tests and vitamin K prophylaxis, psychosocial support available in the postnatal period including maternal and child health services and psychosocial supports, with an opportunity to discuss issues and ask questions
Assess fetal presentation by abdominal palpation from 36 weeks and confirm suspected malpresentation by ultrasound
For women whose babies are not a cephalic presentation, discuss a range of options, including external cephalic version for breech presentation
Offer testing for Group B streptococcus if organisational policy is to routinely test all women
Measure blood pressure
Test for proteinuria in women who have clinical indications of or risk factors for pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity

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38-40 weeks
Assess fetal growth
Give information, including normal length of pregnancy and onset of labour, with an opportunity to discuss any fears and worries and ask questions
Discuss fetal movements, including the need for prompt contact with a health professional if there are any concerns about reduced or absent movements
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Women who have not given birth by 41 weeks
Give information, including discussion about options for prolonged pregnancy (eg membrane sweeping), with an opportunity to discuss issues and ask questions
Discuss fetal movements, including the need for prompt contact with a health professional if there are any concerns about reduced or absent movements
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity

8.6 Resources

AHMC (2010) *National Maternity Services Plan*.

Antenatal Care in: *Minymaku Kutju Tjukurpa Women's Business Manual*, 4th edition. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

Bouverie Centre (2012) Guidelines for Healthcare Providers Working with Same-sex Parented Families. Melbourne: Bouverie Centre, LaTrobe University, Vic Health.

NHMRC (2009) Clinical Practice Guideline for the Prevention of Venous Thromboembolism (Deep Vein Thrombosis and Pulmonary Embolism) in Patients Admitted to Australian Hospitals. Canberra: National Health and Medical Research Council.

8.6.1 Nutrition and physical activity

See Section 11.6

8.6.2 Prevention

Australian Technical Advisory Group on Immunisation (2017 update) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health and Ageing.

NHMRC (2005) *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen Detected Abnormalities*. Canberra: National Health and Medical Research Council.

Safe sleeping resources.

8.6.3 Family violence

See Section 29.3

8.6.4 Sexually transmitted infections

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Sexual Health Society of Victoria *National Management Guidelines for Sexually Transmitted Infections*

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Rumbold AR & Cunningham (2008) A review of the impact of antenatal care for Australian indigenous women and attempts to strengthen these services. *Mat Child Health J* 12(1): 83-100.

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9 Preparing for pregnancy, childbirth and parenthood

Structured antenatal education that is suited to the individual can help women to be informed about pregnancy, birth and parenting. Psychological preparation for parenthood may have benefits for parents' mental health, parenting and infant development.

9.1 Background

Structured education in preparation for childbirth and parenthood has come about as traditional methods of information sharing have declined (Gagnon & Sandall 2007). Many maternity health care providers, including public health departments, hospitals, private agencies and charities, and obstetricians' and midwives' practices, provide antenatal education for expectant parents. Antenatal education may be delivered one-on-one or in groups (eg in a women's group, couples' workshop or a class situation).

Antenatal education programs have a range of aims including (Gagnon & Sandall 2007):

- influencing health behaviours
- preparing women and their partners for childbirth, including building women's confidence in their ability to labour and give birth
- preparing women for the pain of labour and supporting their ability to give birth without pain relief (Leap et al 2010)
- discussing breastfeeding
- enhancing maternal-fetal relationship (Rackett & Holmes 2010)
- preparing for parenthood (eg changes in relationships, physical and emotional needs of the baby, balancing the needs of the newborn and other children) and promoting confident parenting
- developing social support networks
- contributing to reducing perinatal morbidity and mortality.

Antenatal education programs generally cover a range of topics and may include:

- physical wellbeing (nutrition, physical activity, smoking, alcohol, oral health)
- emotional wellbeing and mental health during pregnancy and after the baby is born (maternal-fetal attachment, adapting to change, expectations, coping skills, knowing when to get help)
- labour (stages of labour, positions, breathing and relaxation, support, pain relief)
- birth (normal birth, assisted births, caesarean section, perineal tears)
- options for women with previous pregnancy or birth complications
- breastfeeding (skin-to-skin contact, benefits of early breastfeeding, attachment, breastfeeding as the physiological norm)
- early parenthood (normal newborn behaviour, settling, sleep safety, immunisation, infant attachment)
- ways to find support and build community networks after the baby is born.

Antenatal couple education programs, which aim to enhance the couple relationship and the parent-child relationship, are also available.

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9.2 Discussing antenatal education

The evidence on antenatal education is heterogeneous, with outcomes measured including experience of birth and parenting, postnatal mental health and experience of antenatal education.

9.2.1 Knowledge and health behaviours

A Cochrane review found that women gain knowledge from antenatal education but that the effect of this knowledge on childbirth or parenthood remains largely unknown (Gagnon & Sandall 2007). A prospective cohort study found that 74% of first-time mothers considered that antenatal education helped them to prepare for childbirth but only 40% considered that the education helped them prepare for parenthood (Fabian et al 2005).

Low level evidence suggests that antenatal education may improve some health behaviours during pregnancy (eg nutrition, physical activity)(Mirmolaei et al 2010) and in early parenthood (eg prevention of sudden unexpected death in infancy [SUDI]) (Hesselink et al 2012).

9.2.2 Birth experience and outcomes

Studies have found no statistically significant difference in the overall birth experience between women who participate in antenatal education programs and those who do not (Fabian et al 2005; Bergstrom et al 2009; Maimburg et al 2010). Studies into specific outcomes have found the following.

- *Mode of birth*: There is mixed evidence on the effect of antenatal education on mode of birth (Ferguson et al 2013). Antenatal education does not appear to significantly affect mode of birth among women in general (Fabian et al 2005; Gagnon & Sandall 2007) or among women with a previous caesarean section (Gagnon & Sandall 2007). Specific education on bearing down technique in labour did not affect mode of birth (Phipps et al 2009). Including a component on the risks of induction in antenatal education decreased rates of non-medically indicated elective induction of labour (Simpson et al 2010).
- *Pain*: One study found that women who participated in antenatal education experienced lower levels of pain during birth (Ip et al 2009). Others have reported that participating women had lower epidural analgesia use (Maimburg et al 2010), higher analgesia use (Fabian et al 2005) or there was no difference in epidural analgesia use (Bergstrom et al 2009) or overall pain relief (Maimburg et al 2010).
- *Self-diagnosis of labour*: Women given education about self-diagnosis of labour pains had a higher rate of correct self-diagnosis than women who did not (Lumluk & Kovavisarach 2011). However, a small systematic review found no evidence of criteria for identifying labour (Lauzon & Hodnett 2009).

While the overall experience and outcomes of birth do not seem to be affected by antenatal education, there is some evidence that it reduces anxiety about the birth (Maestas 2003; Ahmadian heris et al 2009; Ip et al 2009; Artieta-Pinedo et al 2010; Ferguson et al 2013), increases use of coping strategies (Escott et al 2005) and partner involvement (Ferguson et al 2013) and that participants experience greater childbirth self-efficacy (Ip et al 2009).

Recommendation	Grade B
2.	Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.
	Approved by NHMRC in June 2014; expires June 2019

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9.2.3 Psychological preparation for parenthood

Studies into the inclusion of psychological preparation for parenthood in antenatal care vary in the content covered. Studies have found that at 6 weeks after the birth:

- women with depression antenatally who participated in antenatal group education focusing on coping skills, recognising distress and seeking help had a reduced risk of subsequent postnatal depression (odds ratio [OR] 0.83; 95% confidence interval [CI] 0.65-0.98; n=1,719) (Kozinszky et al 2012)
- women who participated in antenatal sessions focusing on coping skills, cognitive restructuring, problem-solving and decision-making skills had an overall reduction in depressive symptoms compared with women in the control group (mean Chinese EPDS score 6.5 vs 8.9) and the effect persisted at 6 months (5.8 vs 7.6; n=184) (Ngai et al 2009)
- women who participated in antenatal interpersonal psychotherapy had fewer depressive symptoms (changes in EPDS score: -1.56 vs 0.94; n=194) and greater satisfaction with interpersonal relationships than women who received only antenatal education (Gao et al 2010)
- antenatal education on psychosocial issues associated with parenthood had a positive effect on mood (mean EPDS score 4.5 compared with 11.4 at baseline; n=268) in women who reported low self-esteem antenatally (but not those with medium or high self-esteem antenatally) and partners were significantly more aware of the woman's experience of parenthood (Matthey et al 2004).

Recommendation	Grade B
3. Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.	
Approved by NHMRC in June 2014; expires June 2019	

Small randomised controlled trials (RCTs) have reported benefits from antenatal couple education programs that aim to enhance the couple relationship and the parent-child relationship (Shapiro & Gottman 2005; Feinberg et al 2010; Shapiro et al 2011; Petch et al 2012).

9.2.4 Parents' experience of antenatal education

Parents have expressed satisfaction with antenatal education as preparation for childbirth (Fabian et al 2005; Bergstrom et al 2011). Mothers who were young, single, with a low level of education, living in a small city or who smoked were less likely to find the classes helpful (Fabian et al 2005). Male participants valued the inclusion of an all-male session (Friedewald et al 2005).

Studies into parents' preferences for antenatal education have found that the following factors are valued:

- *style of education*: information provided by a health professional in person rather than sole use of other impersonal media (Nolan 2009) and using a range of learning strategies (Svensson et al 2008)
- *discussion*: parents value being encouraged to ask questions, seek clarification, and relate information to their own circumstances (Svensson et al 2006; Nolan 2009)
- *social networking:* one of the core aims of antenatal education is to assist women to develop social support networks (Fabian et al 2005; Svensson et al 2006; Svensson et al 2008)
- *group size*: small peer groups encourage participants to get to know and support each other, while larger groups make it harder for women to ask questions (Nolan 2009)
- *practising skills*: parents value experiential learning with plenty of opportunity to practise hands-on skills (Svensson et al 2006; Svensson et al 2008)

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- *content*: parents have expressed a preference for antenatal education to include more information on psychoprophylaxis during labour (Bergstrom et al 2011), psychological care (Holroyd et al 2011), preparation for parenthood (Svensson et al 2006; Bergstrom et al 2011; Holroyd et al 2011) and breastfeeding (Svensson et al 2006)
- *timing of education*: education is helpful early in pregnancy when information needs are high (Svensson et al 2006), with a component offered postnatally (Nolan 2009; Svensson et al 2009).

Practice point	
G	Assisting parents to find an antenatal education program that is suitable to their learning style, language and literacy level may improve uptake of information.
	Approved by NHMRC in June 2014; expires June 2019

9.3 Practice summary: antenatal education

When: At an early antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the benefits of antenatal education:** Explain that, while antenatal education is unlikely to change the mode of birth, it may help women to prepare for the birth. It is also a good opportunity to establish a network of peers and to develop skills for adapting to parenthood.
- ☐ **Involve partner and/or family:** Discuss the benefits of partners and/or other family members attending antenatal education with the woman.
- ☐ **Provide information:** Support antenatal education by asking women about any topics on which they would like additional information and suggesting or providing appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video, web sources).
- ☐ **Take a holistic approach:** Give information about locally available antenatal education programs and assist women to select a program that is suitable for them. Give expectant parents booklets/ handouts relating to emotional health and wellbeing during pregnancy and early parenthood.

9.4 Resources

Consumer resources

- *Pregnancy, birth and baby*
- *National Prescribing Service*
- *Better Health Channel*
- *Smart Eating for You*
- *Early parenthood*
- *Raising children*
- *Australian Breastfeeding Association*
- *Healthinsite*
- *Eat for Health*
- *Healthy Active Australia*
- *Health for Women*
- *Sexually transmitted infections*
- Pregnancy, Birth and Baby Helpline: 1800 882 436
- *Safe infant sleeping*

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Resources specific to Aboriginal and Torres Strait Islander women

Antenatal education and planning for the birth. In: *Minymaku Kutju Tjukurpa Women's Business Manual*, *4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

Queensland Centre for Mothers and Babies. *Aboriginal and Torres Strait Islander Resources*.

NSW Health *Strong Women Strong Babies Pregnancy Diary*.

The CARPA Standard Treatment Manual. 5th edition. Central Australian Rural Practitioners Association.

Western Australia Department of Health. *Having a Baby — Aboriginal resources*.

Multicultural resources

- Multicultural Health (Queensland Health): *Pregnancy and postnatal topics*
- NSW Multicultural Health Communication Service: *Pregnancy and postnatal topics*

Mental health resources, referral and advice

See Section 5.3

Sources of reliable online health information

- *Health on the Net Foundation*

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10 Preparing for breastfeeding

Assisting women to plan for breastfeeding by providing information and support may increase initiation and duration of breastfeeding, with health benefits for mother and infant.

10.1 Background

In Australia, the Australian National Breastfeeding Strategy 2010-2015 (AHMC 2009) (a revised strategy is under development) and the Infant Feeding Guidelines (NHMRC 2012) provide guidance on supporting breastfeeding at primary care, hospital and government levels.

10.1.1 Health benefits of breastfeeding

A large body of Australian and international evidence shows that breastfeeding is of significant benefit to babies and mothers (AHMC 2009).

- *Babies*: Breastfeeding has a range of benefits for the developing baby, including improved visual acuity, psychomotor development (Horta et al 2007) and cognitive development (Kramer et al 2008). Breastfed babies have a reduced risk of a range of serious illnesses and conditions such as gastroenteritis, respiratory illness, otitis media, allergy and sudden unexpected death in infancy (SUDI) (Ip et al 2007). They are also less likely to develop chronic disease later in life (Horta et al 2007; Ip et al 2007).
- *Mothers*: Breastfeeding promotes faster maternal recovery from childbirth and return to pre-pregnancy weight and delays return of menstrual periods. Women who have breastfed have reduced risk of breast and ovarian cancer in later life (NHMRC 2011)
- *Mother-infant attachment:* Breastfeeding may assist bonding and attachment between mothers and babies (NHMRC 2011).

Exclusive breastfeeding (no solids or liquids besides human milk, other than vitamins and medications) for 6 months has several advantages over exclusive breastfeeding for 3 to 4 months, including reduced risk of gastrointestinal and respiratory infection (Kramer & Kakuma 2007). No adverse effects on growth have been documented with exclusive breastfeeding for 6 months, but a reduced level of iron has been observed in developing-country settings (Kramer & Kakuma 2007).

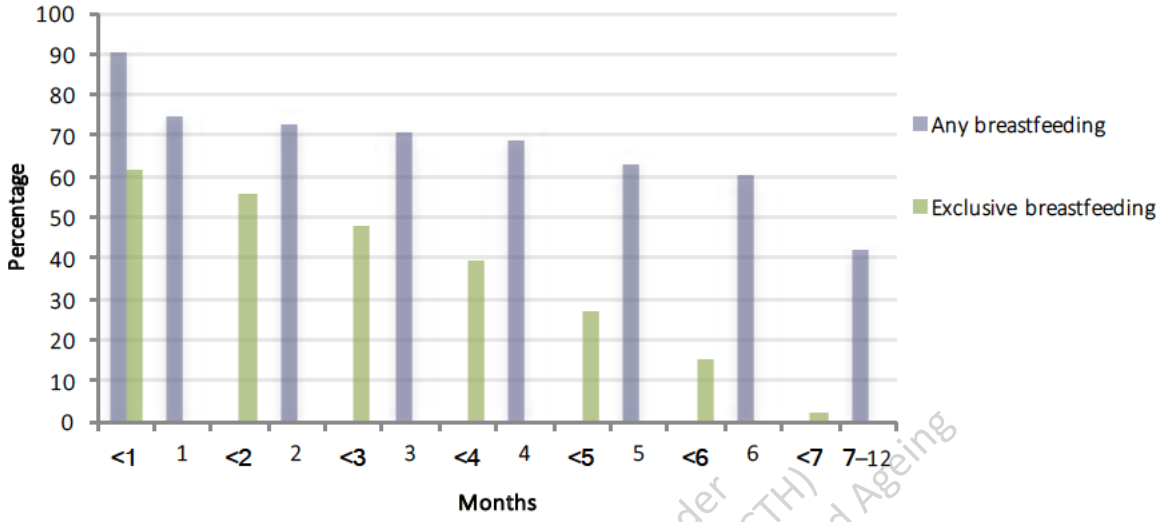
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10.1.2 Initiation and duration of breastfeeding in Australia

The Australian Infant Feeding Guidelines recommend exclusive breastfeeding for 6 months and continuing breastfeeding for one year or for as long as mother and child desire (NHMRC 2012). The 2010 Australian National Infant Feeding Survey found that breastfeeding was initiated for around 96% of infants and that around 90% of infants received breast milk as their first feed (AIHW 2011). Figure B1 shows rates of exclusive and any breastfeeding over the first year of life from the survey.

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Figure B1: Duration of exclusive and any breastfeeding among babies aged 0–12 months, 2010



Note: Rates of exclusive breastfeeding were reported up to each month of age (eg an infant who received fluids other than breast milk at 5 months of age was exclusively breastfed for <6 months). Any breastfeeding was reported at <1 month (age 0) and then in completed months.

Source: AIHW 2011.

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There are regional and jurisdictional variations in rates of breastfeeding (AHMC 2009). Rates of breastfeeding are also influenced by other demographic factors (AIHW 2011).

- *Aboriginal and Torres Strait Islander mothers*: The 2010 National Infant Feeding Survey found that 59% of Aboriginal and Torres Strait Islander infants were exclusively breastfed at less than 1 month, 33% at less than 3 months and 7% at less than 6 months (DoHA 2012). Rates of 'any breastfeeding' were higher in advantaged areas than disadvantaged areas (99% vs 93%) (DoHA 2012). Recent studies in Aboriginal health services in Darwin (Josif et al 2012) and Brisbane (Stapleton et al 2011) have found rates of exclusive breastfeeding on discharge from hospital of 88% and 69%, respectively. A survey conducted in Western Australia in 2000-2002 found that breastfeeding duration increased with remoteness (Cromie et al 2012).
- *Country of origin*: Evidence is mixed as to whether breastfeeding rates among migrant and refugee women are comparable to the general Australian population rates, with studies finding no difference in rates of exclusive breastfeeding on discharge from hospital (Dahlen & Homer 2009) but lower rates of breastfeeding at 3 months among migrant and refugee women (Stephens 2001). It has been reported that breastfeeding practices vary between different cultural groups in Australia, reflecting trends in their countries of origin (AHMC 2009).
- *Age:* In 2010, breastfeeding at 6 months was reported by 64.1% of women aged more than 35 years, 63.5% of women aged 30-35 years, 56.7% of women aged 25-29 years and 39.1% of women aged 24 years or younger (AIHW 2011).
- *Socioeconomic status*: In 2010, breastfeeding at 6 months was reported by 68.7% of women in the least disadvantaged quintile and 52.4% in the most disadvantaged quintile (AIHW 2011).
- *Education:* In 2010, breastfeeding at 6 months was reported by 73.1% of women with a Bachelor degree or higher, 52.0% of women with Year 12 or equivalent and 40.3% of women who did not complete Year 12 (AIHW 2011).

10.1.3 Factors affecting establishment of breastfeeding

The Infant Feeding Guidelines identify a range of factors that affect establishment of breastfeeding (NHMRC 2012):

- caesarean section
- separation of mother and baby (eg not 'rooming in')
- early use of bottles or pacifiers (dummies)
- offering supplementary feeds (water, glucose or formula milk) when there is no medical reason.

The Baby Friendly Hospital Initiative, which aims to support successful initiation and maintenance of breastfeeding, recommends that women be assisted to initiate breastfeeding within 1 hour of birth and given advice on maintaining lactation.

10.1.4 Factors affecting decision-making about breastfeeding

Environmental factors and societal considerations have an impact on a mother's commitment to and ability to continue breastfeeding (AHMC 2009). Factors that negatively influence initiation and continuation of breastfeeding include (Qld Health 2003):

- *physical*: maternal obesity, maternal diabetes, low birth weight or prematurity, multiple birth, congenital anomalies, cracked nipples, separation of mother and baby after birth leading to a delay in onset of milk (eg following caesarean section)
- *psychological*: lack of confidence in breastfeeding, personal image, depression and anxiety
- *social*: maternal attitude (eg lack of intention to breastfeed), knowledge and attitude of partner and family, community customs and traditions, cultural attitudes to breastfeeding, isolation from family or community, relationship problems, public perceptions, return to work
- *environmental*: overcrowding in the home environment, lack of facilities to breastfeed in public areas, employment and work environments that do not support breastfeeding.

Some women (eg adolescent women, young Aboriginal and Torres Strait islander women) experience a cluster of these factors, which can influence their decisions about continuing breastfeeding.

A planned approach and continuity of care and support during pregnancy, birth and early parenthood can ensure that women receive opportunities for education, consistent advice, and appropriate support to continue breastfeeding that considers their individual situation.

Maternal conditions and breastfeeding

The Infant Feeding Guidelines (NHMRC 2012) advise that:

- women with HIV should avoid breastfeeding if replacement feeding is acceptable, feasible, affordable, sustainable and safe
- women with hepatitis B or hepatitis C can breastfeed without risk of transmission to the baby.

Tobacco, alcohol and illicit drugs

The Infant Feeding Guidelines (NHMRC 2012) advise that:

- breastfeeding remains the best choice, even if the mother continues to smoke
- not drinking alcohol is the safest option for women who are breastfeeding
- illicit drugs should be avoided while breastfeeding (specialist advice is needed for each individual).

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10.2 Antenatal breastfeeding promotion

The objectives of antenatal breastfeeding promotion are to (AHMC 2009):

- provide opportunities for pregnant women and their families to learn about the benefits of breastfeeding
- encourage and enable pregnant women to make informed decisions about breastfeeding
- encourage families and support networks to appreciate the benefits of breastfeeding.

Health professionals have a responsibility to promote breastfeeding first but to educate parents individually about formula feeding where it is needed. This responsibility is outlined in the WHO International Code of Marketing of Breast-milk Substitutes and the Australian Infant Feeding Guidelines (NHMRC 2012).

10.2.1 Effect on initiation and duration of breastfeeding

Systematic reviews have shown that antenatal breastfeeding promotion can be effective in increasing initiation rates and duration of breastfeeding, especially among groups of women with low breastfeeding rates (Dyson et al 2005; Renfrew et al 2005; Chung et al 2008; Lumbiganon et al 2011). Evidence from small RCTs (Bonuck et al 2005; Kupratakul et al 2010; Rasmussen et al 2011) and lower level studies (Reeve et al 2004; Gill et al 2007; Lin et al 2008; Spiby et al 2009; Ingram et al 2010) is inconsistent.

A combination of antenatal and postnatal interventions increases the initiation and duration of breastfeeding (Chung et al 2008).

Recommendation	Grade C
4. Routinely offer education about breastfeeding as part of antenatal care.	
Approved by NHMRC in June 2014; expires June 2019	

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10.2.2 Models of care

Studies evaluating breastfeeding promotion interventions have found that:

- initiation rates were significantly improved by antenatal interventions, including health professional support (Dyson et al 2005), peer support/counselling (Dyson et al 2005; Chung et al 2008; Lumbiganon et al 2011) and education sessions for fathers (Wolfberg et al 2004)
- duration of exclusive breastfeeding was improved by antenatal group education about breastfeeding (Lumbiganon et al 2011), health professional support provided antenatally (Lumbiganon et al 2011) and home visits both antenatally and postnatally (Anderson et al 2005)
- duration of 'any breastfeeding' was improved by antenatal group education about breastfeeding (Rosen et al 2008), health professional support provided antenatally (Lumbiganon et al 2011; Pannu et al 2011), peer support (Kaunonen et al 2012) and home visits provided both antenatally and postnatally (Kemp et al 2011)
- combined antenatal and postnatal group education about breastfeeding and peer counselling for adolescent women positively influenced duration of breastfeeding (Wambach et al 2011).

Although peer support interventions increase breastfeeding continuation in low- or middle-income countries, especially exclusive breastfeeding, the effect does not seem to be as strong in high income countries (Jolly et al 2012).

Educational materials provided antenatally were effective when combined with counselling but not as a stand-alone intervention (Mattar et al 2007).

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A combination of methods of education and support is more effective than a single method (Hannula et al 2008). A collaborative approach to breastfeeding promotion that involves local health professionals may be more effective than a breastfeeding expert approach (Hoddinott et al 2007).

There is no evidence to support antenatal breast examinations as a means of promoting breastfeeding (Lee & Thomas 2008).

10.3 Discussing breastfeeding

Discussing breastfeeding is an important part of antenatal care. As the preparatory stage for breastfeeding, the goal is to enable women to develop knowledge and commitment and establish or consolidate support networks (AHMC 2009). A commitment to breastfeeding includes viewing it as the biological and social norm for infant and young child feeding. The extent to which a mother commits to breastfeeding can influence the duration of breastfeeding (Shealy et al 2005).

Discussion of breastfeeding should involve partners and cover:

- the health benefits of breastfeeding for the infant (eg lower risk of infection) and the mother (eg improved recovery from childbirth and return to pre-pregnancy weight, reduced risk of pre-menopausal breast cancer)
- a woman's previous experiences of breastfeeding and any concerns related to these
- how partners can support the mother to breastfeed and be involved in other aspects of baby care (eg bathing, nappy changing)
- the importance of uninterrupted skin-to-skin contact at birth and early breastfeeding, including the benefits of colostrum for the infant
- that it is recommended that babies be exclusively breastfed for 6 months and that breastfeeding continue for one year or for as long as mother and child desire
- the importance of good positioning and attachment, rooming in and feeding on demand
- indications that the baby is ready for a feed and is receiving enough milk
- the need to avoid bottles, teats and dummies while breastfeeding is being established
- that water is not necessary for the baby: breast milk is sufficient food and drink for the first 6 months
- the importance of healthy eating (see Section 11.1.2) and iodine supplementation (see Section 11.3.2) when breastfeeding
- when to seek advice (eg while some discomfort is not unusual at initiation, advice on attachment should be sought if pain continues)
- the availability of breastfeeding support locally (eg peer support, lactation consultant).

Women may choose not to breastfeed for a range of reasons (eg anxiety, medication use) and the discussion should be approached with sensitivity to these issues. A mother's informed decision not to breastfeed should be respected and support and information from a health worker and/or other members of the multidisciplinary team provided (NHMRC 2012).

Some centres encourage women to express and store colostrum before the birth so that it can be provided to the baby if needed (eg if the mother has insulin treatment for diabetes). While the benefits of early colostrum are well documented (NHMRC 2012), the benefits of antenatal breast expression are yet to be substantiated (Chapman et al 2012). However, it does not appear to be harmful among women with diabetes in pregnancy who are at low risk of complications (Forster et al 2017).

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10.4 Practice summary: breastfeeding

When: At all antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; lactation consultant; peer breastfeeding counsellor; childbirth educator; accredited dietitian

- ☐ **Discuss why breastfeeding from birth is important:** It is important to provide consistent information on the health benefits to baby and mother. Explain that exclusive breastfeeding is biologically and nutritionally appropriate to support growth for 6 months and means that the baby receives only breast milk (ie no other liquids or solids except vitamins or medications if indicated).
- ☐ **Provide practical advice:** Give information about local support for timely assistance with breastfeeding difficulties (eg postnatal home visits, lactation consultants, Australian Breastfeeding Association, peer support).
- ☐ **Involve partner or family:** Discuss the importance of support for the mother to enable breastfeeding.
- ☐ **Provide information:** Give booklets/ handouts relating to breastfeeding that are appropriate for the woman. Information should be available in a language that is understood. All information should be free of marketing for formula, bottles and teats.
- ☐ **Take a holistic approach:** In discussing breastfeeding, do not assume that a woman knows how to breastfeed. Reinforce positive attitudes to breastfeeding and tailor advice and support to a woman's individual circumstances, including cultural background. Be aware of different beliefs and cultural practices and explore these with women during pregnancy. Discuss solutions for potential difficulties (eg need to return to work).
- ☐ **Document discussions:** Note a woman's intentions about breastfeeding in her antenatal record. The use of a checklist may provide a prompt for health professionals to ensure discussion regarding feeding intentions has taken place.

10.5 Resources

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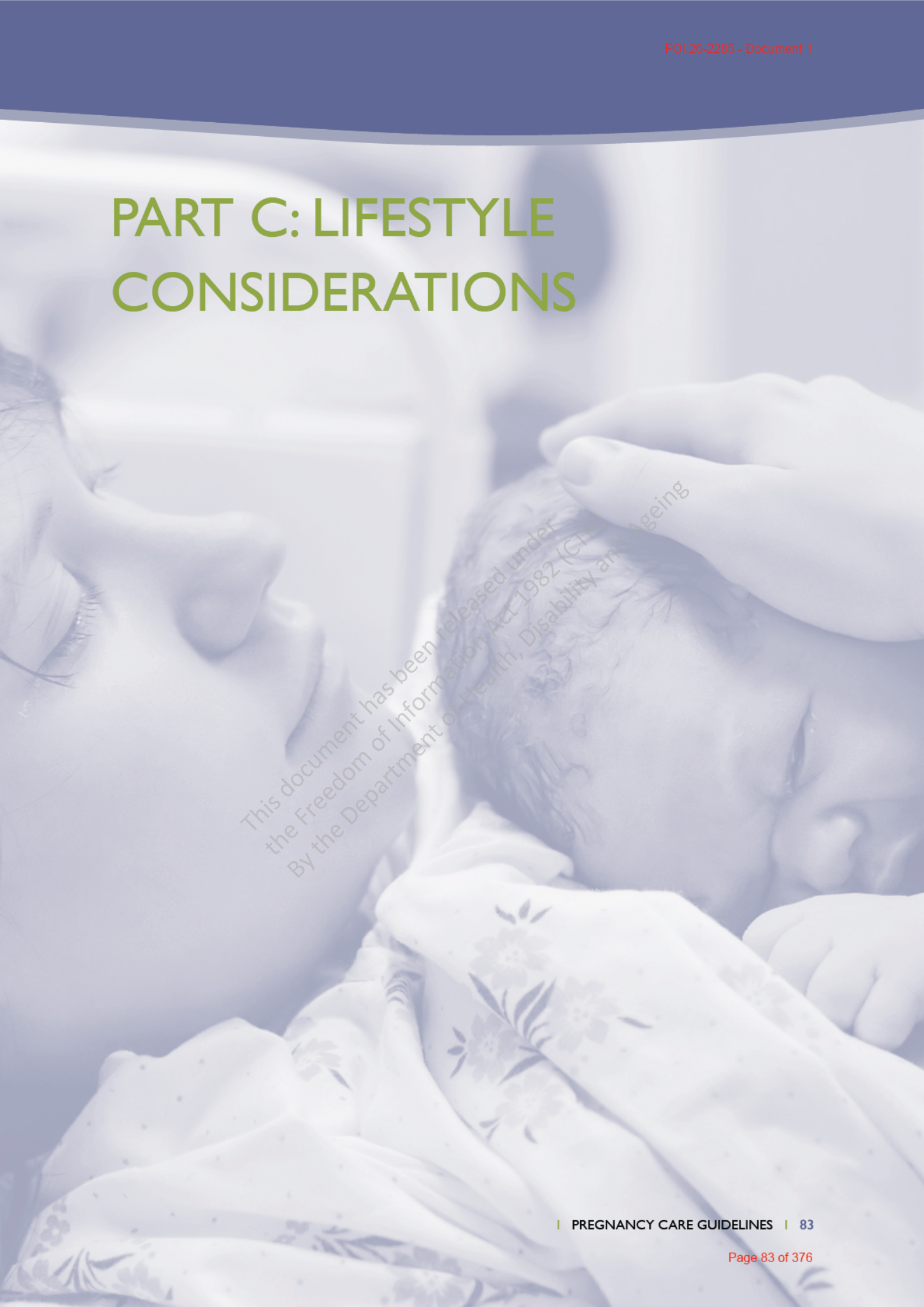
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PART C: LIFESTYLE CONSIDERATIONS



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This section discusses lifestyle factors that contribute to the health and wellbeing of a woman and her baby during pregnancy. Recommendations are based on evidence about the health risks and benefits associated with a range of lifestyle factors.

Table C1 provides a summary of advice on lifestyle considerations during pregnancy considered a priority for inclusion in these Guidelines. Advice on immunisation during pregnancy is included in the *Australian Immunisation Handbook* (ATAGI 2017).

Table C1: Summary of advice for women about lifestyle considerations during pregnancy

Topic	Advice	Chapter
Health behaviours		
Nutrition	Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy	11.1.1
	Additional serves of the five food groups may contribute to healthy weight gain in women who are underweight but these should be limited by women who are overweight or obese	
	Small to moderate amounts of caffeine are unlikely to harm the pregnancy	
Physical activity	Low to moderate-intensity physical activity during pregnancy has a range of benefits and is not associated with negative effects on the pregnancy or baby	11.1.2
Tobacco smoking	Smoking and passive smoking can have negative effects on the pregnancy and the baby	12
Alcohol	Not drinking alcohol is the safest option for women who are pregnant	13
Substance use	Illicit substances and non-medical use of medications (eg opioids) have negative effects on the pregnancy and the baby	15
Preventive health interventions		
Folic acid	Folic acid taken preconception and in the first trimester reduces the risk of a baby having neural tube defects and a supplement of 500 mcg a day is recommended	11.3.1
Other vitamins	Supplements of vitamins A, C and E are not of benefit during pregnancy and may cause harm	11.3.1
Iron	Increasing intake of iron-rich foods reduces the risk of iron deficiency	11.3.2
	Unnecessary iron supplementation offers no benefit and has side effects at higher doses	11.3.2
	For women with low dietary intake, intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects	11.3.2
	For women with identified iron-deficiency anaemia, low-dose supplementation is as effective as high dose, with fewer side effects	29.3
Calcium	For women with low dietary intake and high risk of pre-eclampsia, increased intake of calcium-rich foods or supplements may be beneficial	25.2.1
Iodine	Iodine requirements increase during pregnancy and a supplement of 150 micrograms a day is recommended	11.3.2

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Topic	Advice	Chapter
Medicines		
Medicines	Use of medicines should be limited to circumstances where the benefit outweighs the risk	14
Herbal medicines	Herbal medicines should be avoided during pregnancy	14.3
General advice		
Oral health	Good oral health is important to a woman's health and treatment can be safely provided during pregnancy	16
Sexual activity	Sexual intercourse in pregnancy is not known to be associated with any adverse outcomes	17
Travel	Correct use of three-point seatbelts during pregnancy is to have the belt 'above and below the bump, not over it'	18
	Long-distance air travel is associated with an increased risk of venous thrombosis and pulmonary embolism	
	Pregnant women should discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas	
	If a pregnant woman cannot defer travel to malaria-endemic areas, she should use an insecticide-treated bed net	
	Some medications to prevent malaria can be safely used in pregnancy	

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11 Nutrition and physical activity

Consuming a wide variety of nutritious foods during pregnancy is important to ensure that the nutritional requirements of both mother and baby are met. In some situations, supplementation of some vitamins or minerals may be advisable. Regular low to moderate-intensity physical activity is generally safe during pregnancy with likely benefits for mother and baby.

11.1 Background

11.1.1 Nutrition

The nutritional status of a woman before and during pregnancy plays a vital role in fetal growth and development. While requirements for some nutrients (eg iron, folic acid) increase, the basic principles of healthy eating remain the same.

Risks associated with nutrition during pregnancy

- *Over and under-nutrition*: Too little weight gain during pregnancy increases the risk of a low birth weight infant. Excess weight gain during pregnancy increases the risk of gestational diabetes and of the baby being large for gestational age. It is also associated with increased risk of obesity and metabolic syndrome in women and infants later in life.
- *Food safety*: As the immune system in pregnancy is suppressed, pregnant women are more susceptible to foodborne illnesses, such as listeriosis, which can be transmitted to the unborn child and may cause miscarriage, premature birth or stillbirth (Pezdirc et al 2012). Fetal exposure to high levels of mercury (eg from maternal consumption of some fish species) may cause developmental delays (FSANZ 2011).

Access to healthy food

- *Geographical location:* The decreased availability of nutritious foods (such as fresh fruit and vegetables, wholegrain bread and low fat milk products) in remote and regional areas in Australia has been described frequently. The cost of nutritious foods in these areas is also over 30% higher than in major cities and may affect food choices (NHMRC 2000; NT DHCS 2007; Harrison et al 2010; Landrigan & Pollard 2011).
- *Socioeconomic status*: In some urban centres, people in lower socioeconomic groups have less access to supermarkets and greater access to fast food outlets than more advantaged groups (Burns & Inglis 2007; Ball et al 2009). Supermarkets generally offer a wider variety of food products, as well as fresh raw food.
- *Migrant and refugee women:* Following migration, food habits may change out of choice, because of the limited availability of traditional and familiar foods, or because of change in economic circumstances in Australia. Similarly, financial and language difficulties may affect access to education and employment opportunities which then affects income, health and nutrition literacy, and access to nutritious foods. Some migrants experience disadvantages such as social isolation and poor housing, which can affect access to safe food and safe preparation of food, and are generally in a relatively vulnerable position in their new environments, regardless of the type of migration (WHO 2010).

11.1.2 Physical activity

Physical activity can be defined as any body movement that involves the use of one or more large muscle groups and raises the heart rate. This includes sport, exercise and recreational activities and incidental activity that accrues throughout the day (eg walking to the shops, climbing stairs).

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The Australian Physical Activity and Sedentary Behaviour Guidelines (DoH 2014) recommend that pregnant women try to do some physical activity every day and accumulate 150-300 minutes of moderate-intensity physical activity each week. Women are advised to talk with their health professional regarding the best form of activity and to check with them before undertaking vigorous intensity physical activity.

Levels of physical activity in Australia

Data specific to pregnant women are not available but results from national surveys give some indication of patterns of physical activity and sedentary behaviour.

In Australia in 2014-15, 55.5% of 18-64 year olds participated in sufficient physical activity in the last week (more than 150 minutes of moderate physical activity or more than 75 minutes of vigorous physical activity, or an equivalent combination of both, including walking) (ABS 2015). Nearly one in three (29.7%) 18-64 year olds were insufficiently active (less than 150 minutes in the last week) while 14.8% were inactive (no exercise in the last week). Women were slightly less likely than men to participate in sufficient physical activity in the last week (53.3 vs 57.7%).

Factors influencing levels of physical activity

Women may not be involved in physical activity for a range of reasons, including:

- perceptions that being physically active may harm the baby
- limited facilities (eg pools, gymnasiums) or infrastructure (eg walking paths), particularly in some rural areas (NRHA 2011)
- limited access to group activities and/or facilities specifically for women
- costs of attending activities
- perceptions that being physically active for the sake of it is a waste of time and money
- limited time for physical activity due to other commitments (eg looking after other children, working)
- perception of personal safety in public places.

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11.2 Discussing nutrition[12]

11.2.1 Healthy eating during pregnancy and breastfeeding

Consuming a variety of nutritious foods is particularly important during pregnancy and breastfeeding.

- *Vegetables, legumes/beans and fruit:* Vegetable and fruit consumption before and during pregnancy makes an important contribution to health outcomes for women and their children.
- *Grain (cereal) foods*: Wholegrain foods are a valuable source of iron and zinc and fibre. Bread in Australia is fortified with folic acid and made with iodised salt.
- *Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans*: Lean red meat and chicken is a good source of protein, iron and zinc. Maternal consumption of fish during pregnancy is likely to have a range of health benefits for women and their children but the fish should be low in mercury. Nuts and seeds and legumes/beans are important foods for people who choose vegetarian or vegan dietary patterns and meals without meat as they can provide an alternative source of nutrients. For several nutrients, including iron, calcium and vitamin B_{12}, animal foods are highly bioavailable sources and care needs to be taken to ensure a variety of alternatives if these foods are excluded.

12 Other than the recommendation on caffeine and the practice points, this section is a summary of information provided in the *Australian Dietary Guidelines* (NHMRC 2013).

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- *Milk, yoghurt and cheese and/or their alternatives*: Milk, yoghurt and cheese or their alternatives are good sources of calcium. Reduced fat milk, yoghurt and cheese products are recommended during pregnancy.
- *Water*: Pregnant women have an increased water requirement because of expanding extracellular fluid space and the needs of the baby and the amniotic fluid.

Practice point		
H	Eating the recommended number of daily serves of the five food groups and drinking plenty of water is important during pregnancy and breastfeeding.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Table C2: Recommended number of daily serves during pregnancy

Food group	Sample serve	Pregnancy		Breastfeeding	
		<19 yrs	19-50 yrs	<19 yrs	19-50 yrs
Vegetables of different types and colours, and legumes/ beans	½ cup cooked green or orange vegetables; ½ cup legumes; 1 cup raw green leafy vegetables; 1 small potato; ½ cup sweet corn; 1 medium tomato	5	5	5 ½	7 ½
Fruit	1 apple; 1 banana; 2 plums; 4 dried apricot halves	2	2	2	2
Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley	1 slice bread; ½ cup cooked rice, pasta or noodles; ½ cup porridge; 2/3 cup wheat cereal flakes; ¼ cup muesli; 3 crispbreads; 1 crumpet or English muffin or plain scone	8	8 ½	9	9
Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/ beans	65 g cooked lean red meat; 80 g cooked chicken; 100 g cooked fish fillet; 2 large eggs; 1 cup cooked lentils or canned beans; 170 g tofu; 30 g nuts, seeds, peanut or almond butter or tahini or other nut or seed paste	3 ½	3 ½	2 ½	2 ½
Milk, yoghurt, cheese and/or their alternatives (mostly reduced fat)	1 cup milk; 200 g yoghurt; 40 g hard cheese; 1 cup soy/ other cereal drink with added calcium	3 ½	2 ½	4	2 ½
Approximate number of additional serves from the five food groups or discretionary choices		0-3	0-2 ½	0-3	0-2 ½

Source: (NHMRC 2013).

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Table C3: Practical advice on nutritious foods during pregnancy

Food group	Considerations
Vegetables, legumes/ beans and fruit	• Many women need to increase their consumption of vegetables, legumes/beans and fruit • Due to the risk of listeriosis, pre-prepared or pre-packaged cut fruit or vegetables should be cooked; pre-prepared salad vegetables (eg from salad bars) should be avoided
Grain (cereal) foods	• While bread in Australia contains iodine and folate, supplementary folate is recommended preconception and in the first trimester and iodine should be supplemented preconception and throughout pregnancy and breastfeeding
Lean meats and poultry, fish, eggs, tofu, nuts and seeds, legumes/beans	• Raw or undercooked meat, chilled pre-cooked meats, and pâté and meat spreads should be avoided during pregnancy due to risk of listeriosis • Care needs to be taken with consumption of some fish species (eg shark/flake, marlin or broadbill/swordfish, orange roughy and catfish) due to the potentially higher mercury content • Foods containing raw eggs should be avoided due to the risk of salmonella • Nuts need only be avoided if the woman has an allergy to them
Milk, yoghurt, cheese and/or alternatives	• Unpasteurised dairy products and soft, semi-soft and surface-ripened cheese should be avoided due to the risk of listeriosis • Women who avoid milk products should consume alternative calcium-fortified products
Water	• Fluid need is 750–1,000 mL a day above basic needs

Source: (NHMRC 2013).

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Foods that should be limited

- *Foods containing saturated fat, added salt, added sugars*: Intake of these foods should be limited in general and during pregnancy. The additional energy requirements of pregnancy should be met through additional serves of foods from the five food groups rather than energy-dense foods.
- *Alcohol*: Not drinking alcohol is the safest option during pregnancy (see Chapter 13).

Maternal diet and infant allergy

Maternal diet during pregnancy and while breastfeeding does not appear to affect the risk of asthma, eczema or other allergy symptoms in infants (Hattevig et al 1989; Chatzi et al 2008; De Batlle et al 2008; Shaheen et al 2009; Lange et al 2010).

Caffeine

There is insufficient evidence to confirm or refute the effectiveness of caffeine avoidance on birth weight or other pregnancy outcomes (Jahanfar & Sharifah 2009; Peck et al 2010; Milne et al 2011). The Australian Department of Health and Ageing suggests limiting intake during pregnancy to around three cups of coffee or six cups of tea a day (eg 300 mg of caffeine) (DoHA 2009). Other caffeinated beverages (eg colas, energy drinks, green tea) should also be limited.

Recommendation	Grade C
5. Reassure women that small to moderate amounts of caffeine are unlikely to harm the pregnancy.	
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Appropriate weight gain

Appropriate, steady weight gain during pregnancy is important to optimise the health outcomes (short and long term) for the infant and mother (NHMRC 2013). Calculation of body mass index (BMI) at the first antenatal visit (see Chapter 20) allows appropriate advice about nutrition to be given early in pregnancy as the optimal amount of weight gained depends on the woman's pre-pregnancy BMI. Supporting weight management is discussed in Section 20.2.4.

Practice points	
I	For women who are underweight, additional serves of the five food groups may contribute to healthy weight gain.
J	For women who are overweight or obese, limiting additional serves and avoiding energy-dense foods may limit excessive weight gain. Weight loss diets are not recommended during pregnancy.
	Approved by NHMRC in June 2014; expires June 2019 — UNDER REVIEW

11.3 Nutritional supplements

There is evidence to support routine supplementation with folic acid preconception and in the first trimester and to support iodine supplementation preconception and during pregnancy and breastfeeding. Iron supplementation may prevent iron deficiency in women with limited dietary iron intake. Vitamin B_{12} supplementation may be needed if a woman has a vegetarian or vegan diet. Vitamin D supplementation may be a consideration for women with vitamin D levels lower than 50 nmol/L (see Chapter 47). Other nutritional supplements do not appear to be of benefit unless there is an identified deficiency.

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11.3.1 Vitamins

Folic acid

Folic acid supplementation prevents first and second time occurrence of neural tube defects (De-Regil et al 2010). In Australia, the rates of anomalies such as encephalocele, anencephaly and spina bifida have fallen with promotion of folic acid supplements and voluntary fortification (Bower et al 2009). However, no such falls have been seen for Aboriginal babies (Bower et al 2009) and the prevalence of neural tube defects among Aboriginal and Torres Strait Islander babies is almost double that in the non-Indigenous population (Bower et al 2004). Levels of knowledge about folic acid supplementation appear to be lower among Aboriginal and Torres Strait Islander women (55% vs 67.5% of the mostly non-Indigenous women surveyed), particularly among adolescent women (38%) (Bower et al 2004). Restricted food choices and higher costs in rural and remote areas may also contribute to lower levels of folate intake and higher prevalence of neural tube defects (Bower et al 2004).

Women taking medicines that are folate antagonists (eg carbamazepine, lamotrigine) should be encouraged to take high-dose folate supplements preconception and during the first trimester (Austin et al 2017).

Recommendation	Grade A
6.	Inform women that dietary supplementation with folic acid, from 12 weeks before conception and throughout the first 12 weeks of pregnancy, reduces the risk of having a baby with a neural tube defect and recommend a dose of 500 micrograms per day.
	Approved by NHMRC in June 2014; expires June 2019 — UNDER REVIEW

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Practice point	
K	Specific attention needs to be given to promoting folic acid supplementation to Aboriginal and Torres Strait Islander women of childbearing age and providing information to individual women at the first antenatal visit.
	Approved by NHMRC in December 2011; expires December 2016 UNDER REVIEW

Other vitamins

There is insufficient evidence on supplementation during pregnancy of vitamin C (Rumbold et al 2015b), vitamin E (Rumbold et al 2015a), vitamin A (van den Broek et al 2010) or vitamin B6 (Thaver et al 2006) to show whether these are beneficial. However, supplementation has been associated with:

- preterm birth (500–1,000 mg vitamin C per day) (Rumbold et al 2015b)
- perinatal death and preterm rupture of the membranes (1,000 mg vitamin C and 400 IU vitamin E per day) (Xu et al 2010)
- congenital malformation (vitamin A) (Oakley & Erickson 1995; Rothman et al 1995; Dolk et al 1999).

There is insufficient evidence about the effects of other combinations of vitamins on pregnancy outcomes (Rumbold et al 2011).

Recommendation	Grade B
7.	Advise women that taking vitamin A, C or E supplements is not of benefit in pregnancy and may cause harm.
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11.3.2 Minerals

Iodine[13]

Increased thyroid activity during pregnancy increases iodine requirements. If iodine intake is inadequate before pregnancy, maternal stores may run low and be inadequate to support the unborn baby in later stages of pregnancy (Smyth 2006). Iodine deficiency is of particular concern during pregnancy because abnormal function of the mother's thyroid has a negative impact on the nervous system of the unborn baby, and increases the risk of infant mortality (Zimmerman 2009). Adverse effects on early brain and nervous system development are generally irreversible and can have serious implications for mental capacity in later life (WHO 2005-09).

There are limited studies specific to the iodine status of pregnant women in Australia, but those available prior to fortification suggest it was inadequate (APHDPC 2007). With the introduction of mandatory iodine fortification of bread, most of the Australian population will get enough iodine (Food Standards Australia New Zealand 2008) and women of child-bearing age should enter pregnancy with adequate iodine intake. However, the extra iodine available through fortified bread is not enough to meet the additional needs of pregnancy and during breastfeeding (Burgess et al 2007).

Consensus-based recommendation	
III	Advise women who are pregnant to take an iodine supplement of 150 micrograms each day. Women with pre-existing thyroid conditions should seek advice from their medical practitioner before taking a supplement.
	Approved by NHMRC in December 2011; expires December 2016 UNDER REVIEW

13 This section, including the consensus-based recommendation, is based on NHMRC (2010) N*HMRC Public Statement: Iodine Supplementation for Pregnant and Breastfeeding Women*. Canberra: National Health and Medical Research Council.

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Iron

Demand for iron increases during pregnancy and insufficient iron intake or absorption or blood loss (eg due to gastrointestinal parasites) can result in deficiency or anaemia (see Chapter 30). There is a lack of evidence that, in otherwise healthy women, the benefits of treatments for mild iron-deficiency anaemia in pregnancy will outweigh the adverse effects associated with them (Reveiz et al 2007). There is a potential dose response relationship between dose of iron and reported adverse events (Reveiz et al 2007).

Recommendation		**Grade B**
8.	Do not routinely offer iron supplementation to women during pregnancy.	
	Approved by NHMRC in December 2011; expires December 2016	UNDER REVIEW

Daily supplementation with iron during pregnancy reduces the risk of maternal iron deficiency and anaemia and low birth weight (Pena-Rosas et al 2012a; Haider et al 2013) but is associated with side effects (constipation, nausea, vomiting and diarrhoea and an increased risk of high haemoglobin concentration at term) (Pena-Rosas et al 2012a). These effects need to be weighed against the risks of iron deficiency (Pena-Rosas et al 2012a). Intermittent iron+folic acid regimens produce similar maternal and infant outcomes at birth and are associated with fewer side effects (Pena-Rosas et al 2012b).

Recommendation		**Grade B**
9.	Advise women with low dietary iron intake that intermittent supplementation is as effective as daily supplementation in preventing iron-deficiency anaemia, with fewer side effects.	
	Approved by NHMRC in June 2014; expires December 2016	UNDER REVIEW

Iron-rich staple foods can help women reach dietary targets for iron (Bokhari et al 2012). Absorption is aided by vitamin C and limited by tea and coffee (Marsh et al 2009). Where iron-rich foods are not available (eg due to geographical location or socioeconomic factors), women may be at high risk of iron deficiency. Ferritin concentrations should be checked and supplementation considered if iron stores are low or if they are normal but dietary intake is likely to remain low.

Practice point		
L	Women at risk of iron deficiency due to limited access to dietary iron may benefit from practical advice on increasing intake of iron-rich foods.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Other minerals

- *Calcium*: While calcium supplements are useful in decreasing pre-eclampsia risk if dietary intake is low (see Chapter 26), they do not appear to be of benefit in preventing preterm birth or low infant birth weight (Buppasiri et al 2011).
- *Magnesium*: There is insufficient evidence to show whether dietary magnesium supplementation during pregnancy is beneficial (Makrides & Crowther 2001).
- *Zinc*: While some studies have found benefits from zinc supplementation among women in areas of high perinatal mortality (Wieringa et al 2010; Mori et al 2012), these results may not be generalisable to the Australian context.

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11.3.3 Other nutritional supplements

- *Multiple micronutrients*: While multiple micronutrients improve nutrient status of pregnant women (Brough et al 2010) and reduced rates of small-for-gestational-age (Haider et al 2011) and low birth weight babies (Haider & Bhutta 2012), more evidence is needed to understand which groups of women may benefit from these supplements.
- *Omega-3 fatty acids*: While there is emerging evidence of benefits associated with supplementing omega-3 fatty acids during pregnancy (eg reduced risk of early preterm birth) (Makrides et al 2010; Leung et al 2011; Imhoff-Kunsch et al 2012; Larque et al 2012; Mozurkewich & Klemens 2012), the benefits of routine supplementation are not known.
- *Probiotics*: While there is also emerging evidence on the benefits of probiotics combined with dietary counselling during pregnancy (eg improved blood glucose control) (Laitinen et al 2009; Luoto et al 2010; Ilmonen et al 2011), again the benefits of routine supplementation are not known.
- *Multivitamins:* An observational study has shown an association between risk of preterm birth and multivitamins and minerals if taken daily in the third trimester by women who were unlikely to be deficient in these nutrients (Alwan et al 2010).

11.4 Discussing physical activity

Systematic reviews and RCTs have found that regular physical activity during pregnancy:

- appears to improve (or maintain) physical fitness (Kramer & McDonald 2006; Ramírez-Vélez et al 2011)
- improves health-related quality of life (Montoya Arizabaleta et al 2010) and maternal perception of health status (Barakat et al 2011)
- may reduce depressive symptoms (Robledo-Colonia et al 2012)
- can prevent urinary incontinence (pelvic floor muscle training) (Boyle et al 2012).

Calculation of BMI at the first antenatal visit (see Chapter 19) allows appropriate advice about physical activity to be given early in pregnancy. Supporting weight management is discussed in Section 19.2.4.

There is insufficient evidence for reliable conclusions about the effect of physical activity on:

- maternal and fetal outcomes (Kramer & McDonald 2006)
- preventing gestational diabetes or glucose intolerance in pregnancy (Han et al 2012) or improving glucose tolerance in women with gestational diabetes (Ceysens et al 2006); or
- preventing pre-eclampsia and its complications (Meher & Duley 2006).

RCTs into specific types of physical activity during pregnancy have found:

- specifically designed exercise programs prevented pelvic girdle pain (n=301) (Morkved et al 2007) and reduced severity of back pain (Kashanian et al 2009)
- yoga reduced perceived stress (n=90) (Satyapriya et al 2009), improved quality of life and enhanced interpersonal relationships (n=102) (Rakhshani et al 2010) and women reported less pain during labour (n=74) (Chuntharapat et al 2008).

The safety of moderate physical activity during pregnancy is supported by a number of RCTs:

- walking, joint mobilisation and light resistance exercises (three 35-minute sessions a week in the second and third trimester) (n=160) did not affect fetal cardiovascular responses (Barakat et al 2010), maternal anaemia (Barakat et al 2009a), type of birth (Barakat 2009b), gestational age at birth (Barakat et al 2008) or the newborn's body size or overall health (Barakat et al 2009c)

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- aerobic dance exercise was not associated with reduction in birth weight, preterm birth rate or neonatal wellbeing (Haakstad & Bø 2011)
- stationary cycling (up to five 40-minute sessions a week from 20 weeks gestation) (n=84) was associated with normalisation of birth weight (Hopkins et al 2010)
- water aerobics (three 50-minute sessions a week from 16–20 weeks gestation) (n=71) was not associated with any alteration in maternal body composition, type of birth, preterm birth rate, neonatal wellbeing or weight (Cavalcante et al 2009).

Recommendation	Grade B
10. Advise women that low- to moderate-intensity physical activity during pregnancy is associated with a range of health benefits and is not associated with adverse outcomes.	
Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Pregnant women should avoid physical activity that involves the risk of abdominal trauma, falls or excessive joint stress, such as in high impact sports, contact sports and vigorous racquet sports (NICE 2008). They are also recommended not to scuba dive, because the risk of birth defects seems to be greater among those who do, and there is a serious risk of fetal decompression disease (Camporesi 1996).

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11.5 Practice summary: nutrition and physical activity

Nutrition

When: All antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian; nutritionist

- ☐ **Assess levels of nutrition:** Ask women about their current eating patterns.
- ☐ **Provide advice**: Explain the benefits of healthy nutrition for the mother and baby. Give examples of foods in the five food groups, sample serves for each group and how many serves are recommended a day. Discuss foods that are rich in iron (eg meat, seafood and poultry), dietary factors that aid or limit absorption, and supplementing iron if the woman has a low dietary intake.
- ☐ **Discuss use of nutritional supplements with women:** Explain that some supplements (folic acid, iodine) are recommended for all women during pregnancy, while others (vitamins A, C and E) are not of benefit and may be harmful and that iron should only be supplemented if a deficiency is identified.
- ☐ **Consider referral:** Referral to an accredited dietitian may be a consideration if there is concern about the quality of nutritional intake, the woman would like information about nutrition for herself and her family, clinical assessment confirms underweight or overweight of the woman or there are other factors of concern (eg diabetes, gastrointestinal disorders).
- ☐ **Take a holistic approach:** Consider the availability of foods appropriate to the woman's cultural practices and preferences and the affordability of supplements.

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Physical activity

When: All antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist or accredited exercise physiologist

- ☐ **Assess levels of activity**: Ask women about their current levels of physical activity, including the amount of time spent being active and the intensity of activity.
- ☐ **Provide advice**: Explain the benefits of regular physical activity. Give examples of activities that are of sufficient intensity to achieve health benefits (eg brisk walking, swimming, cycling). Advise women to discuss their plans with a health professional before starting or continuing a program of physical activity.
- ☐ **Provide information**: Give information about local supports for physical activity (eg women's walking groups, swimming clubs, yoga classes). Advise women to avoid exercising in the heat of the day and to drink plenty of water when active.
- ☐ **Take a holistic approach**: Assist women to identify ways of being physically active that are appropriate to their cultural beliefs and practices (eg activities they can do at home).

11.6 Resources

11.6.1 Nutrition

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12 Tobacco smoking

Health professionals have an important role in advising women of the risks associated with smoking in pregnancy, assessing smoking status on first contact with a woman and supporting efforts to stop or reduce smoking at subsequent contacts.

The effects of tobacco smoking on an individual's health are well documented. Tobacco smoking in pregnancy is a risk factor for complications, and is associated with low birth weight, preterm birth, small-for-gestational-age babies and perinatal death (AIHW 2016). While the prevalence of smoking in pregnancy has declined in high-income countries over the last decade, this decline has not been consistent across all sectors of society.

12.1 Background

12.1.1 Smoking during pregnancy among Australian women

One in 9 women (11%) who gave birth in Australia in 2014 smoked at some time during their pregnancy, a decrease from 15% in 2009 (AIHW 2016). Rates of smoking were slightly higher in the first 20 weeks of pregnancy (11%) compared with after 20 weeks of pregnancy (8%).

Among women who gave birth in 2014, some were more likely than others to smoke in the first 20 weeks of pregnancy. Proportions were highest among the following women, noting that some may fall into more than 1 of these categories (AIHW 2016).

- *Adolescent women*: almost one-third (32%) of mothers under 20 smoked, compared with rates of 6% and 7% of mothers aged 35-39 and 40 and over, respectively.
- *Aboriginal and Torres Strait Islander women*: 44% of Indigenous mothers smoked, compared with 12% of non-Indigenous mothers (age-standardised percentages).
- *Socioeconomic status:* around one-fifth (19%) of mothers living in the lowest SES areas smoked, compared with 4% of mothers in the highest SES areas
- *Geographical location:* around one-third (34%) of mothers in *Very remote* and one-fifth (20%) in *Remote* areas smoked, compared with only 8% of women living in *Major cities*.

On average, women who smoked at any time during pregnancy (AIHW 2016):

- attended their first antenatal visit later in pregnancy than those who did not smoke (15 vs 13 weeks)
- had one less antenatal care visit (nine visits) than women who did not smoke (ten visits).

These patterns were present even when taking into consideration the effect of differences in SES.

Prevalence of smoking during pregnancy is higher among women with severe mental disorders than among women in general (eg 51% vs 24% for women with schizophrenia [Nilsson et al 2002]). A considerable proportion of adverse pregnancy outcomes among women with serious mental health disorders is attributable to smoking (Hauck et al 2008; King-Hele et al 2009; Matevosyan 2011).

12.1.2 Risks associated with smoking during pregnancy

High-level evidence identified in the NICE guidelines indicates a significant association between smoking in pregnancy and adverse outcomes. These include:

- ***effects on the pregnancy*** — **perinatal mortality** (DiFranza & Lew 1995), **placental abruption** (Ananth et al 1999; Castles et al 1999), **premature rupture of membranes** (Castles et al 1999), **ectopic pregnancy** (Castles et al 1999), **placenta praevia** (Castles et al 1999), **preterm birth** (Shah & Bracken 2000), **miscarriage** (DiFranza & Lew 1995)

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- ***birth defects*** **including cleft lip and palate** (Wyszynski et al 1997)
- ***effects on the baby,*** **in particular reduced birth weight (with babies born to smokers being a consistent 175-200 g smaller than those born to similar non-smokers)** (Lumley 1987)**, small-for-gestational-age baby** (Clausson et al 1998)**, stillbirth** (Raymond et al 1994)**, fetal and infant mortality** (Kleinman et al 1988) **and sudden infant death syndrome** (DiFranza & Lew 1995)
- **although studies into *long-term effects* report conflicting results** (Faden & Graubard 2000; MacArthur et al 2001; von Kries et al 2002)**, there is evidence of an association between low birth weight and coronary heart disease, type 2 diabetes and adiposity in adulthood** (Gluckman et al 2008)**.**

Passive smoking (exposure to second-hand or environmental tobacco smoke) during pregnancy may also be associated with increased risk of low birth weight or preterm birth (Khader et al 2010)**.**

12.2 Assessing smoking status

While many women who smoke quit spontaneously before their first antenatal visit, a significant proportion will relapse during or after pregnancy (Panjari et al 1997)**. Other women may not be aware of the risks associated with smoking in pregnancy or find it difficult to quit. It is important that women are asked early in pregnancy about their smoking status and whether others in the household smoke.**

Women may feel guilty or stigmatised if they smoke during pregnancy, and as a result may deny or under-report their smoking (Walsh et al 1996; Windsor et al 1998; Gilligan et al 2009a)**. Questions about smoking should be phrased in a non-judgemental way, or collected using a written questionnaire rather than verbally, for example using a multiple-choice question as outlined below.**

'Which of the following statements best describes your cigarette smoking?

- **I smoke daily now, about the same as before finding out I was pregnant**
- **I smoke daily now, but I've cut down since I found out I has pregnant**
- **I smoke every once in a while**
- **I quit smoking since finding out I was pregnant**
- **I wasn't smoking around the time I found out I was pregnant and I don't currently smoke.'**

Specific resources to assist with assessing smoking status are available (see Section 12.6).

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Recommendation	Grade A
11. At the first antenatal visit: • assess the woman's smoking status and exposure to passive smoking • give the woman and her partner information about the risks to the unborn baby associated with maternal and passive smoking • if the woman smokes, emphasise the benefits of quitting as early as possible in the pregnancy and discuss any concerns she or her family may have about stopping smoking.	
Approved by NHMRC in December 2011; expires December 2016	

12.3 Interventions to assist women to stop smoking

Pregnancy is a time when women who smoke may be more receptive to quitting (McDermott et al 2004) and there are many opportunities for supporting women to quit at this time. This section summarises the available evidence on smoking cessation interventions in pregnancy. Discussion of ways to support people to quit smoking is included in specific smoking cessation guidelines (see Section 12.6).

12.3.1 Effectiveness of interventions

There is high-level evidence, based on systematic reviews and RCTs, that smoking cessation interventions reduce smoking rates in pregnant women. A Cochrane review (Lumley et al 2009), which is the largest study on this topic to date, found that interventions:

- improved smoking cessation rates by 6% (RR 0.94; 95% CI 0.93-0.96)
- reduced rates of low birth weight (RR 0.83; 95% CI 0.73-0.95) and preterm birth (RR 0.86; 95% CI 0.74-0.98) and there was a 53.91g increase in mean birth weight (95% CI 10.44-95.38g).

Of the interventions studied, cognitive behavioural interventions (including educational strategies and motivational interviewing; see Glossary) (RR 0.95; 95% CI 0.93-0.97) were similar in effect to interventions in general. Incentives (eg vouchers) increased the effectiveness of interventions (RR 0.76; 95% CI 0.71-0.81), while using the 'stages of change' theory (RR 0.99; 95% CI 0.97-1.00) or providing feedback to the mother (eg fetal health status) (RR 0.92; 95% CI 0.84-1.02) did not. While nicotine replacement therapy (NRT) was as effective as cognitive behaviour therapy (CBT) (RR 0.95; 95% CI 0.92-0.98), there is no clear evidence on its safety during pregnancy.

Other recent studies are consistent with the Cochrane review. Additional findings include that:

- telephone-based support combined with face-to-face sessions is beneficial (Dennis & Kingston 2008)
- providing information (eg at ultrasound appointments) has a significant effect (Stotts et al 2009)
- smoking cessation may be influenced by concern about weight gain (Berg et al 2008).

12.3.2 Cost-effectiveness of interventions

An economic analysis conducted to inform the development of these Guidelines (see separate document on economic analyses) found that smoking cessation interventions for both pregnant women and the wider population may be cost-effective from both a health system and societal perspective.

CBT and NRT have the same effect on life-years saved but the cost to the health system for NRT is lower. However, NRT is not an appropriate option for women who smoke less than 10 or 15 cigarettes a day (Hotham et al 2006) and CBT is likely to be more successful in these women. Also, a woman's out-of-pocket costs are higher for NRT. If the health system were to cover the total costs of treatment, CBT would be the more cost-effective option.

Recommendation	Grade B
12. Offer women who smoke referral for smoking cessation interventions such as cognitive behavioural therapy.	
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12.3.3 Supporting smoking cessation

Antenatal care is an opportunity to provide women with information about interventions that have been identified as effective (see above), are available locally or through the phone or internet, and are suitable to the individual woman's age, education level, intellectual capacity, language and/or cultural factors and motivation. Providing written or other form of information can reinforce this advice.

Practice point	
M	At each antenatal visit, offer women who smoke personalised advice on how to stop smoking and provide information about available services to support quitting, including details on when, where and how to access them.
	Approved by NHMRC in December 2011; expires December 2016

12.3.4 Pharmacological therapy

While the safety or otherwise of single-agent NRT in pregnancy has not been established (Lumley et al 2009), a large cohort study (Lassen et al 2010) found no serious effect on birth weight unless more than one type of NRT product was used.

NRT appears to be effective in reducing smoking among pregnant women with nicotine dependence (Smith et al 2006; Oncken et al 2008). Prescribing NRT or other pharmacological therapy requires consideration of the risks from the treatment versus the benefits of the woman not smoking. If NRT is prescribed, women should be advised that smoking while using NRT leads to high nicotine levels.

Recommendation	Grade B
13.	If, after options have been explored, a woman expresses a clear wish to use nicotine replacement therapy, discuss the risks and benefits with her.
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Practice point	
N	If nicotine replacement therapy is used during pregnancy, intermittent-use formulations (gum, lozenge, inhaler and tablet) are preferred to continuous-use formulations (nicotine patches).
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12.3.5 Reducing smoking if quitting is not possible

Women who are unable to quit during pregnancy often reduce the number of cigarettes that they smoke. This can reduce nicotine concentrations and offer some measure of protection for the fetus, with a 50% reduction being associated with a 92 g increase in birth weight (Li et al 1993; Windsor et al 1999). However, the greatest health benefits for the woman and baby are from quitting completely.

12.4 Monitoring and relapse prevention

Even where women are motivated to quit smoking in pregnancy, they may relapse either later in the pregnancy or after the birth. Health professionals should reinforce quitting behaviours and continue to monitor all women who have recently quit about their willingness to stay smoke free. Partner smoking is highly correlated to relapse so it may be beneficial to extend the offer of smoking cessation support strategies to the woman's partner.

At each visit, congratulate the woman for having quit, review and reinforce the reasons for quitting, and encourage the non-smoker image. Discuss some high-risk times for relapse, such as late pregnancy, post-partum

and after breastfeeding has stopped. Remind the woman about useful resources and sources of support (RACGP 2007). Continue to advise women who are trying to reduce their exposure to passive smoking.

Practice point	
O	Smoking status should be monitored and smoking cessation advice, encouragement and support offered throughout pregnancy.
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12.5 Considerations among specific population groups

As discussed in Section 12.1, the prevalence of smoking among Aboriginal and Torres Strait Islander women is high, with close to half of women smoking in the first 20 weeks of pregnancy. The recommendations given in the preceding sections apply to all women in the antenatal period. This section outlines additional considerations and approaches that may assist in supporting Aboriginal and Torres Strait Islander women and adolescent women to quit smoking. Understanding community attitudes to smoking and language used when referring to tobacco products will support both assessment and intervention.

12.5.1 Aboriginal and Torres Strait Islander women

A range of factors has contributed to the relatively high proportion of Aboriginal and Torres Strait Islander women who smoke and continue to smoke in pregnancy. These include:

- the 'normalisation' of tobacco use within many Aboriginal and Torres Strait Islander communities in which smoking continues to play a key role in social interaction and relationship building (Harvey et al 2002; Briggs et al 2003; Power et al 2009)
- continuing socioeconomic disadvantage (Power et al 2009)
- the potential for children and non-smoking adults to be exposed to tobacco smoke in larger households (Cunningham 1994; Briggs et al 2003; ABS 2006).

At the individual level, knowledge and attitudes influence smoking behaviour. Qualitative research into the context surrounding smoking among Aboriginal and Torres Strait Islander women has identified some factors that may affect motivation or ability to quit (Heath et al 2006; Wood et al 2008; Gilligan et al 2009b):

- smoking provides an opportunity for 'time out' from social pressures and for 'sharing with others'
- smoking is perceived as reducing stress, easing social interaction, relieving boredom and controlling weight
- smoking may be seen as a less immediate problem relative to other issues
- high levels of smoking by the woman's partner or among family and friends make it harder to quit.

In some areas, women may use chewing tobacco (with or without pituri[14]) and enquiry about this may also be useful.

Practice points	
P	Health care professionals involved in the care of Aboriginal and Torres Strait Islander women should be aware of the high prevalence of smoking in some communities, and take account of this social norm when discussing smoking and supporting women to quit.
Q	Culturally appropriate smoking cessation services should be offered.
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14 The collective name for wild tobacco plants in Central Australia.

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Effective smoking cessation interventions

A review of evidence regarding smoking cessation and prevention programs for Aboriginal and Torres Strait Islander Australians (Power et al 2009) identified that:

- strategies at the individual level such as culturally appropriate counselling and/or NRT are likely to be effective for Aboriginal and Torres Strait Islander people who are motivated to quit
- brief interventions may be effective (Harvey et al 2002)
- group-based programs need to be tailored to individual needs
- health workers who are able to quit smoking themselves will be in a stronger position to be a role model for others
- a range of health promotion resources are available and may be used to support other interventions.

National action to reduce smoking in Aboriginal and Torres Strait Islander communities

The Australian Government is funding a national network of regional tobacco coordinators and tobacco action workers to work with Aboriginal and Torres Strait Islander communities to reduce the number of people smoking. This workforce will implement a range of community-based smoking prevention, awareness raising and cessation support activities tailored to local communities.

Practice point	
R	In discussing smoking and supporting Aboriginal and Torres Strait Islander women to quit smoking, health professionals should draw on the expertise of anti-tobacco workers where available.
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12.5.2 Adolescent women

Smoking is one of a range of risk-taking behaviours engaged in by adolescents. Adolescents who are pregnant and smoke may be at risk of other behaviours that compromise their health and that of the unborn baby (eg drinking alcohol) (Mohsin & Bauman 2005).

Very few studies have investigated the effectiveness of interventions designed to help young people stop smoking and none are specific to pregnancy in this age group. It is likely that interventions aimed at young people need to be different from those developed for adults, given differences in lifestyle and attitudes to smoking and quitting (NZ MOH 2007).

Smoking cessation programs that combine a variety of approaches show promise, including taking into account the young person's preparation for quitting, supporting behavioural change and enhancing motivation (Grimshaw & Stanton 2010). Nicotine replacement has not yet been shown to be successful with adolescents (Grimshaw & Stanton 2010).

12.6 Practice summary: tobacco smoking

Assessing smoking status

When: At the first contact with all women and at subsequent contacts for women who report smoking or have recently quit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss risks to the pregnancy:** Explain that smoking during pregnancy makes it more likely that the baby will be born prematurely and that there are other serious risks to the pregnancy that can be life-threatening to mother or baby.
- ☐ **Discuss risks to the unborn baby:** Discuss the increased risk of the baby having a low birth weight. Explain that this does not just mean that the baby will be small. Low birth weight is known to contribute to the development of coronary heart disease, type 2 diabetes and obesity in adulthood.
- ☐ **Take a non-judgemental approach:** Women may feel uncomfortable telling a health professional that they smoke. They may also under report the amount that they smoke or answer in a way that does not really quantify their level of smoking (eg "half a pack a day", "socially"). The important message to get across is that if they smoke, stopping smoking is the safest option.
- ☐ **Seek information about passive smoking:** Women who are exposed to smoke from others smoking around them may be more likely to have low birth weight or premature babies. Explain that smoke-free environments give people of all ages the best chance to be healthy.

Supporting women to stop or reduce smoking

When: At subsequent antenatal contacts with women who smoke or have recently quit

- ☐ **Be aware of local smoking cessation programs:** Provide women with advice on locally available supports for smoking cessation. Depending on location this may include community support groups, Quitline or State/Territory quit services.
- ☐ **Inform decision-making:** Help each woman to select smoking cessation options that are suitable to her needs. For example, NRT would be inappropriate for a woman who does not appear to be nicotine-dependent or only smokes when she is with friends.
- ☐ **Continue monitoring:** While many women are able to stop smoking when they are pregnant, many relapse either during the pregnancy or after the birth. It is helpful to continue enquiring about a woman's smoking or passive smoking and to offer advice about quitting or reducing the family's exposure to smoke.

12.7 Resources

12.7.1 Smoking cessation guidelines

Bittoun R & Femia G (2010) Smoking cessation in pregnancy. *Obstet Med* 3: 90-93.

Flenady V, New K, MacPhail J (2005) Smoking Cessation in Pregnancy. Clinical Practice Guideline Working Party on Smoking Cessation in Pregnancy. Brisbane: Centre for Clinical Studies, Mater Health Services.

NZ MOH (2007) Guidelines for Smoking Cessation. Wellington: Ministry of Health.

RACGP (2007) Smoking Cessation Guidelines for Australian General Practice. Melbourne: Royal Australian College of General Practitioners.

12.7.2 Psychological services

The *beyondblue* website includes a directory of medical and allied health professionals in mental health, including psychologists, clinical psychologists, social workers and mental health nurses.

Government funding to receive treatment from psychiatrists, psychologists and appropriately trained GPs can be accessed through Better Access to Mental Health Care (Medicare items).

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12.7.3 Resources for Aboriginal and Torres Strait Islander women

Resources that are culturally appropriate to the area should be selected, taking into consideration local language and literacy.

smokecheck NSW

smokecheck Queensland

smokecheck NT

- **Centre for Indigenous Tobacco Control**
- **HealthInfoNet**
- **National action to reduce Indigenous smoking rate**

12.7.4 Australian quit services

National quitline

131 848

New South Wales

Tobacco and Health Branch, NSW Health
ph 02 9391 9111
fax 02 9424 5995

Victoria

QUIT Victoria
ph 03 9663 7777
fax 03 9635 5510

Queensland

Queensland Cancer Fund
ph 07 3258 2200
fax 07 3257 1306

Western Australia

Tobacco Control Branch, Department of Health
ph 08 9242 9633
fax 08 9382 0770

South Australia

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Tasmania

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Australian Capital Territory

ACT Cancer Council
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Northern Territory

Tobacco Action Project, Department of Health and Community Services
ph 08 8999 2661
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13 Alcohol[15]

Alcohol consumption increases the risk of injury in the short-term and chronic disease in the longer term. Drinking in pregnancy can have significant effects on fetal development.

13.1 Background

13.1.1 Alcohol consumption among pregnant women in Australia

The National Drug Survey reported that in Australia in 2013 (AIHW 2014):

- more than half (56%) had consumed alcohol during their pregnancy, and while a large proportion of these women stopped drinking alcohol once they find out that they were pregnant, one-quarter (26%) continued to drink once they knew they were pregnant
- about 3 in 4 (78%) pregnant women who consumed alcohol while pregnant drank monthly or less, and 17.0% drank 2-4 times a month
- most (96%) usually consumed 1-2 standard drinks
- only 1.4% had consumed 6 or more standard drinks on at least one occasion during their pregnancy.

13.1.2 Risks associated with alcohol consumption in pregnancy

- High-level and/or frequent intake of alcohol in pregnancy increases the risk of miscarriage, stillbirth and premature birth (O'Leary 2004).
- Alcohol crosses the placenta and nearly equal concentrations in the mother and fetus can be attained. Exposure of the fetus to alcohol may result in a spectrum of adverse effects, referred to collectively as fetal alcohol spectrum disorders (FASD). Of these, fetal alcohol syndrome (FAS) has been described in children exposed to high levels of alcohol *in utero* as a result of either chronic or intermittent maternal alcohol use (Lemoine et al 1968; Jones et al 1973; Hoyme et al 2005; Astley & Clarren 2000). These children have characteristic facial abnormalities (and often a range of other birth defects), impaired growth and abnormal function or structure of the central nervous system. The diagnosis may not be evident at birth. However, not all children exposed to alcohol during pregnancy are adversely affected, or affected to the same degree. Expression of FAS appears to depend on other factors including (O'Leary 2004): the timing of alcohol intake in relation to the stage of fetal development; the pattern and quantity of alcohol consumption (dose and frequency); and socio-behavioural risk factors (maternal age/duration of drinking, lower socioeconomic status, race, genetic differences, polydrug use).
- A number of alcohol-related birth defects (ARBD) and alcohol-related neurodevelopmental disorders (ARND) have also been described following exposure to alcohol during pregnancy and can be included, with FAS, under the umbrella term of FASD (Hoyme et al 2005; Astley & Clarren 2000). Although children with ARND do not have birth defects, they have significant developmental, behavioural and cognitive problems similar to those of children with FAS.
- People with FASD experience lifelong problems, including learning difficulties and disrupted education, increased rates of mental illness, drug and alcohol problems and trouble with the law (Streissguth et al 2004).

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15 The information in this section, including the consensus-based recommendation, is based on Guideline 4 in NHMRC (2009) *Australian Guidelines to Reduce Health Risks from Drinking Alcohol* (under review). Canberra: National Health and Medical Research Council. Literature on prevalence of alcohol consumption and associated risks during pregnancy published subsequent to the NHMRC guidelines has not been reviewed.

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- The effects of alcohol exposure on fetal development occur throughout pregnancy (including before the pregnancy is confirmed), with the developing fetus being most vulnerable to structural damage during the first three to six weeks of gestation (O'Leary 2004). Effects also vary depending on the dose of alcohol and the pattern of consumption. The most serious of the adverse pregnancy outcomes occur when pregnant women consume high levels of alcohol frequently.

13.2 Discussing alcohol consumption in pregnancy

While there is convincing evidence linking chronic or intermittent high level alcohol intake with harms, including adverse pregnancy outcomes and FASD, there remains uncertainty about the potential for harm to the fetus if a woman drinks low levels of alcohol during pregnancy. It is important that all women of child-bearing age are aware, before they consider pregnancy, of both this uncertainty and the potential risks of harm, so they can make informed decisions about drinking in pregnancy. Health professionals should highlight that:

- the risk is higher with high alcohol intake, including episodic intoxication (binge drinking)
- the risk appears to be low with low alcohol intake
- it is impossible to determine how other maternal and fetal factors will alter risk in the individual.

The high rates of drinking in Australian women, including pregnant women, and the high rates of unplanned pregnancy suggest that, regardless of policy, many fetuses will be inadvertently exposed to alcohol. Assessment of women who have consumed alcohol before knowing that they were pregnant should include appraisal of how much alcohol was consumed and at what stage in the pregnancy. Efforts should be made not to induce unnecessary anxiety for isolated episodes of drinking. Women who drank alcohol before they knew they were pregnant or during pregnancy should be reassured that the risk to the fetus is likely to be low if they had drunk at low risk levels. Women who remain concerned should seek specialist medical advice. Health professionals who are uncertain how to advise pregnant women seeking information concerning the potential for alcohol-related harm should seek expert advice from specialist medical services.

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Consensus-based recommendation	
IV	Advise women who are pregnant or planning a pregnancy that not drinking is the safest option as maternal alcohol consumption may adversely affect the developing fetus.
	Approved by NHMRC in December 2011; expires December 2016

Section 13.4.1 includes example questions that may assist in asking women about their alcohol consumption.

13.3 Practice summary: alcohol

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss alcohol consumption during pregnancy:** Explain that not drinking is the safest option and the risk of harm to the fetus is highest when there is high, frequent maternal alcohol intake. However, the level of risk to the individual fetus is influenced by maternal and fetal characteristics and is hard to predict.
- ☐ **Assist women who consumed alcohol before knowing they were pregnant:** Advise these women that risk of harm to the fetus is likely to be low if a woman has consumed only small amounts of alcohol before she knew she was pregnant or during pregnancy.
- ☐ **Take a holistic approach:** If there are concerns about the effects of a woman's alcohol consumption on the pregnancy, seek specialist medical advice. Women who find it difficult to decrease their alcohol intake will require support and treatment and should be offered referral to Drug and Alcohol services.

13.4 Resources

13.4.1 Assessment tools

T-ACE and TWEAK are validated and reliable tools that have been developed for use with pregnant women. However, they may not be useful with lower levels of drinking that may still be risky in pregnancy. AUDIT is a validated tool, but is not designed specifically for use during pregnancy.

AUDIT

Babor TF, Higgins-Biddle JC, Saunders JB et al (2001) *The Alcohol Use Disorders Identification Test Guidelines for Use in Primary Care* Second Edition. Geneva: World Health Organization.

TWEAK

T	Tolerance: How many drinks can you hold?
W	Have close friends or relatives Worried or complained about your drinking in the past year?
E	Eye Opener: Do you sometimes take a drink in the morning when you get up?
A	Amnesia: Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember?
K (C)	Do you sometimes feel the need to Cut down on your drinking?

Scores are calculated as follows: A positive response to question T on Tolerance (ie consumption of more than five drinks) or question W on Worry yields 2 points each; an affirmative reply to question E, A, or K scores 1 point each. A total score of 2 or more points on the TWEAK indicates a positive outcome for pregnancy risk drinking. In the context of these Guidelines, a positive score for any question would be considered to indicate high-risk drinking.

T-ACE

T	Tolerance: How many drinks does it take to make you feel high?
A	Have people Annoyed you by criticising your drinking?
C	Have you ever felt you ought to Cut down on your drinking?
E	Eye opener: Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover?

Scores are calculated as follows: a reply of More than two drinks to question T is considered a positive response and scores 2 points, and an affirmative answer to question A, C, or E scores 1 point, respectively. A total score of 2 or more points on the T-ACE indicates a positive outcome for pregnancy risk drinking. In the context of these Guidelines, a positive score for any question would be considered to indicate high-risk drinking.

13.4.2 Treatment guidelines

DoHA (2007) *Alcohol Treatment Guidelines for Indigenous Australians.* Canberra: Commonwealth of Australia.

DoHA (2009) *Guidelines for the Treatment of Alcohol Problems*. Canberra: Commonwealth of Australia.

DoHA (2009) *Quick Reference Guide for the Treatment of Alcohol Problems*. Canberra: Commonwealth of Australia.

Ministerial Council on Drug Strategy (2006) *National Clinical Guidelines for the Management of Drug Use During Pregnancy, Birth and the Early Development Years of the Newborn*. Sydney: NSW Health.

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Zubrick SR, Silburn SR, De Maio J et al (2006) *The Western Australian Aboriginal Child Health Survey: Improving the Educational Experiences of Aboriginal Children and Young People*. Curtin University of Technology and Telethon Institute for Child Health Research, Perth.

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14 Medicines

14.1 Prescription medicines

Prescribing medicines during pregnancy involves balancing the likely benefit to the pregnant woman against the potential harm to the fetus. Only a small number of medicines have proven safety in pregnancy and a number of medicines that were initially thought to be safe in pregnancy were later withdrawn. General principles include prescribing only well-known and tested medicines at the smallest possible doses and only when the benefit to the woman outweighs the risk to the fetus.

The Therapeutic Goods Administration has categorised medicines that are commonly used in Australia, taking into account the known harmful effects on the developing baby, including the potential to cause birth defects, unwanted pharmacological effects around the time of birth and future health problems (see Table C4).

Table C4: Therapeutic Goods Administration categorisation of medicines

Category	
A	Medicines which have been taken by a large number of pregnant women and women of childbearing age without any proven increase in the frequency of malformations or other direct or indirect harmful effects on the fetus having been observed.
B1	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have not shown evidence of an increased occurrence of fetal damage.
B2	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals are inadequate or may be lacking, but available data show no evidence of an increased occurrence of fetal damage.
B3	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have shown evidence of an increased occurrence of fetal damage, the significance of which is considered uncertain in humans.
C	Medicines which, owing to their pharmacological effects, have caused or may be suspected of causing, harmful effects on the human fetus or neonate without causing malformations. These effects may be reversible. Accompanying texts should be consulted for further details.
D	Medicines which have caused, are suspected to have caused or may be expected to cause, an increased incidence of human fetal malformations or irreversible damage. These medicines may also have adverse pharmacological effects. Accompanying texts should be consulted for further details.
X	Medicines which have such a high risk of causing permanent damage to the fetus that they should not be used in pregnancy or when there is a possibility of pregnancy.

14.2 Over-the-counter medicines

As few medicines have been established as safe to take during pregnancy, a general principle of use is that as few should be used as possible. However, over-the-counter medicines may be useful for relieving symptoms of pregnancy such as nausea and vomiting (see Chapter 54), heartburn (see Chapter 56), constipation (see Chapter 55) and haemorrhoids (see Chapter 57).

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Consensus-based recommendations	
V	Advise women that use of prescription and over-the-counter medicines should be limited to circumstances where the benefit outweighs the risk as few medicines have been established as safe to use in pregnancy.
VI	Therapeutic Goods Administration Category A medicines have been established to be safe in pregnancy.
	Approved by NHMRC in December 2011; expires December 2016

Practice point	
S	Health professionals should seek advice from a tertiary referral centre for women who have been exposed to Category D or X medicines during pregnancy.
	Approved by NHMRC in December 2011; expires December 2016

14.3 Herbal medicines

The use of complementary therapies (including herbal medicines) is increasingly common in Australia (AMA 2002). Women may choose to use them to support wellbeing, because they are perceived to be 'safe' alternatives to pharmacological treatments or because they are part of traditional practices in pregnancy. However, there is a lack of evidence on the safety of complementary medicines during pregnancy and some are known to be harmful in the first trimester.

There is little evidence from randomised trials to support the benefits or safety of herbal medicines (preparations derived from plants) and, even if active ingredients have been studied in trials, supplements may contain other ingredients with unknown effects. Studies have identified harms associated with some European (Cuzzolin et al 2010) and Chinese (Chuang et al 2006) herbal medicines.

Practice point	
T	Few herbal preparations have been established as being safe and effective during pregnancy. Herbal medicines should be avoided in the first trimester.
	Approved by NHMRC in December 2011; expires December 2016

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14.4 Providing advice on medicines

Health professionals can support women in safe use of medicines by being well informed themselves and by providing advice on relevant information services. Current information on specific medicines in pregnancy is available from:

- Therapeutic Goods Administration *medicines in pregnancy database*, which can be searched by name or classification level
- medicines in pregnancy information services in each State/Territory, which provide advice to health professionals and consumers on supplements, over-the-counter and prescription medicines (see Section 14.6)
- the *National Prescribing Service* website, which publishes resources for health professionals and consumers, with an emphasis on quality use of medicines.

14.5 Practice summary: medicines in pregnancy

When: At antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; pharmacist

- ☐ **Discuss use of medicines with women:** Explain that while many medicines are not safe in pregnancy, they may be needed in some situations (eg to treat high blood pressure, epilepsy, depression) or relieve some symptoms of pregnancy. Advise women to tell the pharmacist that they are pregnant if they are purchasing over-the-counter medicines.
- ☐ **Discuss risks and benefits:** If prescribing medicines, explain any risks to the fetus and the benefits of the treatment to the mother so that women can make an informed decision about the treatment.

14.6 Resources

14.6.1 Medicines in pregnancy information services for health professionals

Australian Capital Territory

ACT Drug Information Service
The Canberra Hospital
Garran ACT 2605
Phone: 02 6244 3333
Fax: 02 6244 3334

New South Wales

Mothersafe
Medications in Pregnancy and Lactation Service
Royal Hospital for Women
Randwick NSW 2031
Phone: 02 9382 6539 or 1800 647 848

Victoria

Royal Women's Hospital
Medicines Information Centre
Cnr Grattan St and Flemington Rd
Parkville VIC 3052
Phone: 03 8345 3190
Fax: 03 8345 3195

Monash Medical Centre
Obstetric Drug Information
246 Clayton Road
Clayton VIC 3168
Phone: 03 9594 2361
Fax: 03 9594 2595

South Australia

Drugs in Pregnancy and Lactation Information Service
Women's and Children's Hospital
72 King William Road
North Adelaide SA 5006
Phone: 08 8161 7222
Fax: 08 8161 6049

Western Australia

Obstetric Drug Information Service
King Edward Memorial Hospital for Women
374 Bagot Road
Subiaco WA 6008
Phone: 08 9340 2723
Fax: 08 9340 2713

Queensland

Royal Women's Hospital
Obstetric Drug Information Service
Brisbane QLD
Phone: 07 3253 7300
Fax: 07 3253 3544

Queensland Drug Information Centre
Royal Brisbane Hospital
E Floor, Block 7
Herston Road
Herston QLD 4029
Phone: 07 3253 7098 or 07 3253 7599
Fax: 07 3253 1393

Tasmania

Drug Information Centre
Pharmacy Department
Royal Hobart Hospital
GPO Box 1061L
Hobart TAS 7001
Phone: 03 6238 8737
Fax: 03 6222 8029 or 03 6231 2905

Northern Territory

Northern Territory Drug Information Centre
Royal Darwin Hospital
PO Box 41326
Casuarina NT 0811
Phone: 08 8922 8424
Fax: 08 8922 8499

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14.6.2 Websites

Information about specific medicines regarding safety during pregnancy is available from:

- *Medsafe* (NZ)
- *MICROMEDIX*
- *Mothersafe* (NSW)
- *National Prescribing Service*
- Therapeutic Goods Administration *Prescribing Medicines in Pregnancy Database*

14.7 References

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Cuzzolin L, Francini-Pesenti F, Verlato G et al (2010) Use of herbal products among 392 Italian pregnant women: focus on pregnancy outcome. *Pharmacoepidemiol Drug Saf* 19(11): 1151-58.

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15 Substance use

Antenatal care provides an opportunity to ask women about substance use. Enquiring in a non-judgemental way may assist women to disclose and enable access to additional support and care, including mental health and drug and alcohol services.

15.1 Background

Substance use in pregnancy is an important issue in antenatal care. The use of tobacco and alcohol are common (these are discussed in Sections 12 and 13) but the use of illicit substances and the misuse of prescription medications is also important. The simultaneous use of several substances (polysubstance use) and comorbid mental health problems are also common.

The substances considered in this chapter include cannabis (marijuana), methylenedioxymethamphetamine (MDMA or ecstasy), meth/amphetamines (including powder/pills [speed] and crystals [crystal meth or ice]), cocaine and opioids (including heroin) and misuse of pharmaceuticals.

No information relevant to lysergic acid diethylamide (LSD) was identified.

15.1.1 Prevalence of substance use in Australia

General population

According to the 2013 National Drug Strategy Household Survey, trends in substance use 'in the last 12 months' among Australians aged >14 years are as follows (AIHW 2014):

- *cannabis*: use has remained relatively stable since 2004 (10.2% recent use; 35% in their lifetime)
- *ecstasy*: use has declined (3.0% in 2010 to 2.5% in 2013)
- *meth/amphetamine*: use has remained stable (2.1% since 2007) but, among meth/amphetamine users, use of ice has almost doubled (22% in 2010 to 50% in 2013) and that of speed has almost halved (51% in 2010 to 29% in 2013)
- *cocaine*: use has remained stable (2.1% in 2010 and 2013)
- *heroin*: use has declined (0.8% in 1998 to 0.1% in 2013)
- *misuse of pharmaceutical medications*: misuse has increased (7.4% in 2010 to 11.4% in 2013).

The type of substance use in the last 12 months varied across jurisdictions. For example (AIHW 2014):

- cannabis was most commonly used in the Northern Territory (17.1%); almost double the usage in Victoria (9.1%)
- meth/amphetamines were used more by people in Western Australia (3.8%) than other jurisdictions
- people in New South Wales (2.7%) and the Australian Capital Territory (2.8%) were more likely to use cocaine than people in other jurisdictions
- ecstasy use was most common in the Northern Territory (3.7%)
- people in Western Australia were more likely to misuse pharmaceuticals (5.6%) than those in any other jurisdiction.

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Pregnancy

The National Drug Strategy Household Survey reported that in Australia in 2013 (AIHW 2014):

- regardless of whether women knew they were pregnant or not, 2.2% had used an illicit substance such as marijuana and 0.9% had misused prescription analgesics
- among pregnant women, a small minority had used illicit substances; 2.4% before knowledge of their pregnancy and 1.6% after they knew they were pregnant.

15.1.2 Risks associated with substance use in pregnancy

Systematic reviews of observational studies have identified the following maternal and perinatal risks associated with substance use.

- *Marijuana use in pregnancy*: One review (n=31) found an association with increased risk of low birth weight (RR 1.43, 95%CI 1.27 to 1.62) and preterm birth (RR 1.32, 95%CI 1.14-1.54) but, when pooled data were adjusted for tobacco use and other confounding factors, there was no statistically significant difference (birth weight RR 1.16, 95%CI 0.98 to 1.37; preterm birth RR 1.08, 95%CI 0.82 to 1.43) (Conner et al 2016). Another review that did not adjust for confounders found an increase in risk of low birth weight (OR 1.77; 95%CI 1.04 to 3.01) and maternal anaemia (OR 1.36: 95%CI 1.10 to 1.69) (Gunn et al 2016).
- *Amphetamine use in pregnancy*: Significant increases in unadjusted risks of preterm birth (OR 4.11; 95%CI, 3.05 to 5.55), low birthweight (OR 3.97; 95%CI, 2.45 to 6.43), and small for gestational age (OR 5.79; 95%CI 1.39 to 24.06) were identified and mean birthweight was significantly lower (MD -279 g; 95% CI, -485 to -74 g) (Ladhani et al 2011).
- *Cocaine use in pregnancy*: There was an association with significantly higher risk of preterm birth (OR 3.38; 95%CI 2.72 to 4.21), low birthweight (OR 3.66; 95%CI 2.90 to 4.63), and small-for-gestational-age infants (OR 3.23; 95%CI 2.43 to 4.30), as well as lower gestational age at birth (-1.47 wk; 95%CI -1.97 to -0.98 wk) and reduced birthweight (-492 g; 95%CI -562 to -421 g) (Gouin et al 2011).
- *Opioid dependence in pregnancy*: A review of neurobehavioural function in infants (mean age 14.1 months) found non-significant mean effect sizes in favour of non-opioid exposed controls for cognition (0.24, 95%CI −0.09 to 0.58, Z=1.41, p=0.16), psychomotor function (0.28, 95%CI −0.05 to 0.61, Z=1.67, p=0.09) and behaviour (corrected mean 1.21, 95%CI −0.61 to 3.03, Z=1.30, p=0.19;) (Baldacchino et al 2014).

A cohort study found that births associated with maternal opioid abuse or dependence compared with those without opioid abuse or dependence were associated with an increased odds of maternal death during hospitalisation (aOR 4.6; 95%CI 1.8 to 12.1); cardiac arrest (aOR 3.6; 95% CI 1.4 to 9.1), intrauterine growth restriction (aOR 2.7; 95%CI 2.4 to 2.9), placental abruption (aOR 2.4; 95%CI 2.1 to 2.6), length of stay >7 days (aOR 2.2; 95%CI 2.0 to 2.5), preterm labour (aOR 2.1; 95%CI 2.0 to 2.3), oligohydramnios (aOR 1.7; 95%CI 1.6 to 1.9), transfusion (aOR 1.7; 95% CI 1.5 to 1.9), stillbirth (aOR 1.5; 95%CI 1.3 to 1.8), premature rupture of membranes (aOR 1.4; 95%CI 1.3 to 1.6) and caesarean section (aOR 1.2; 95%CI 1.1 to 1.3) (Maeda et al 2014).

No studies were identified that investigated outcomes associated with the use of crystal methamphetamine, LSD or ecstasy in pregnancy.

15.2 Assessing substance use

The World Health Organization (WHO) recommends screening for substance use in pregnancy (WHO 2014). Periodic screening for substance use in pregnancy is also recommended in Canada (SOGC 2011). In Australia, guidelines developed nationally and revised by NSW Health (NSW Health 2014) recommend screening for substance use early in pregnancy. They emphasise the importance of establishing an effective relationship with

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the woman based on respect and non-judgemental attitudes, of engaging the woman into adequate antenatal care through this relationship, and of maintaining continuity of care and of carers throughout the pregnancy and postnatal period.

Validated screening instruments for substance use are available (see Section 15.5).

Consensus-based recommendation	
VII	Early in pregnancy, assess a woman's use of illicit substances and misuse of pharmaceuticals and provide advice about the associated harms.
	Approved by NHMRC in October 2017; expires October 2022

Practice point	
U	Asking about substance use at subsequent visits is important as some women are more likely to report sensitive information only after a trusting relationship has been established.
	Approved by NHMRC in October 2017; expires October 2022

15.2.1 Referral and intervention

Australian guidelines (NSW Health 2014) recommend that pregnant women with significant problematic substance use will benefit from an appropriate referral for specialist drug and alcohol assessment (in addition to midwifery and obstetric care), appointment of a consistent and continuous case manager and care team who use effective communication systems, and specific treatments for their substance use, which may include counselling, pharmacotherapies and relapse prevention strategies.

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Psychosocial interventions

Cognitive behavioural therapy compared to brief advice for pregnant women with problematic substance use had no clear effect on the risk of low birth weight (RR 0.72, 95%CI 0.36 to 1.43; 1 study; n=160; low quality), preterm birth (RR 0.5; 95%CI 0.23 to 1.09; 1 study; n=163; low quality) or maternal substance use (no significant difference at birth or 3 months postpartum) (WHO 2014).

Pharmacological interventions

A Cochrane review on treatments for women with opioid dependence in pregnancy (Minozzi et al 2013) did not find sufficient significant differences between methadone and buprenorphine or slow-release morphine to allow conclusions to be drawn on whether one treatment is superior to another for all relevant outcomes. While methadone seems superior in terms of retaining women in treatment, buprenorphine seems to lead to less severe neonatal abstinence syndrome (Minozzi et al 2013).

15.3 Discussing substance use

Discussions with women identified as using illicit substances or misusing pharmaceuticals may include:

- the harms associated with substance use and the benefits of reducing or ceasing their use
- the availability of local support services, including mental health and drug and alcohol services
- for opioid-dependent women, the benefits and harms of methadone compared to buprenorphine or oral slow-release morphine.

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15.4 Practice summary: substance use

When: Early in pregnancy and at subsequent visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the purpose of enquiring about substance use:** Explain that enquiry about substance use is a routine part of antenatal care and that it aims to identify women who would like assistance.
- ☐ **Take a holistic approach:** If a woman admits that she is using illicit substances or misusing pharmaceuticals (eg prescribed opioids such as codeine, oxycodone, morphine), other considerations include interventions to assist the woman and provide ongoing support. The woman's emotional well-being, her safety and that of children in her care should be assessed and reporting and/or referral to other services (eg community services, emergency housing, police) made as required or mandated.
- ☐ **Learn about locally available support services:** Available support services for women who are using illicit substances or misusing pharmaceuticals will vary by location.
- ☐ **Document the discussion:** Document in the medical record any evidence of substance use, referrals made and any information the woman provides. If woman-held records are used, the information included in these should be limited and more detailed records kept at the health service.
- ☐ **Seek support:** Depending on your skills and experience in discussing substance use with women and assisting them, seek advice and support through training programs, clinical supervision, mentoring and/or helplines.
- ☐ **Be aware of relevant legislation:** Each state and territory has requirements about reporting the potential for harms from substance use to the unborn child as set out in its legislation.

15.5 Resources

NSW Health (2014) NSW Clinical Guidelines for the Management of Substance Use during Pregnancy, Birth and the Postnatal period. Sydney: Ministry of Health NSW.

WHO (2014) Guidelines for the Identification and Management of Substance Use and Substance Use Disorders in Pregnancy. Geneva: World Health Organization. Available at: who.int

15.6 References

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Conner SN, Bedell V, Lipsey K et al (2016) Maternal Marijuana Use and Adverse Neonatal Outcomes: A Systematic Review and Meta-analysis. Obstet Gynecol 128(4): 713-23.

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Gunn JK, Rosales CB, Center KE et al (2016) Prenatal exposure to cannabis and maternal and child health outcomes: a systematic review and meta-analysis. BMJ Open 6(4): e009986.

Ladhani NN, Shah PS, Murphy KE et al (2011) Prenatal amphetamine exposure and birth outcomes: a systematic review and metaanalysis. Am J Obstet Gynecol 205(3): 219 e1-7.

Maeda A, Bateman BT, Clancy CR et al (2014) Opioid abuse and dependence during pregnancy: temporal trends and obstetrical outcomes. Anesthesiology 121(6): 1158-65.

Minozzi S, Amato L, Bellisario C et al (2013) Maintenance agonist treatments for opiate-dependent pregnant women. Cochrane Database Syst Rev(12): CD006318.

NSW Health (2014) NSW Clinical Guidelines for the Management of Substance Use during Pregnancy, Birth and the Postnatal period. Sydney: Ministry of Health NSW.

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16 Oral health

Treatment of periodontal disease improves a woman's wellbeing and is safe in pregnancy.

16.1 Background

Oral health refers to the health of tissues in the mouth, including mucous membrane, connective tissue, muscles, bone, teeth and periodontal structures or gums (gingiva). Pregnancy itself does not have a negative effect on oral health, but may increase the risk of dental problems (eg frequent vomiting may raise acidity in the mouth and contribute to caries). As well, high levels of hormones increase blood flow to the gums and may cause inflammation and bleeding (gingivitis) (Taanni et al 2003). In the absence of local plaque build up, healthy gums will not show changes during pregnancy but the risk of peridontitis (inflammation and destruction of supporting tissues around the teeth [ADA 1999]) is increased.

Measures to prevent caries and periodontal disease include regular brushing and flossing and regular dental checkups, with teeth cleaning and treatment as required.

16.1.1 Oral health in Australia

Access to dental services in Australia varies, with limited services available in rural and remote areas and women in all areas potentially affected by the costs of dental services, which are not covered under Medicare.

Data from the Australian Institute of Health and Welfare show that:

- dental care in Australia is largely provided in the private sector, with public dental patients generally being health care card holders and socioeconomically disadvantaged (AIHW 2010)
- adults living outside major cities are more likely to have poorer dental health, such as more tooth loss and untreated decay and less likely to have visited the dentist in the previous 12 months than those in major cities (AIHW 2009)
- Aboriginal and Torres Strait Islander adults seeking dental care in Australia in 2004-06 had a greater average number of decayed and missing teeth and a lower average number of filled teeth than non-Indigenous adults across most age groups (AIHW 2008).

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16.1.2 Prevalence of periodontal disease in pregnancy

A multicentre randomised trial (n=3,563) found a prevalence of periodontal disease of 50% during pregnancy (Macones et al 2010). The incidence of periodontal disease has been associated with lower levels of education and socioeconomic status (Machuca et al 1990; Gaffield et al 2001; Taanni et al 2003).

16.1.3 Risks associated with periodontal disease in pregnancy

Associations between periodontal disease and preterm birth (Jeffcoat et al 2003; Lopez et al 2005; Offenbacher et al 2006; Polyzos et al 2009) and low birth weight (Lopez et al 2005; Sadatmansouri et al 2006; Tarannum & Faizuddin 2007) have been suggested. However, a recent cohort study (n=876) found no association between periodontal disease and adverse pregnancy outcomes (Srinivas et al 2009) and a meta-analysis of observational studies (Khadar & Ta'ani 2005) found that treating periodontal disease did not decrease the rate of preterm birth. Controlled trials into treating periodontitis during pregnancy have also found:

- improved periodontal disease but no significant change in rates of preterm birth, low birth weight or fetal growth restriction (n=812) (Michalowicz et al 2006; Novak et al 2008; Michalowicz et al 2009)
- no significant reduction in the risk of preterm birth (n=824) (Offenbacher et al 2009; Macones et al 2010), although treatment may protect against low birth weight (n=339) (Cruz et al 2010)

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- no significant differences between women receiving treatment during or after pregnancy in terms of preterm birth (9.3% vs 9.7%), birth weight (3,450 vs 3,410g) or pre-eclampsia (4.1% vs 3.4%) (n=1,082) (Newnham et al 2009)
- a reduction in the incidence of caries among children whose mothers received oral health advice during pregnancy (1.7% vs 9.6% in the control group) (n=649) (Plutzer & Spencer 2008).

16.2 Providing advice on oral health

Good oral health and control of oral disease is important to a woman's health and quality of life and has the potential to reduce transmission of pathogenic bacteria from mothers to their children (CDAF 2010). Dental treatment can be safely provided at any time during pregnancy (ADA 1999) if the dentist is informed of the pregnancy.

An Australian survey of women who had recently given birth (n=388) (Thomas et al 2008) found that most were knowledgeable about oral and dental health but only a small percentage knew about periodontal disease. Lack of knowledge about oral and dental health was strongly linked to lower educational achievement and lower socioeconomic background. Over half of respondents had not attended a dentist in the previous 12 months, and only 30% attended during their most recent pregnancy.

16.2.1 Nausea and vomiting

Nausea and vomiting have the potential to affect oral health:

- frequent snacks and soft drinks/carbonated drinks and cravings for particular foods (often sweet) can increase risk of tooth decay
- excessive vomiting brings teeth into contact with strong stomach acid
- repeated reflux and vomiting can damage tooth enamel and increase the risk of decay.

Measures to reduce the impact of nausea and vomiting on oral health include (Morgan et al 2008; CDAF 2010; Rogers 2011):

- rinsing the mouth with a solution of bicarbonate of soda after vomiting, avoiding tooth brushing directly after vomiting as the effect of erosion can be increased by brushing an already demineralised tooth surface
- using fluoridated mouthwash and toothpaste
- eating small amounts of nutritious yet non-cariogenic foods (snacks rich in protein) throughout the day
- chewing sugar-free gum (especially gums containing xylitol or casein phosphopeptide-amorphous calcium phosphate [CPP-ACP]) after meals or high sugar or acidic drinks.

Recommendation	Grade B
14.	At the first antenatal visit, advise women to have oral health checks and treatment, if required, as good oral health is important to a woman's health and treatment can be safely provided during pregnancy.
	Approved by NHMRC in December 2011; expires December 2016

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16.3 Practice summary: oral health

When: At antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss oral health with women: Explain that pregnancy does not cause dental problems but may make them more likely. Advise women to have their oral health checked and to tell the dentist that they are pregnant.**
- ☐ **Provide advice on oral health to women experiencing nausea and vomiting: Explain that vomiting exposes teeth to acid and give tips on how to reduce the impact (see above).**

16.4 Resources

CDAF (2010) Oral health during pregnancy and early childhood: evidence-based guidelines for health professionals. California Dental Association Foundation, American College of Obstetricians and Gynecologists. *J Calif Dent Assoc* 38(6): 391-403, 405-40.

NACOH (2004) *Healthy Mouths Healthy Lives: Australia's National Oral Health Plan 2004-2013*. Adelaide: National Advisory Committee on Oral Health, Australian Health Ministers' Advisory Council.

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AIHW (2008) *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*. ABS Cat No 4704.0, AIHW Cat No IHW 21. Commonwealth of Australia.

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Machuca G, Khoshfeiz O, Lacalle JR et al (1990) The influence of the general health and socio-cultural variables on the periodontal condition of pregnant women. *J Periodont* 70: 779-85.

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Michalowicz BS, Hodges JS, DiAngelis AJ et al (2006) Treatment of periodontal disease and the risk of preterm birth. *New Engl J Med* 355(18): 1885-94.

Michalowicz BS, Novak MJ, Hodges JS et al (2009) Serum inflammatory mediators in pregnancy: changes after periodontal treatment and association with pregnancy outcomes. *J Periodont* 80(11): 1731-41.

Morgan MV, Adams GG, Bailey DL et al (2008) The anticariogenic effect of sugar-free gum containing CPP-ACP nanocomplexes on approximal caries determined using digital bitewing radiography. *Caries Res* 42: 171-84.

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Novak MJ, Novak KF, Hodges JS et al (2008) Periodontal bacterial profiles in pregnant women: response to treatment and associations with birth outcomes in the obstetrics and periodontal therapy (OPT) study. *J Periodont* 79(10): 1870-79.

Offenbacher S, Beck JD, Jared HL et al (2009) Effects of periodontal therapy on rate of preterm delivery: a randomized controlled trial. *Obstet Gynecol* 114(3): 551-59.

Offenbacher S, Lin D, Strauss R et al (2006) Effects of periodontal therapy during pregnancy on periodontal status, biologic parameters, and pregnancy outcomes: a pilot study. *J Periodont* 77(12): 2011-24.

Plutzer K & Spencer AJ (2008) Efficacy of an oral health promotion intervention in the prevention of early childhood caries. *Comm Dent Oral Epidemiol* 36(4): 335-46.

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Rogers JG (2011) *Evidence-based Oral Health Promotion Resource*. Melbourne: Prevention and Population Health Branch, Department of Health, Victoria.

Sadatmansouri S, Sedighpoor N, Aghaloo M (2006) Effects of periodontal treatment phase I on birth term and birth weight. *J Ind Soc Pedodont Prevent Dent* 24(1): 23-26.

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Thomas NJ, Middleton PF, Crowther CA (2008) Oral and dental health care practices in pregnant women in Australia: a postnatal survey. *BMC Pregnancy & Childbirth* 8: 13.

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17 Sexual activity

Women and their partners may ask about the safety of sexual activity during pregnancy. They can be reassured that there is little evidence of harm to low-risk pregnancies.

17.1 Background

The frequency of sexual activity in pregnancy varies widely, with a tendency to decrease with advancing pregnancy, particularly during the third trimester (Alder 1989; Barclay et al 1994; Aslan et al 2005; Gökyildiz & Beji 2005; Johnson 2011; Jones et al 2011). Factors contributing to decreased sexual activity include nausea, fear of miscarriage, fear of harming the baby, lack of interest, discomfort, physical awkwardness, fear of membrane rupture, fear of infection, and fatigue (Gökyildiz & Beji 2005; Brtnicka et al 2009; Jones et al 2011).

As well as concerns about the safety of sex during pregnancy, women may ask about sexual activity as a natural way to induce labour at term.

17.2 Discussing sexual activity

Most available evidence comes from observational studies and relies on self-reported results. In addition, studies tend to examine any sexual activity in pregnancy, so the effects of different frequencies of intercourse cannot be known. The evidence is inconsistent on the effects of sexual activity on the length of gestation.

The limited available evidence suggests that in low risk pregnancies:

- there is a low risk of adverse outcomes from sexual activity during pregnancy (Tan et al 2009; Kontoyannis et al 2011)
- sexual activity is unlikely to be associated with preterm birth (Sayle et al 2001; Yost et al 2006).

Nipple and genital stimulation have been advocated as a way of naturally promoting the release of endogenous oxytocin, and prostaglandins released in semen as a method of cervical ripening (Jones et al 2011). Overall, there is little evidence to support the theory that sexual activity has an effect in inducing labour at term. One prospective cohort study (n=200) found sexual activity at term was associated with earlier onset of labour and reduced requirement for labour induction at 41 weeks (Tan et al 2006); however, other similar studies have reported either no difference or a reduced rate of spontaneous labour prior to the date of scheduled labour induction (Schaffir 2006; Tan et al 2007).

While there is no evidence to suggest a clear benefit from restricted sexual activity in women who are at risk of preterm labour (eg previous spontaneous preterm birth) or antepartum haemorrhage because of placenta praevia, it may be advisable for them to abstain from sexual activity (Jones et al 2011).

Recommendation	Grade B
15.	Advise pregnant women without complications that safe sexual activity in pregnancy is not known to be associated with any adverse outcomes.
	Approved by NHMRC in June 2014; expires June 2019

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17.3 Practice summary: sexual activity

When: A woman asks about sexual activity during pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss any concerns:** Explain that the desire for sex commonly decreases as the pregnancy progresses and after the birth, and in most women gradually returns over time.
- ☐ **Provide reassurance:** Reassure women that sex is not likely to harm the pregnancy or increase the risk of preterm birth.
- ☐ **Take a holistic approach:** Explain that it is a woman's choice whether she is sexually active and she has the right not to consent. Also explain that childbirth and parenting may have an effect on a couple's sex life.

17.4 Resources

Johnson CE (2011) Sexual health during pregnancy and the postpartum. *J Sex Med* 8(5): 1267-84.

Jones C, Chan C, Farine D (2011) Sex in pregnancy. *CMAJ* 183(7): 815-18.

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Schaffir J (2006) Sexual intercourse at term and onset of labor. *Obstet Gynecol* 107(6):1310-1314.

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Tan PC, Yow CM, Omar SZ (2007) Effect of coital activity on onset of labour in women scheduled for labour induction: a randomized controlled trial. *Obstet Gynecol* 110(4): 820-26.

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18 Travel

Discussing the risks associated with travel during pregnancy enables women to make informed decisions and take measures to improve their safety.

18.1 Background

Studies have identified limited knowledge among women of factors associated with travel during pregnancy, including the correct use of seat belts and risks associated with overseas travel.

18.1.1 Risks associated with travel in pregnancy

- *Car travel*: Severe and non-severe injuries from motor vehicle accidents are associated with adverse maternal and fetal outcomes (Schiff & Holt 2005; El Kady et al 2006; Hitosugi et al 2006; Wahabi et al 2007; Aboutanos et al 2008; Klinich et al 2008; Kvarnstrand et al 2008; Schiff et al 2008; Weiss et al 2008; Cheng et al 2012), with a higher risk of adverse outcomes if the birth takes place during an admission for a motor vehicle accident (Vivian-Taylor et al 2012). Adverse maternal and fetal outcomes are more likely following a motor vehicle accident if a seat belt is not worn (Hyde 2003; Klinich et al 2008; Motozawa et al 2010). Airbag deployment does not appear to adversely affect maternal or fetal outcomes (Metz & Abbott 2006; Schiff et al 2010).
- *Long-distance air travel:* Commercial flights are normally safe for pregnant women (Freeman et al 2004; RCOG 2008; ACOG 2009) and frequent air travel during pregnancy (eg by flight crew members) does not appear to increase the risk of adverse outcomes (Irgens et al 2003; dos Santos Silva et al 2009). However, air travel at 34-37 weeks gestation has been associated with an increased risk of preterm birth (Chibber et al 2006; Magann et al 2010). Venous thrombosis, which is associated with long-distance air travel in the general population (Belcaro et al 2001), is more likely in pregnancy.
- *Overseas travel:* Exposure to infection is increased with travel to certain regions. Pregnant women are more likely than non-pregnant women to become infected with malaria (Coll et al 2008). Malaria during pregnancy is associated with spontaneous miscarriage, preterm birth, low birth weight, stillbirth, congenital infection and maternal death (Lagerberg 2008).

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18.2 Discussing travel during pregnancy

While the available evidence on travel in pregnancy is from low level studies and is heterogeneous, this evidence largely supports the NICE recommendations.

18.2.1 Car travel

High-level evidence from general populations supports the use of seat belts (Glassbrenner & Starnes 2009). However, studies examining pregnant women's knowledge and compliance of seat belt use and health professionals' counselling on the use of seat belts in pregnancy have found a lack of knowledge, compliance and advice given (McGwin et al 2004a; McGwin et al 2004b; Beck et al 2005; Jamjute et al 2005; Taylor et al 2005; Sirin et al 2007). Information provided to pregnant women can promote correct use of seat belts (McGwin et al 2004b).

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The Confidential Enquiry into Maternal Deaths in the United Kingdom provides the following advice on the correct use of seatbelts in pregnancy (Lewis & Drife 2001):

- straps should be placed above and below the 'bump', not over it
- use three-point seatbelts with the lap strap placed as low as possible beneath the 'bump', lying across the thighs with the diagonal shoulder strap above the bump lying between the breasts
- adjust the fit to be as snug as comfortably possible.

Recommendation	Grade B
16. Inform pregnant women about the correct use of seat belts; that is, three-point seat belts 'above and below the bump, not over it'.	
Approved by NHMRC in June 2014; expires June 2019	

18.2.2 Overseas travel

Overseas travel is increasingly common in pregnancy (McGovern et al 2007), and women are not always adequately prepared in terms of travel advice and insurance (Kingman & Economides 2003). Travel-related morbidity can be avoided by postponing the trip until after the birth, but this may not be feasible due to family desire or emergent situations. It is important to convey the risks associated with travel during pregnancy and to inform women of useful preventive interventions (McGovern et al 2007).

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Long-distance air travel

The policies of commercial airlines regarding travel by pregnant women vary, with most limiting air travel beyond 36 weeks gestation due to associated risks (Breathnach et al 2004). Some airlines require that women carry with them a letter from their doctor or midwife outlining the estimated due date, single or multiple pregnancies, the absence of complications, and fitness to fly for the duration of the flight(s) booked.

A survey of women's knowledge of air travel risks in pregnancy reported that only one-third of respondents sought travel advice and one-quarter were unaware of the risk of venous thrombosis (Kingman & Economides 2003). Advice on venous thrombosis provided by health professionals also varies (ranging from simple preventive measures to use of aspirin or heparin) (Voss et al 2004).

Preventive measures to minimise the risk of venous thrombosis include (ACOG 2009; Brenner 2009):

- using support stockings and periodic movement of the lower extremities
- avoiding restrictive clothing
- going for a walk occasionally
- maintaining hydration (eg drinking plenty of water, avoiding caffeine and not drinking alcohol).

Recommendation	Grade C
17. Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis and pulmonary embolism, although it is unclear whether there is additional risk during pregnancy.	
Approved by NHMRC in June 2014; expires June 2019	

Vaccinations

Some vaccinations for travel overseas are contraindicated in pregnancy. The NICE Guidelines (NICE 2008) advise:

- in general, killed or inactivated vaccines, toxoids and polysaccharides can be given during pregnancy, as can oral polio vaccine
- live vaccines are generally contraindicated because of largely theoretical risks to the baby
- measles, mumps, rubella, BCG and yellow fever vaccines should be avoided in pregnancy.

The risks and benefits of specific vaccines should be examined for each woman and the advice of a travel medicine doctor sought. Recommendations on vaccinations during pregnancy are included in the Australian Immunisation Handbook and the World Health Organization provides interactive maps on areas where the risk of specific infections is medium to high (see Section 18.4).

Travel insurance

Women should be advised to compare various policies and read the exclusion clauses carefully.

Practice point	
V	Pregnant women should be advised to discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas.
	Approved by NHMRC in June 2014; expires June 2019

Travel to malaria-endemic areas

Due to the risks associated with maternal malaria and potential adverse effects associated with preventive medications, the safest option is for women to avoid travel to malaria-endemic areas during pregnancy. When travel cannot be deferred, women should be advised about preventive measures and any risks associated with them.

Taking precautions against mosquito bites is an important preventive measure. Insecticide-treated bed nets have been shown to reduce malarial levels in the general population (Jacquerioz & Croft 2009) and adverse outcomes among pregnant women (Gamble et al 2006). Other barrier measures include:

- wearing clothes that have been pretreated with insecticide
- wearing long-sleeved treated clothing when outdoors in the evening and at night
- applying insect repellent regularly to exposed skin.

Barrier measures have the additional advantage of protecting against other mosquito-transmitted infections, such as dengue fever, Japanese encephalitis and yellow fever.

Recommendation	Grade B
18.	If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.
	Approved by NHMRC in June 2014; expires June 2019

Medications to prevent malaria infection reduce antenatal parasite prevalence and placental malaria among pregnant women, regardless of number of previous pregnancies (Garner & Gülmezoglu 2006). Among women having their first or second baby, they also have positive effects on birth weight and may reduce the risk of perinatal death (Garner & Gülmezoglu 2006).

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The use of preventive medicine depends on the level of risk (eg travel destination, season, length of stay). The Therapeutic Goods Administration (TGA) advises that the use of preventive medicines is justified in high-risk situations (TGA 2013).

Practice point	
W	Beyond the first trimester, mefloquine is approved for use to prevent malaria. Neither malarone nor doxycycline are recommended for prophylaxis any time during pregnancy. Chloroquine (or hydroxychloroquine) plus proguanil is safe but less effective so seldom used. For areas where only vivax is endemic, chloroquine or hydroxychloroquine alone is appropriate.
	Approved by NHMRC in June 2014; expires June 2019

Current information on specific medicines in pregnancy is available from the TGA and information on areas where there is a risk of transmission of malaria is available from the WHO and the Centers for Disease Control and Prevention (CDC) (see Section 18.4).

The risks and benefits of specific anti-malarial medications should be examined for each woman and the advice of an expert in travel medicine sought.

18.3 Practice summary: travel

When: Early in antenatal care and when women seek advice about travel during pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; infectious disease specialist; travel medicine specialist

- ☐ **Discuss the use of seat belts:** Explain that using a seat belt will not harm the baby and will improve outcomes should an accident occur. Describe how to fit the seat belt correctly.
- ☐ **Discuss air travel:** If a woman is planning long-distance air travel during pregnancy, she should discuss this with a health professional and make enquiries with individual airlines and travel insurers to assess whether planned travel is possible. If travel is arranged, provide advice on minimising the risk of venous thrombosis.
- ☐ **Discuss prevention of infection while travelling:** Explain that vaccinations required for travel to some destinations may be contraindicated during pregnancy. Provide advice on malaria prevention to women who are unable to defer travel to malaria-endemic areas.
- ☐ **Take a holistic approach:** Assist women who are planning to travel to access relevant services (eg health professionals with expertise in travel medicine). Advise that they take their antenatal record with them when travelling.

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WHO interactive disease maps

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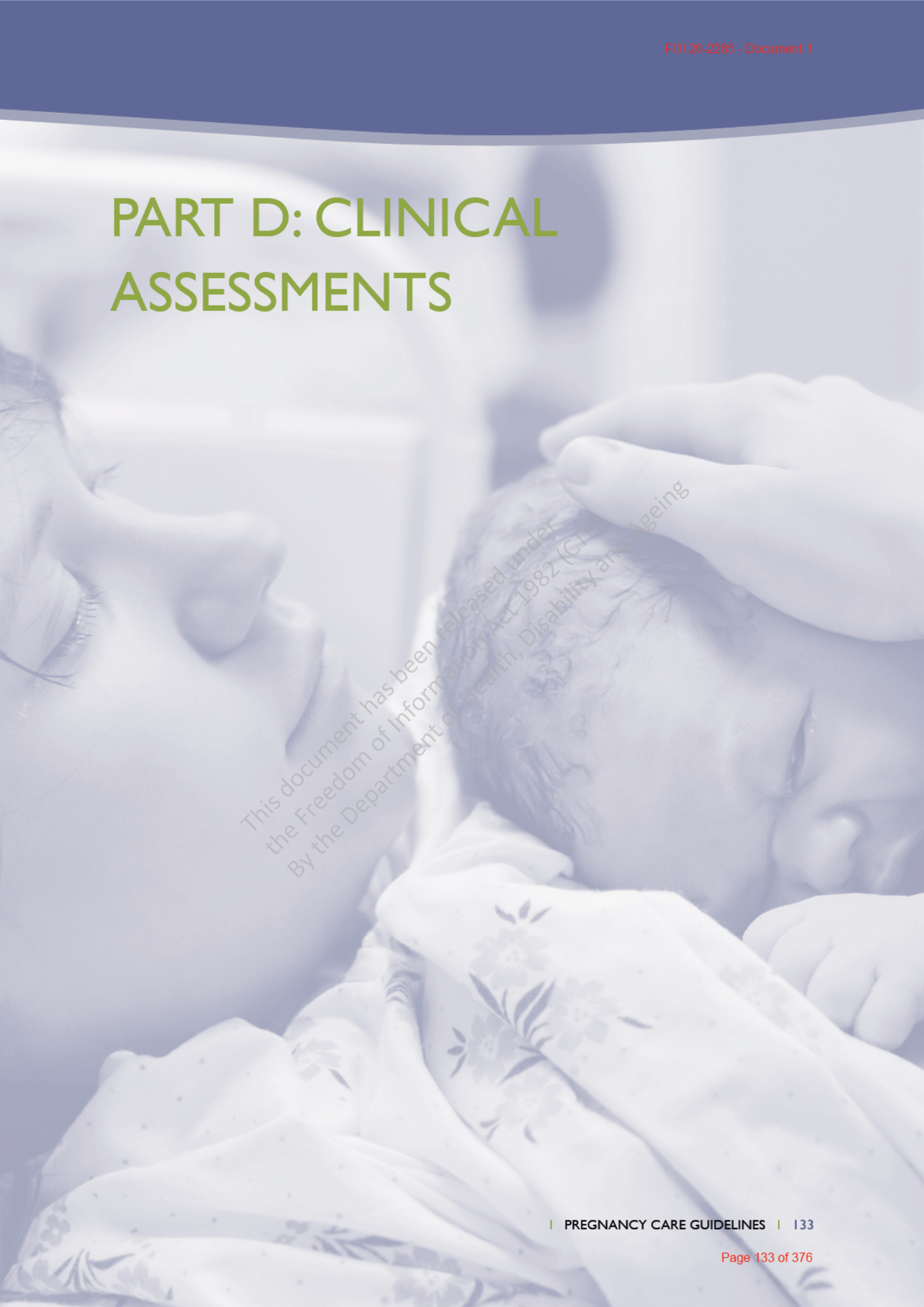
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PART D: CLINICAL ASSESSMENTS



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A range of clinical assessments is offered to promote and enhance the physical and emotional wellbeing of a woman and her baby during pregnancy. This section discusses assessments that are offered to all women during pregnancy. Recommendations are based on evidence about the accuracy of assessments in predicting complications in pregnancy and the effectiveness of interventions in reducing symptoms.

Table D1 presents a summary of advice on assessments during pregnancy considered a priority for inclusion in these Guidelines. Advice on other assessments, such as routine breast and pelvic examination (which are not recommended) is included in the NICE Guidelines (NICE 2008).

Table D1: Summary of advice for women about assessments during pregnancy

Clinical assessment	Advice about assessment	Chapter
Weight and body mass index	Calculation of body mass index at the first antenatal visit allows appropriate advice about nutrition and physical activity to be given during pregnancy	19
Gestational age	Ultrasound scanning is most accurate in determining gestational age between 8 and 14 weeks of pregnancy; after 24 weeks of pregnancy, the date of the last menstrual period is used	20
Fetal development and anatomy	Ultrasound scanning at 18-20 weeks of pregnancy detects structural anomalies	21
Fetal growth restriction and wellbeing	Fetal growth is assessed at each antenatal visit	22
	Promoting awareness of the normal pattern of fetal movement assists women in knowing when to seek advice if they perceive decreased or absent movements	
	Hearing the fetal heart is not predictive of pregnancy outcomes	
Risk of preterm birth	Discussing risk and protective factors for preterm birth may assist some women to reduce their risk	23
Blood pressure	Measuring blood pressure at the first antenatal visit allows identification of women who have chronic hypertension and may require additional monitoring during pregnancy	24
Proteinuria	Testing women for proteinuria at the first antenatal visit identifies existing kidney disease or urinary tract infection	25
Risk of pre-eclampsia	Routine measuring of blood pressure during pregnancy allows monitoring for new onset hypertension	26
	After the first antenatal visit, proteinuria is tested in women with risk factors for, or clinical indications of, pre-eclampsia	

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19 Weight and body mass index

Body mass index (prior to pregnancy or at the first antenatal visit) and weight gain during pregnancy are among the important determinants of the health of both mother and baby.

19.1 Background

The worldwide prevalence of obesity has risen dramatically in the past few decades and Australia is among those countries with the highest prevalence. There is a well-documented increased risk of complications for women who are overweight or obese during pregnancy. Conversely, being underweight during pregnancy can also affect the baby's health.

19.1.1 Calculating and interpreting BMI

Body mass index (BMI) is an index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is calculated by dividing weight by the square of height: weight (kg)/height (m)2. The WHO classification of BMI classification is given in Table D2.

Table D2: Classification of adult underweight, overweight and obesity according to BMI

BMI (kg/m²)	Classification
<18.50	Underweight
18.5-24.9	Healthy weight
25.0-29.9	Overweight
≥30.0	Obesity

Source: WHO 2000.

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19.1.2 Weight classification during pregnancy in Australia

Among women who gave birth in Australia in 2013 (AIHW 2016):[16]

- 19% were obese, 24% were overweight, 46% were in the normal weight range and 3% were underweight at the beginning of their pregnancy
- Aboriginal and Torres Strait Islander women were more likely than non-Indigenous women to be obese (25%) or underweight (7%), less likely to be in the normal weight range (37%) and had a similar likelihood of being overweight (23%)
- compared to women born in Australia, women born overseas were less likely to be obese (13 vs 21%) and more likely to be in the healthy weight range (51 vs 44%); rates of overweight (23 vs 25%) or underweight (4 vs 3%) were similar
- compared to women in the highest socioeconomic status quintile, those in the lowest quintile were more likely to be obese (25 vs 12%), less likely to be in the healthy weight range (40 vs 53%) and had a similar likelihood of being overweight (25 vs 23%) or underweight (both 4%)
- obesity was most common in very remote areas (25 vs 17% in major cities), prevalence of overweight was similar across geographical regions, prevalence of healthy weight decreased with increasing remoteness (47% in major cities to 36% in very remote areas) and underweight was more common in very remote areas (6 vs 3% in major cities).

16 Data from Victoria, Queensland, Western Australia, South Australia, Tasmania and the Australian Capital Territory.

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19.1.3 Risks associated with a low or high BMI

- *Underweight*: a low BMI is associated with increased risk of preterm birth, small-for-gestational-age babies and low birth weight (Liu et al 2016). A BMI <20 has been associated with an increased risk of a low birth weight baby among Aboriginal and Torres Strait Islander women (Panaretto et al 2006).
- *Overweight*: BMI >25 has been linked with stillbirth (Chu et al 2007a), congenital anomalies (Chu et al 2007b; Oddy et al 2009; Stothard et al 2009), neural tube defects (Rassmussen et al 2008; Oddy et al 2009; Stothard et al 2009), preterm birth (Viswanathan et al 2008; McDonald et al 2010), low birth weight (Viswanathan et al 2008; McDonald et al 2010), large-for-gestational-age babies (HAPO 2010), gestational hypertension (Callaway et al 2006; HAPO 2010), pre-eclampsia (HAPO 2008), gestational diabetes (Chu et al 2007b; Callaway et al 2006), postpartum haemorrhage (CMACE & RCOG 2010) and major depressive disorders (Bodnar et al 2009).
- *Obesity*: BMI ≥30 is also linked to the above outcomes and to an inability to initiate breastfeeding (Viswanathan et al 2008), postpartum weight retention (Thornton et al 2009) and increased rate of caesarean section (Callaway et al 2006; Chu et al 2007c; HAPO 2010).

19.1.4 Weight gain during pregnancy

While BMI prior to or early in pregnancy is independently associated with pregnancy outcomes, the amount of weight gained during pregnancy is also a contributing factor (Nohr et al 2008; Viswanathan et al 2008). The US Institute of Medicine (IOM) provides guidance on weight gain in pregnancy based on pre-pregnancy BMI (see Table D3).

Table D3: IOM 2009 recommendations for weight gain in pregnancy

Pre-pregnancy BMI (kg/m²)	Recommended weight gain (kg)	Rates of weight gain 2nd and 3rd trimester (kg/wk)
<18.5	12.5-18.0	0.51 (0.44-0.58)
18.5 to 24.9	11.5-16.0	0.42 (0.35-0.50)
25.0 to 29.9	7.0-11.5	0.28 (0.23-0.33)
≥30	5.0-9.0	0.22 (0.17-0.27)

Note: The IOM recommendations are consensus-based and were written in 2009. Since that time, evidence has accumulated on the need to tailor weight gain recommendations to the individual in women with a BMI ≥40; further research is required into the applicability of the IOM recommendations in these women. It should also be noted that the recommended weight gain ranges are indicative only and provide suggested limits rather than specific goals.

Source: (NHMRC 2013) based on (IOM 2009).

A recent systematic review of 23 studies from the US, Europe and Asia found 47% of women gained more and 23% gained less weight during pregnancy than recommended (Goldstein et al 2017). In an Australian study (de Jersey et al 2012), 36% of women gained weight according to guidelines, 26% gained inadequate weight and 38% gained excess weight. Among overweight women, 56% gained weight in excess of the IOM guidelines compared with 30% of those who started with a healthy weight ($P < 0.001$).

19.1.5 Risks associated with low or high weight gain during pregnancy

A recent systematic review found (Goldstein et al 2017):

- gestational weight gain below the recommendations was associated with higher risk of small-for-gestational age (OR 1.53; 95% CI 1.44 to 1.64) and preterm birth (OR 1.70; 95% CI 1.32 to 2.20); there was no clear difference in risk of caesarean section (OR 0.98; 95% CI 0.96 to 1.02).
- gestational weight gain above the recommendations was associated with higher risk of large-for-gestational age (OR 1.85; 95% CI 1.76 to 1.95), macrosomia (OR 1.95; 95% CI 1.79 to 2.11) and caesarean section (OR 1.30; 95% CI 1.25 to 1.35).

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Gestational weight gain above recommendations is also associated with hypertension (Crane et al 2009) and pre-eclampsia (DeVader et al 2007). High gestational weight gain in women who are obese has been associated with neonatal metabolic abnormalities (Crane et al 2009).

Weight gain before and during pregnancy not only affects the current pregnancy but may also contribute to future weight retention (Nohr et al 2008; Viswanathan et al 2008; Siega-Riz et al 2009).

19.2 Assessing BMI and weight gain

Routinely measuring women's height and weight and calculating BMI at an early antenatal contact is recommended in New Zealand (NZ MoH 2014), the United Kingdom (NICE updated 2016), the United States (ACOG 2013) and in Australia (RANZCOG 2017).

Encouraging self-monitoring of weight is recommended in New Zealand (NZ MoH 2014), while the NICE guidelines recommend confining repeated weighing to circumstances in which clinical management is likely to be influenced (NICE updated 2016). In Canada, weight gain tracking charts have been developed for the different weight classifications (Health Canada 2010).

Guidelines on the management of obesity in pregnancy have been developed in Australia (RANZCOG 2013), the United Kingdom (CMACE& RCOG 2010) and Canada (SOGC 2010). These guidelines are consistent in recommending that women who are obese be advised of the risks associated with obesity in pregnancy.

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19.2.1 Measuring height and weight and calculating BMI

Routine measurement of women's weight and height and calculation of BMI at the first antenatal contact allows identification of women who require additional care during pregnancy. When there is an accurate record of a woman's pre-pregnancy BMI, this may be used to inform gestational weight gain. Note that the BMI can be less accurate for assessing healthy weight in certain groups due to variations in muscle mass and fat mass (eg cut-offs lower than the WHO classifications are recommended for women from Asian backgrounds and higher cut-offs are recommended for women from Pacific Islands) (Duerenberg et al 2002; James et al 2004; Depres & Tchernof 2007).

Consensus-based recommendations		
VIII	Measure women's weight and height at the first antenatal visit and calculate their body mass index (BMI) to inform gestational weight gain.	
IX	Give women advice about appropriate weight gain during pregnancy in relation to their pre-pregnancy BMI (if recorded) or their BMI at the first antenatal visit.	
	Approved by NHMRC in December 2011; expires December 2016	UNDER REVIEW

19.2.2 Discussing weight and weight gain with women

Women who have a BMI that is below or above the healthy range are likely to require additional care during pregnancy. For women with an elevated BMI, there may be additional implications for care during pregnancy (eg the potential for poor ultrasound visualisation) and the birth (eg need for the birth to take place in a larger centre, difficulties with fetal monitoring). Relevant risks associated with a woman's BMI should be explained and the woman given the opportunity to discuss these and how they might be minimised.

Practice point		
X	Adopting a respectful, positive and supportive approach and providing information about healthy eating and physical activity in an appropriate format may assist discussion of weight management. This should be informed by appropriate education for health professionals.	
	Approved by NHMRC in December 2011; expires December 2016	UNDER REVIEW

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19.2.3 Recent evidence on routine weight monitoring

No systematic reviews on weight monitoring were identified. A recent Australian RCT (n=782) (Brownfoot et al 2015; Brownfoot et al 2016) addressed regular weighing at antenatal care visits plus advice on weight gain versus usual care. The study found no clear difference in weight gain, proportion of women gaining more weight than IOM recommended range or secondary outcomes (Brownfoot et al 2015). Among a subset of women who provided feedback (n=586), 73% were comfortable with being weighed routinely (Brownfoot et al 2016).

A pilot study (Daley et al 2015) (n=76) combined regular weighing by midwives and advice on weight gain with self-weighing between antenatal visits. Compared to usual care, there was no clear difference in the percentage of women gaining excessive weight during pregnancy or in mean depression and anxiety scores. Feedback in a subset of participants showed support for routine weighing among participants (9/12) and midwives (7/7).

When these two trials were pooled (n=711), there was no clear difference in excessive gestational weight (RR 1.05 95% CI0.95 to 1.16) or in mean weekly weight gain (0.01 kg per week 95%CI -0.03 to 0.05). Quality of evidence was low for both outcomes. There was no indication in the two trials that either excessive gestational weight gain or mean gestational weight gain differed in women of normal weight at the beginning of pregnancy compared with women who were overweight or obese.

A third study (from Australia) found that, compared to usual care, self-weighing plus advice on weight gain reduced weight gain among women who were overweight but not among women who were normal weight or obese before pregnancy. However, the intervention did not influence excessive weight gain (n=236) (Jeffries et al 2009).

Consensus-based recommendation	
X	At every antenatal visit, offer women the opportunity to be weighed and encourage self-monitoring of weight gain.
	Approved by NHMRC in October 2017; expires October 2022

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19.2.4 Supporting weight management

A recent meta-analysis of individual patient data from 36 RCTs, found that diet and physical activity based interventions during pregnancy reduced gestational weight gain (MD –0.70 kg; 95% CI –0.92 to –0.48 kg) and lowered the odds of caesarean section (OR 0.91; 95% CI 0.88 to 0.99) (i-WIP Collaborative Group 2017). There was no evidence that effects differ across subgroups of women (ie it is likely that women of all BMI groups could benefit from specific advice on diet and physical activity for weight management).

Consensus-based recommendation	
XI	At every antenatal visit, discuss weight change, diet and level of physical activity with all women.
	Approved by NHMRC in October 2017; expires October 2022

Nutrition and physical activity in pregnancy are discussed in Chapter 11.

19.2.5 Specific risk assessments required for women who are underweight or overweight/obese

A high BMI during pregnancy highlights the need to monitor fetal growth (RCOG 2014), gestational diabetes (Chu et al 2007b; Callaway et al 2006) and hypertensive disorders (Callaway et al 2006; HAPO 2008; 2010), congenital anomaly (Chu et al 2007b; Oddy et al 2009; Stothard et al 2009) and neural tube defects (Rassmussen et al 2008; Oddy et al 2009; Stothard et al 2009). Individual assessment of the risk of potential complications during the birth, including anaesthetic risk, may also be necessary for women with a BMI ≥40.

19.2.6 Other considerations

- Potential for sub-optimal visualisation on ultrasound for women with elevated BMI (delaying the ultrasound until 20 to 22 weeks pregnancy for women with BMI ≥30 may provide better results but needs to be balanced against the possibility of a delayed diagnosis of structural anomalies) (SOGC 2010).
- Antenatal consultation with an obstetric anaesthetist to identify any potential difficulties with venous access, regional or general anaesthesia for women with a BMI ≥40.
- Additional support for initiating breastfeeding for women with BMIs lower or higher than the healthy range.
- For women with a high BMI, ongoing nutritional advice following childbirth from an appropriate health professional, with a view to weight reduction and maintenance.

19.3 Practice summary: weight and BMI

When: At first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the purpose of assessing weight and weight gain during pregnancy:** For women with a BMI outside the healthy range, discuss the risks associated with a woman's weight being below or above the healthy range before, during pregnancy and in between pregnancies.
- ☐ **Engage women in discussions about weight gain:** Offer women the opportunity to be weighed and to discuss their weight gain since the last antenatal visit. Use the IOM recommendations to give women advice about the risks of inadequate or excessive weight gain, regardless of BMI. Provide advice on nutrition and lifestyle based on the Australian dietary and physical activity guidelines.
- ☐ **Take a holistic approach:** Provide women with culturally appropriate advice on the benefits of a healthy diet and regular physical activity.
- ☐ **Consider referral:** Women who are gaining weight at a rate below or above recommendations for gestational weight gain may benefit from referral for nutrition and lifestyle advice (eg from an accredited practising dietitian).

19.4 Resources

19.4.1 Health professionals

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20 Gestational age

Ultrasound examination in the first trimester allows accurate assessment of gestational age, and identifies and allows for appropriate care of women with multiple pregnancies.

20.1 Assessing gestational age

Methods used to assess gestational age include known date of ovulation, date of the last menstrual period (LMP) and diagnostic ultrasound. Diagnostic ultrasound is a sophisticated electronic technology, which uses pulses of high frequency sound to produce an image. This imaging enables measurement of the fetus and estimation of the gestational age.

20.1.1 Accuracy and effectiveness

The NICE guidelines reviewed the diagnostic value and effectiveness of screening methods in determining gestational age. Studies identified included a Cochrane review, four RCTs and a number of observational studies. Findings were as follows.

- *Accuracy of screening tests*: Evidence suggests that ultrasound is a more accurate predictor of gestational age than LMP (Okonofua 1989; Rowlands & Royston 1993; Alexander et al 1995; Crowther et al 1999; Taipale 2001; Savitz et al 2002; Olesen & Thomsen 2006). If only LMP is available, the estimated date of birth should be calculated as the first day of the LMP plus 282 days (Nguyen 1999). The estimated date of birth based on LMP is subject to significant error and will be influenced by the woman's age, number of previous pregnancies, BMI and whether she smokes (Savitz et al 2002; Morin 2005).
- *Measurements used:* Crown-rump length (CRL) measurement should be used in the first trimester for estimating gestational age (Selbing 1983; Taipale 2001). CRL > 90 mm is unreliable in estimating gestational age in second trimester and head circumference (HC) measurement, which appears more reliable than the biparietal diameter (BPD) (Johnsen et al 2006), should be used instead when establishing an estimated date of birth in the second trimester.

These findings are largely supported by subsequent lower level studies as follows.

- A small comparative study (n=30) (Martins et al 2008) suggested that fetal head and trunk (HT) volume could be more accurate than CRL for estimating gestational age, possibly due to flexion of the fetal head affecting CRL measurement.
- An Australian prospective cohort study (n=396) (McLennan & Schluter 2008) found that CRL measurement predictions were superior to BPD measurement predictions.
- A retrospective comparative study (n=165,908) (Dietz et al 2007) found that ultrasound-based estimates of gestational age were more accurate than LMP based-estimates of gestational age.
- A prospective cohort study (Hoffman et al 2008) found that LMP classified more births as post term than ultrasound (4.0% vs 0.7%), with a greater difference among young women, non-Hispanic Black and Hispanic women, women of non-optimal body weight and mothers of low birth weight babies.
- A retrospective study (n=40,730) (Koster et al 2008) showed that the estimation of gestational age from CRL was not consistent, with reported age for a single CRL differing by up to 10 days. This highlights the need to ensure that reference curves and standards are consistently applied.

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- A prospective cross-sectional study (n=200) (Salpou et al 2008) concluded that significant ethnic differences between mothers were not reflected in fetal biometry at second trimester. The results support the recommendation that ultrasound in practical health care can be used to assess gestational age in various populations with little risk of error due to ethnic variation.

A Cochrane review (Whitworth et al 2010), which compared selective versus routine use of ultrasound in pregnancy, concluded that ultrasound improves the early detection of multiple pregnancies.

20.1.2 Timing of assessment

The systematic review conducted to inform the development of these Guidelines identified one prospective cohort study (n=8,313) (Verberg et al 2008) that investigated the best time to conduct gestational age assessment. The study found that the earlier the ultrasound assessment in pregnancy (preferably between 10 and 12 weeks), the more accurate the prediction of date of birth. The results indicate that after 24 weeks of pregnancy, a reliable LMP provides better estimates.

Recommendations	Grade B
19.	Provide information and offer pregnant women who are unsure of their conception date an ultrasound scan between 8 weeks 0 days and 13 weeks 6 days to determine gestational age, detect multiple pregnancies and accurately time fetal anomaly testing.
20.	Use crown-rump length (CRL) measurement to determine gestational age. If the CRL is above 84 mm, estimate the gestational age using head circumference.
	Approved by NHMRC in December 2011; expires December 2016

Practice point	
Y	The timeframe for ultrasound assessment of gestational age overlaps with that for assessment of nuchal translucency thickness as part of testing for fetal chromosomal anomalies (11 weeks to 13 weeks 6 days), which may enable some women to have both tests in a single scan. This should only occur if women have been provided with an explanation of the purpose and implications of the tests and have given their informed consent to both tests.
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20.1.3 Calculating the estimated date of birth

The ability to estimate the range of dates during which birth may occur is influenced by the regularity and length of a woman's menstrual cycle, whether the date of ovulation (rather than that of intercourse) is known and the timing of any ultrasound assessment. Selection of the better estimate of the date of birth is based on the following criteria (Altman & Chitty 1997; Campbell Westerway 2000; Callen 2008):

- if the LMP was certain and menstruation regular, compare the LMP estimate to the ultrasound estimate:
  - *ultrasound performed between 6 and 13 weeks pregnancy*: if the two dates differ by 5 days or less, use the LMP estimate; if the dates differ by more than 5 days, use the ultrasound estimate
  - *ultrasound performed between 13 and 24 weeks pregnancy*: if the two dates differ by 10 days or less, use the LMP estimate; if the dates differ by more than 10 days, use the ultrasound estimate
- if the ultrasound was performed between 6 and 24 weeks pregnancy and the LMP was not certain or menstruation irregular, use the ultrasound estimate
- if the LMP was certain and menstruation regular and no ultrasound was performed between 6 and 24 weeks pregnancy (or none with a heartbeat), use the LMP estimate.

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Practice point	
Z	The agreed due date should not be changed without advice from another health professional with considerable experience in antenatal care.
	Approved by NHMRC in December 2011; expires December 2016

20.2 Other considerations in gestational age assessment

20.2.1 Safety

The NICE guidelines do not discuss the safety of ultrasound and the literature review conducted to inform these Guidelines identified only a single prospective observational study (n=52) (Sheiner et al 2007). The study found a negligible rise in temperature at the ultrasound beam's focal point. No studies were identified that assessed psychological harms to the mother, risk of overdiagnosis of placenta praevia or its contribution to anxiety.

20.2.2 Cost-effectiveness

An analysis of the cost implications of recommending routine ultrasound for gestational age assessment in the first trimester was undertaken to inform the development of these Guidelines (see separate document on economic analyses). The analysis aimed to balance the costs of additional scans undertaken against the savings resulting from:

- optimising the timing and performance of maternal serum testing and thereby reducing the number of diagnostic tests (chorionic villus sampling and amniocentesis) undertaken
- reducing rates of inductions (which in turn may reduce the rate of caesarean section).

The analysis was limited by a lack of data on privately funded ultrasounds and those carried out in hospitals and therefore could only identify implications for Medicare expenditure. Data limitations also meant that the analysis had to rely on a range of assumptions and on the literature, which is inconsistent in some areas. While some studies have found no significant difference in the rate of induction between women who have a first trimester scan and women who have both a first and second trimester scan (Crowther et al 1999; Ewigman et al 1990; Harrington et al 2005; Whitworth et al 2010), others have found decreased rates of induction associated with first trimester screening (Bennett et al 2004).

The analysis was therefore unable to conclusively determine whether the benefits of the recommendation would be likely to outweigh the costs. While a maximum number of additional scans (75,500) and associated costs ($A4.53 million) was estimated, the benefits vary considerably depending on whether a decrease in inductions is assumed; from $A230,000 if only improved power of maternal serum testing is included, to around $A17 million if a decrease in inductions is assumed, with an additional saving of around $A5 million if the link between induction and caesarean section is included.

20.2.3 Who should conduct the assessment?

A range of health professionals may be trained to carry out ultrasounds, including midwives, Aboriginal health workers and GPs. In addition to having appropriate training and accreditation, it is important that caseload is sufficient to maintain skills.

Minimum standards for health professionals conducting ultrasound assessments are disseminated by the Australian Society for Ultrasound in Medicine, the Australasian Sonographer Accreditation Registry, the Royal Australian and New Zealand College of Radiologists, and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

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Practice points	
AA	Ultrasound assessment of gestational age should only be performed by a person who has had specific training.
BB	Repeated ultrasound assessments should only be used when clinically indicated.
	Approved by NHMRC in December 2011; expires December 2016

20.2.4 Additional considerations for Aboriginal and Torres Strait Islander women

Accurately assessing gestational age is particularly important among Aboriginal and Torres Strait Islander women as:

- many women live in rural and remote areas and move to a larger centre to give birth, requiring logistical arrangements to be made around the estimated date of birth (see below)
- the higher rates of preterm birth and intrauterine growth restriction.

20.2.5 Issues of access in rural and remote areas

In remote regions, it may be difficult for women to access ultrasound examination early in pregnancy due to limited availability of adequate equipment, health professionals not offering ultrasound, a lack of accredited and trained professionals in some areas and the costs involved in travelling for the assessment (this is not consistently funded under State/Territory schemes to support travel and accommodation for women from rural and remote areas to access care and services). Health professionals should ensure that history taking is comprehensive and detailed, paying attention to ongoing assessment of fetal growth and wellbeing.

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20.3 Practice summary: gestational age

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss the purpose of the ultrasound**: Explain that it is intended to assess the gestational age of the baby (when the conception date is not known) to enable other tests that a woman elects to have to be conducted at the appropriate time.
- ☐ **If a woman chooses to have an ultrasound, arrange an appointment or referral**: Whether providing the ultrasound or arranging referral, ensure that the ultrasound takes place between 8 weeks 0 days and 13 weeks 6 days of pregnancy.

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21 Fetal development and anatomy

Ultrasound examination between 18 and 20 weeks gestation allows assessment of fetal development and anatomy. It is also used to estimate gestational age when this has not been assessed in the first trimester.

21.1 Background

Diagnostic ultrasound is a sophisticated electronic technology that uses pulses of high frequency sound to produce an image. This imaging can enable measurement of the baby, estimation of the gestational age and identification of structural anomalies. Gestational age assessment and testing for chromosomal anomalies in the first trimester are discussed in Chapter 20 and Part H. This section discusses the second trimester scan to assess the development and anatomy of the baby and the position of the placenta. This assessment is also known as the morphology scan.

21.1.1 Congenital anomalies in Australia

In Australia in 2010, congenital anomalies (including chromosomal and structural anomalies) was the leading cause of perinatal death in single pregnancies (29%) and accounted for 76.1% of neonatal deaths of babies born at 32-36 weeks gestation and 44.1% of deaths of babies born after 37 weeks gestation (Li et al 2012). Available data on neural tube defects among babies born to Aboriginal and Torres Strait Islander women show a higher overall prevalence than among non-Indigenous women (16.6 vs 7.3 per 10,000 total births in 2006-2008) (AIHW 2011).

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21.2 Offering assessment of fetal development and anatomy

21.2.1 Accuracy and effectiveness of ultrasound assessment of fetal development and anatomy

- *Gestational age:* While gestational age assessment using ultrasound is more accurate in the first trimester (Kalish et al 2004; Caughey et al 2008), some women may not have access to ultrasound until later in pregnancy. Gestational age has been successfully estimated in the second trimester (Johnsen et al 2005; Oleson & Thomsen 2006).
- *Structural anomalies:* Ultrasound has been used in the second trimester to detect anomalies of the heart (Perri et al 2005; Del Bianco et al 2006; Westin et al 2006; Fadda et al 2009), renal tract (Cho et al 2005) and umbilical artery (Cristina et al 2005), neural tube defects (Norem et al 2005) and anomalies resulting from exposure to alcohol (Kfir et al 2009). The rate of detection of structural anomalies is generally higher in the second than in the first trimester (Saltvedt et al 2006; Hildebrand et al 2010).
- *"Soft" markers:* While the combination of nuchal thickness and biochemical markers in the first trimester is more effective in identifying chromosomal anomalies (see Part H), some markers (eg echogenic bowel, short femur, short humerus, thickened nuchal fold, absent nasal bone) identified in the second trimester ultrasound occur more frequently in babies with chromosomal anomalies (Bottalico et al 2009). A combination of markers is more accurate than a single marker alone; for example, only 5% of babies with identified chromosomal anomalies had echogenic bowel as the only finding (Iruretagoyena et al 2010).
- *Placenta:* Second trimester ultrasound has effectively identified placental location (Cargill et al 2009), overlap of the cervical os (Robinson et al 2012), placental length (which may assist in identifying risk of having a small-for-gestational age baby) (McGinty et al 2012) and placenta praevia (which may resolve in women with [61%] and without [90%] a previous caesarean section) (Lal et al 2012).
- *Type of ultrasonography*: Accurate assessment can be performed using standard 2D ultrasonography. Assessment may be performed more rapidly using 3D ultrasonography (Benacerraf et al 2006; Pilu et al 2006).

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21.2.2 Timing of ultrasound assessment of fetal development and anatomy

Recommended timing of the ultrasound scan varies in international guidelines but is generally in the range of 18–20 weeks as:

- sensitivity in detecting structural anomalies increases after 18 weeks gestation (Cargill et al 2009)
- detection of structural anomalies before 20 weeks gestation gives women the choice of ending the pregnancy, where this is permitted under jurisdictional legislation.

Ultrasound can be used to assess gestational age up to 24 weeks gestation and to detect anomalies throughout the pregnancy.

Recommendation	Grade B
21.	Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.
	Approved by NHMRC in June 2014; expires June 2019

Practice point	
CC	Timing of the ultrasound will be guided by the individual situation (eg for women who are obese, visualisation may improve with gestational age).
	Approved by NHMRC in June 2014; expires June 2019

There is no benefit from repeated diagnostic ultrasound assessments unless clinically indicated. Repeated tests may increase costs for women, be inconvenient and have the potential to increase anxiety (eg through false positives). As well, access for some women is limited as this technology is not available in all settings.

Practice point	
DD	Repeated ultrasound assessment may be appropriate for specific indications but should not be used for routine monitoring.
	Approved by NHMRC in June 2014; expires June 2019

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21.3 Other considerations

21.3.1 Benefits and harms

A Cochrane review (Whitworth et al 2010) found a reduced number of inductions for 'prolonged pregnancy' and no significant differences in birth weight, size for gestational age, Apgar scores and rates of admission to neonatal intensive care between babies exposed to ultrasound in early pregnancy (before 24 weeks) and those not exposed. There were no significant differences in growth and development, visual acuity or hearing for children aged 8–9 years (Whitworth et al 2010). Follow-up at 15–16 years (n=4,458) found no significant effect on overall school performance (Stalberg et al 2009).

No studies were identified that assessed psychological benefits or harms to the mother. Women may not be fully informed about the purpose of routine ultrasound and may be made anxious, or be inappropriately reassured by scans (Garcia et al 2002; Lalor & Devane 2007). A small systematic review found insufficient evidence to support either high or low levels of feedback during ultrasound to reduce maternal anxiety and change maternal health behaviour (smoking, alcohol use) (Nabhan & Faris 2010).

21.3.2 Who should conduct the assessment?

Minimum standards for health professionals conducting ultrasound assessments are disseminated by the Australian Society for Ultrasound in Medicine, the Australasian Sonographer Accreditation Registry, the Australian Sonographers Association, the Royal Australian and New Zealand College of Radiologists, and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Practice point	
EE	Ultrasound assessment should only be performed by healthcare professionals with appropriate training and qualifications, within the appropriate scope (eg diagnostic or point of care).
	Approved by NHMRC in June 2014; expires June 2019

21.3.3 Access to ultrasound

The costs associated with ultrasound may limit access for some women, particularly if bulk-billed services are not available in their area.

In remote regions, it may be difficult for women to access ultrasound examination due to limited availability of appropriate equipment, a lack of accredited and trained professionals in some areas and the costs involved in travelling for the assessment. It is noted that there is a lack of consistency in funding across the States and Territories to support travel and accommodation for women from rural and remote areas to access care and services.

21.3.4 Cost effectiveness

An economic analysis carried out to inform the development of these Guidelines (see separate document on economic analyses) found that screening for congenital anomalies at 18–20 weeks is moderately cost-effective, without generating significant risks, although without driving substantive benefits. This excludes the positive psychological value of the information obtained from the ultrasound (which may be associated with improvements in fetal wellbeing) and benefits from the detection of placental problems and confirmation of gestational age, making these estimates fairly conservative.

21.4 Discussing assessment of fetal development and anatomy

Not all women will want an ultrasound and some may not understand the purpose of the assessment or think that it is being offered because there is something wrong with the pregnancy.

In discussing the ultrasound scan, it is important to explain:

- that it is the woman's decision whether the ultrasound takes place
- where ultrasound services are available if the woman chooses to have one
- that ultrasound does not detect all fetal and maternal anomalies
- any costs involved for the woman and the timeframe for receiving results
- choices if any anomalies are detected (some parents may not want an ultrasound if there is no change in birth outcomes).

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21.5 Practice summary: fetal development and anatomy

When: Between 18 and 20 weeks

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the purpose of the ultrasound**: Explain that ultrasound assessment is offered to all women to check the anatomy and growth of the baby and can also be used to estimate gestational age if this has not already been done.
- ☐ **If a woman chooses to have an ultrasound, arrange an appointment or referral**: When arranging referral, ensure that the ultrasound takes place before 20 weeks of pregnancy.
- ☐ **Take a holistic approach**: Provide advice to assist women in accessing services (eg availability of bulk-billed services and interpreters). For women who need to travel for assessment, explain the need to plan early and organise travel and accommodation. Provide information on available funding to assist with these costs.
- ☐ **Arrange follow-up**: Routinely make sure that women are informed of the results of the scan and document these in her antenatal record. If an anomaly is suspected or identified, offer women access to appropriate counselling and ongoing support by trained health professionals.

21.6 Resources

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22 Fetal growth restriction and well-being

Antenatal visits provide an opportunity to assess fetal growth, auscultate the fetal heart (although this cannot predict pregnancy outcomes) and encourage women to be aware of the normal pattern of fetal movements for their baby.

22.1 Fetal growth restriction[17]

Monitoring growth aims to identify small-for-gestational age babies, who are at increased risk of associated morbidity and mortality.

22.1.1 Background

Perinatal deaths associated with small-for-gestational age in Australia

In Australia in 2014, intrauterine growth restriction was the cause of 5.4% of perinatal deaths among singleton babies (AIHW 2016). Perinatal deaths associated with intrauterine growth restriction among singleton babies were most common at 28-31 weeks gestation (13.2%).

Risk factors for small-for-gestational age

Major risk factors (OR>2.0) for having a small-for-gestational age fetus or newborn include (RCOG 2014):

- maternal diabetes with vascular disease (OR 6.0, 95%CI 1.5 to 2.3), renal impairment (aOR 5.3, 95%CI 2.8 to 10) chronic hypertension (ARR 2.5, 95%CI 2.1 to 2.9) or antiphospholipid syndrome (RR 6.22, 95%CI 2.43 to 16.0).
- having a previous small-for-gestational age baby (OR 3.9, 95%CI 2.14 to 7.12) or stillbirth (OR 6.4, 95%CI 0.78 to 52.56)
- vigorous daily exercise (leading to being very out of breath) (aOR 3.3, 95%CI 1.5 to 7.2)
- maternal age >40 years (OR 3.2, 95%CI 1.9 to 5.4)
- PAPP-A <0.4 MoM (OR 2.6)
- using cocaine in pregnancy (OR 3.23, 95%CI 2.43 to 4.3)
- smoking 11 or more cigarettes a day in pregnancy (OR 2.21, 95%CI 2.03 to 2.4).
- maternal (OR 2.64, 95%CI 2.28 to 3.05) or paternal (OR 3.47, 95%CI 1.17 to 10.27) history of being a small-for-gestation-age baby is also a significant risk factor but may not be ascertainable.

Other risk factors (OR <2.0) include (RCOG 2014):

- maternal diet (low fruit intake pre-pregnancy) (AOR 1.9; 95%CI 1.3 to 2.8)
- nulliparity (OR 1.89; 95%CI 1.82 to 1.96)
- in vitro fertilisation (IVF) singleton pregnancy (OR 1.6; 95%CI 1.3 to 2.0)
- BMI ≥30 (RR 1.55; 95%CI 1.3 to 1.7)
- smoking up to 10 cigarettes a day (OR 1.54; 95%CI 1.39 to 1.7)

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17 The information and recommendations in this chapter have been adapted from RCOG (2014) *The Investigation and Management of the Small-For Gestational Age Fetus: Green-Top Guideline 31*. London: Royal College of Obstetricians and Gynaecologists. This involved mapping of clinical questions and rewording of recommendations for consistency within these Guidelines.

- history of pre-eclampsia (AOR 1.31; 95%CI 1.19 to 1.44)
- pregnancy interval of <6 months (AOR 1.26; 95%CI 1.18 to 1.33) or ≥60 months (AOR 1.29; 95%CI 1.2 to 1.39).

Practice point	
FF	Early in pregnancy, assess women for risk factors for having a small-for-gestational-age fetus/newborn.
	Approved by NHMRC in October 2017; expires October 2022

Consensus-based recommendations	
XII	When women are identified as being at risk of having a small-for-gestational-age fetus/newborn, provide advice about modifiable risk factors.
XIII	Refer women with a major risk factor or multiple other factors associated with having a small-for-gestational-age fetus/newborn for ultrasound assessment of fetal size and wellbeing at 28-30 and 34-36 weeks gestation.
	Approved by NHMRC in October 2017; expires October 2022

22.1.2 Protective and preventive factors

A high green leafy vegetable intake pre-pregnancy has been reported to be protective (AOR 0.44, 95% CI 0.24-0.81) (RCOG 2014).

Low-dose aspirin for women at risk of pre-eclampsia is likely to reduce intrauterine growth restriction by about 10% (whether taken earlier or later than 16 weeks) (Meher et al 2017).

22.1.3 Assessing fetal growth

Abdominal palpation

Low-level evidence from cohort and case-control studies performed in low-risk populations has consistently shown abdominal palpation to be of limited accuracy in the detection of a small-for-gestational age newborn (sensitivity 19-21%, specificity 98%) and severely small-for-gestational age newborn (<2.3rd centile, sensitivity 28%) (Kean & Liu 1996; Bais et al 2004). In mixed-risk populations, the sensitivity increases to 32-44% (Hall et al 1980; Rosenberg et al 1982). In high-risk populations sensitivity is reported as 37% for a small-for-gestational age newborn and 53% for severely small-for-gestational age newborn (Bais et al 2004) (low quality evidence).

Consensus-based recommendation	
XIV	Do not assess fetal growth based solely on abdominal palpation.
	Approved by NHMRC in October 2017; expires October 2022

Measurement of fundal height

A systematic review highlighted the wide variation of predictive accuracy of fundal height measurement for a small-for-gestational age newborn (Morse et al 2009). Although early studies reported sensitivities of 56-86% and specificities of 80-93% for fundal height detection of small-for-gestational age (Belizan et al 1978; Cnattingius et al 1984; Mathai et al 1987), a large study (n=2,941) reported fundal height to be less predictive with a sensitivity of 27% and specificity of 88% (LR+ 2.22, 95% CI 1.77 to 2.78; LR- 0.83, 95% CI 0.77 to 0.90) (Persson et al 1986). Maternal obesity, abnormal fetal lie, large fibroids, polyhydramnios and fetal head engagement contribute to the limited predictive accuracy of fundal height measurement. Fundal height is associated with significant intra- and inter-observer variation (Bailey et al 1989; Morse et al 2009) and serial measurement may improve predictive accuracy (Pearce & Campbell 1987).

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The impact on perinatal outcome of measuring fundal height is uncertain. A systematic review found only one trial (n=1,639), which showed that fundal height measurement did not improve any of the perinatal outcomes measured (Neilson 2000).

Consensus-based recommendation	
XV	At each antenatal visit from 24 weeks, measure fundal height in centimetres.
	Approved by NHMRC in October 2017; expires October 2022

Practice points	
GG	Refer women after 24 weeks gestation with a fundal height ≥3cm less than expected, a single fundal height which plots below the 10th centile or serial measurements that demonstrate slow or static growth by crossing centiles for ultrasound measurement of fetal size.
HH	Refer women in whom measurement of fundal height is inaccurate (for example: BMI >35, large fibroids, polyhydramnios) for serial assessment of fetal size using ultrasound.
	Approved by NHMRC in October 2017; expires October 2022

Customised charts

Customised fundal height charts are adjusted for maternal characteristics (eg maternal height, weight). As no RCTs have compared customised with non-customised fundal height charts, the evidence for their effectiveness in improving outcomes such as perinatal morbidity/mortality is lacking (RCOG 2014).

22.2 Fetal movements[18]

Fetal movement assessment is widely used to monitor fetal wellbeing (Froen et al 2008a; O'Sullivan et al 2009) and is most commonly undertaken through subjective maternal perception. Fetal movement counting is a more formal method to quantify fetal movements (Mangesi & Hofmeyr 2007). Maternal perception rather than formal fetal movement counting is recommended in Australia (Gardener et al 2017) and in the United Kingdom (NICE 2008b; RCOG 2011). Maternal reporting of decreased fetal movement occurs in 5–15% of pregnancies in the third trimester (Froen 2004b; Heazell et al 2008; Flenady et al 2009).

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22.2.1 Background

Risks associated with decreased fetal movement

Stillbirth, which affects over 2,700 families in Australia and New Zealand each year (Hilder et al 2014), is often preceded by maternal perception of decreased fetal movement (Froen 2004a; Erlandsson et al 2012). Decreased fetal movement is also strongly linked to other adverse perinatal outcomes such as neurodevelopmental disability, infection, feto-maternal haemorrhage, umbilical cord complications, low birth weight and fetal growth restriction (Froen et al 2008b; Heazell & Froen 2008). Decreased fetal movements for some women may be associated with placental dysfunction or insufficiency, which could lead to fetal growth restriction and/or stillbirth (Warrander et al 2012).

22.2.2 Information on fetal movements

Antenatal education about fetal movement has been shown to reduce the time from maternal perception of decreased fetal movements to health-seeking behaviour (Tveit et al 2009). A reduction in stillbirth rates has been associated with increased awareness of decreased fetal movements among women and health professionals

18 The information and recommendations in this chapter have been adapted from Gardener G, Daly L, Bowring V et al (2017) *Clinical Practice Guideline for the Care of Women with Decreased Fetal Movements*. Brisbane: The Centre of Research Excellence in Stillbirth. This involved mapping of clinical questions and rewording of recommendations for consistency within these Guidelines.

in both the overall study population (OR 0.67, 95% CI: 0.49-0.94) and in women with decreased fetal movements (aOR 0.51, 95% CI: 0.32 to 0.81) (Tveit et al 2009; Saastad et al 2010).

However, many women do not receive adequate information about fetal movements (Saastad et al 2008; Peat et al 2012). A recent study found that more than one-third of women at 34 weeks gestation or later did not recall receiving information from their healthcare professional about fetal movement (McArdle et al 2015). Another study found that information provided by midwives was not always consistent with evidence-based guidelines (Warland & Glover 2017). Pregnant women preferred to be given as much information as possible about fetal movements and cited health professionals as a trustworthy source (McArdle et al 2015).

Consensus-based recommendations	
XVI	Early in pregnancy provide women with verbal and written information about normal fetal movements. This information should include a description of the changing patterns of movement as the fetus develops, normal wake/sleep cycles and factors that may modify the mother's perception of fetal movements.
XVII	Advise women with a concern about decreased fetal movements to contact their health professional immediately.
	Approved by NHMRC in October 2017; expires October 2022

Practice point	
II	Emphasise the importance of maternal awareness of fetal movements at every antenatal visit.
	Approved by NHMRC in October 2017; expires October 2022

22.2.3 Monitoring fetal movements

A Cochrane review assessed the effect of formal fetal movement counting and recording (eg using kick charts) on perinatal death, major morbidity, maternal anxiety and satisfaction, pregnancy intervention and other adverse pregnancy outcomes (5 RCTS; n=71,458) (Mangesi et al 2015). The review did not find sufficient evidence to inform practice. In particular, no trials compared fetal movement counting with no fetal movement counting. Only two studies compared routine fetal movements with standard antenatal care. Indirect evidence from a large cluster-RCT (Grant et al 1989) suggested that more babies at risk of death were identified in the routine fetal monitoring group but this did not translate to reduced perinatal mortality.

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Consensus-based recommendation	
XVIII	Do not advise the use of kick charts as part of routine antenatal care.
	Approved by NHMRC in October 2017; expires October 2022

Practice point	
JJ	Maternal concern about decreased fetal movements overrides any definition of decreased fetal movements based on numbers of fetal movements.
	Approved by NHMRC in October 2017; expires October 2022

22.2.4 Discussing fetal movements

Information given to women should include that:

- most women are aware of fetal movements by 20 weeks of gestation, and although fetal movements tend to plateau at 32 weeks of gestation, there is no reduction in the frequency of fetal movements in the late third trimester

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- patterns of movement change as the baby develops, and wake/sleep cycles and other factors (eg maternal weight and position of the placenta) may modify the woman's perception of movements
- taking a short amount of time each day to be aware of the baby's movements is a good way for women to 'check on' the baby
- most women (approximately 70%) who perceive a single episode of decreased fetal movements will have a normal outcome to their pregnancy (RCOG 2011)
- if a woman reports decreased fetal movement, tests can be undertaken to assess the baby's wellbeing.

22.3 Fetal heart rate assessment

Auscultation of the fetal heart has traditionally formed an integral part of a standard antenatal assessment.

22.3.1 Auscultation

Routine auscultation of the fetal heart rate is not recommended in the United Kingdom (NICE 2008a).

Although successful detection of a fetal heart confirms that the baby is alive, it does not guarantee that the pregnancy will continue without complications (Rowland et al 2011) and is unlikely to provide detailed information on the fetal heart rate such as decelerations or variability (NICE 2008a).

The sensitivity of Doppler auscultation in detecting the fetal heart is 80% at 12 weeks + 1 day gestation and 90% after 13 weeks (Rowland et al 2011). Attempts to auscultate the fetal heart before this time may be unsuccessful, and lead to maternal anxiety and additional investigations (eg ultrasound) in pregnancies that are actually uncomplicated (Rowland et al 2011). It is unlikely that a fetal heart rate will be audible before 28 weeks if a Pinard stethoscope is used (Wickham 2002).

Although there is no evidence on the psychological benefits of auscultation for the mother, it may be enjoyable, reduce anxiety and increase mother-baby attachment.

Consensus-based recommendation	
XIX	If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and either Doppler or a Pinard stethoscope from 28 weeks.
	Approved by NHMRC in October 2017; expires October 2022

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22.3.2 Cardiotocography

Electronic fetal heart rate monitoring is not recommended as a routine part of antenatal care in the United Kingdom (NICE 2008a) or Canada (Liston et al 2007).

A Cochrane review found no clear evidence to support the use of cardiotocography in women at low risk of complications (Grivell et al 2010).

Anxiety levels in women who undergo routine cardiotocography are increased. This reaction seems to be influenced by the perception of fetal movement during the examination and is more evident in women whose pregnancies are affected by complications (Mancuso et al 2008).

Consensus-based recommendation	
XX	Do not routinely use electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy.
	Approved by NHMRC in October 2017; expires October 2022

22.4 Practice summary: Fetal growth restriction and wellbeing

Fetal growth restriction

When: At all antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal growth**: Early in pregnancy, give all women appropriate written information about the measurement of fetal growth and an opportunity to discuss the procedure with a health professional.
- ☐ **Take a consistent approach to assessment**: When measuring fundal height, use a non-elastic tape with numbers facing downwards so that an objective measurement is taken. Measure from the variable point (the fundus) and continue to the fixed point (the symphysis pubis) or vice versa. Take and document measurements in a consistent manner.
- ☐ **Take a holistic approach**: Abdominal palpation provides a point of engagement between the health professional and mother and baby.

Fetal movements

When: At antenatal visits from 20 weeks

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal movement patterns**: Emphasise the importance of the woman's awareness of the pattern of movement for her baby and factors that might affect her perception of the movements.
- ☐ **Advise early reporting**: Women should report perceived decreased fetal movement on the same day rather than wait until the next day.
- ☐ **Take a holistic approach:** Support information given with appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video) and details of whom the woman should contact if decreased fetal movements are perceived.

Fetal heart rate

When: At antenatal visits between 12 and 26 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal heart rate**: Explain that listening to the fetal heart does not generally provide any information about the health of the baby and that other tests (such as ultrasound) are relied upon for identification of any problems with the pregnancy.
- ☐ **Take a holistic approach:** Some women may be reassured by hearing the fetal heart beat.

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23 Risk of preterm birth

While there are many known and unknown causes of preterm birth, women identified as being at risk may benefit from advice about risk and protective factors.

23.1 Background

Preterm birth is defined as birth before 37 completed weeks of pregnancy (WHO 2012). Sub-categories of preterm birth are based on weeks of gestational age: early preterm (<34 weeks), very preterm (28 to <32 weeks) and extremely preterm (<28 weeks). This section is concerned with spontaneous preterm birth as opposed to planned preterm birth.

23.1.1 Incidence of preterm birth

In Australia in 2014 (AIHW 2016):

- overall, 8.6% of babies were born preterm, with most of these births occurring at gestational ages between 32 and 36 completed weeks
- the average gestational age for all preterm births was 33.3 weeks
- babies whose mothers smoked during pregnancy were more likely to be born preterm (13%) than those whose mothers did not smoke during pregnancy (8%).
- other characteristics associated with increased likelihood of preterm birth included:
  - babies born in multiple births: 63% of twins and all (100%) of other multiples (triplets and higher) were preterm, compared with 7% of singleton babies
  - babies born to mothers usually residing in more remote areas: 13% in very remote areas compared with 8% in major cities
  - babies of younger (<20 years) and older (≥40 years) mothers: 11% and 12% were preterm, compared with 8% of babies with mothers aged 20-39 years.

Nationally in 2014, approximately 14% of babies of Indigenous mothers were born preterm, compared with 8% of babies of non-Indigenous mothers (AIHW 2016); similar rates were found in an earlier West Australian study (14.8 and 7.6%) (Langridge et al 2010). However, a study in a Melbourne hospital found no significant difference in risk of preterm birth between Indigenous and non-Indigenous babies and mothers (Indigenous babies aOR 1.19, 95%CI 0.77 to 1.87, Indigenous mothers aOR 0.97 95%CI 0.52 to 1.80) (Whish-Wilson et al 2016).

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23.1.2 Risks associated with preterm birth

Preterm birth is associated with perinatal mortality, long-term neurological disability (including cerebral palsy), admission to neonatal intensive care, severe morbidity in the first weeks of life, prolonged hospital stay after birth, readmission to hospital in the first year of life and increased risk of chronic lung disease (WHO 2012). Preterm birth can have a serious emotional impact on the family. In Australia in 2014 (AIHW 2016):

- preterm babies were more likely to be admitted to a special care nursery or neonatal intensive care unit (72%) than babies born at term (10%) or post-term (13%)
- spontaneous preterm birth accounted for 14% of all perinatal deaths and one third (33%) of perinatal deaths of babies of Indigenous mothers.

23.2 Identifying women at increased risk of giving birth preterm

A range of risk and protective factors influence the likelihood of preterm birth. While many risk factors are not modifiable during a woman's current pregnancy, addressing modifiable risk factors may reduce risk of preterm birth. It should also be noted that many women who experience preterm birth have no risk factors.

23.2.1 Significant risk factors

There is a significant association between preterm birth and:

- **social disadvantage** (OR 1.27, 95%CI: 1.16 to 1.39) (Ncube et al 2016) **and lower levels of maternal education** (RR 1.48; 95%CI 1.29 to 1.69) (Ruiz et al 2015)
- **previous preterm birth** (absolute recurrence rate among women with a singleton pregnancy and previous preterm singleton birth 20%, 95% CI 19.9-20.6) (Kazemier et al 2014)
- **pre-existing** (p=0.002) (Kock et al 2010) **or gestational diabetes** (AIHW 2010)
- **current urogenital infections: eg chlamydia** [OR 1.60; 90%CI 1.01 to 2.5] (John Hopkins Study Team 1989), **bacterial vaginosis** [OR 1.85; 95%CI 1.62 to 2.11] (Flynn et al 1999)
- **alcohol consumption** (OR 1.34; 95%CI 1.28 to 1.41) (Aliyu et al 2010), **in a dose-response fashion** (Sokol et al 2007; Patra et al 2011)
- **smoking at the first antenatal visit** (aOR 1.42, 95%CI 1.27 to 1.59) (Bickerstaff et al 2012) **and active smoking during pregnancy** (aOR 1.53, 95%CI 1.05 to 2.21) (Fantuzzi et al 2007), **with risk further increased among women smoking more than 10 cigarettes a day compared to those smoking 1-9 cigarettes per day** (aOR 1.69 vs 1.54) (Fantuzzi et al 2007).

23.2.2 Other factors

Systematic reviews of RCTs found:

- **women who were overweight and obese who participated in aerobic exercise for 30-60 minutes three to seven times per week had a lower risk of preterm birth <37weeks** (RR 0.62, 95% CI 0.41 to 0.95) **compared to controls** (Magro-Malosso et al 2016)
- **no clear difference in risk of preterm birth <37 weeks with treatment of periodontal disease** (RR 0.87; 95%CI 0.70 to 1.10; low quality evidence) (Iheozor-Ejiofor et al 2017).

Systematic reviews of observational studies show the following associations with preterm birth:

- ***country of origin/ethnicity*: odds of very preterm birth among East African immigrants were higher than among Australian-born women** (aOR 1.55, 95%CI 1.27 to 1.90) (Belihu et al 2016) **and higher among African American women than among Caucasian women** (pooled OR 2.0; 95%CI 1.8 to 2.2), **with no significant association for Asian or Hispanic ethnicity** (Schaaf et al 2013)
- ***weight*: risk was increased among women who were obese and gained more than the IOM recommendations** (aOR 1.54; 95% CI 1.09 to 2.16) (Faucher et al 2016)
- ***emotional health and wellbeing*: increased risk was associated with low social support compared to high social support** (OR 1.22, 95%CI 0.84 to 1.76); **stress** (OR 1.52, 95%CI 1.18, to 1.97) (Hetherington et al 2015); **untreated depression** (OR 1.56; 95%CI 1.25 to 1.94) (Jarde et al 2016) **and anxiety** (RR 1.50, 95%CI 1.33 to 1.70) (Ding et al 2014), (OR 1.70, 95%CI 1.33 to 2.18) (Rose et al 2016) **but not with maternal personality traits** (Chatzi et al 2013)

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- *exposure to antidepressants*: risk was increased among women exposed to antidepressants during pregnancy compared to women with depression but without antidepressant exposure (OR 1.17, 95%CI 1.10 to 1.25) (Eke et al 2016), (RR 2.85, 95%CI 2.00 to 4.07) (Huang et al 2014a); and risk was significantly increased with exposure in the third trimester (aOR 1.96, 95%CI 1.62 to 2.38) but not in the first trimester (aOR 1.16, 95%CI 0.92 to 1.45) (Huybrechts et al 2014)
- *environmental factors*: increased risk was associated with high environmental temperature (Beltran et al 2013), especially heat stress (Carolan-Olah & Frankowska 2014); exposure to passive smoke in any place (OR 1.20, 95%CI 1.07 to 1.34) or at home (OR 1.16, 95%CI 1.04 to 1.30) (Cui et al 2016); risk associated with exposure to fine particulate matter was unclear due to significant heterogeneity between studies (Sun et al 2015)
- *pre-existing conditions*: risk of preterm birth was increased among women with hepatitis C (OR 1.62, 95%CI 1.48 to 1.76, P < 0.001) (Huang et al 2015), human papilloma virus (OR 2.12, 95%CI 1.51 to 2.98, P<0.001) (Huang et al 2014c), hypothyroidism (OR 1.19, 95%CI 1.12 to 1.26; P < 0.00001) and hyperthyroidism (OR, 1.24, 95%, CI 1.17-1.31; P < .00001) (Sheehan et al 2015) but not hepatitis B (OR 1.12, 95%CI 0.94 to 1.33) (Huang et al 2014b).
- *lifestyle factors*: incidence of preterm birth (4.5% vs 4.4%; RR 1.01, 95%CI 0.68 to 1.50) was similar among women in the normal BMI category undertaking aerobic exercise during pregnancy and controls (Di Mascio et al 2016); risk was increased among women with serum vitamin D levels lower than 50 nmol/L (OR 1.29, 95%CI 1.16 to 1.45) (Qin et al 2016); and there was no clear or statistically significant relationship between preterm birth and shift work (van Melick et al 2014), multivitamin use (Johnston et al 2016) or influenza vaccination during pregnancy (Fell et al 2015)
- *history of gynaecological procedures*: risk was increased among women with a history of dilatation and curettage (D&C) (OR 1.29, 95% CI 1.17 to 1.42) or multiple D&Cs (OR 1.74, 95%CI 1.10 to 2.76) (Lemmers et al 2016); surgically induced termination of pregnancy (OR 1.52, 95%CI 1.08 to 2.16); surgically managed miscarriage (OR 1.19, 95%CI 1.03 to 1.37) (Saccone et al 2016); loop electrosurgical excision procedure compared to women with no history of cervical dysplasia (pooled RR 1.61, 95%CI 1.35 to 1.92) but not when compared to women with a history of cervical dysplasia but no cervical excision (pooled RR 1.08, 95%CI 0.88 to 1.33) (Conner et al 2014); and treatment for cervical intraepithelial neoplasia before (OR 1.4, 95%CI 0.85 to 2.3) or during pregnancy (OR 6.5, 95%CI 1.1 to 37) (Danhof et al 2015).

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Consensus-based recommendation	
XXI	When women are identified as being at risk of giving birth preterm based on the presence of risk factors, provide advice about modifiable risk factors.
	Approved by NHMRC in October 2017; expires October 2022

23.3 Prediction and prevention

23.3.1 Cervical length measurement

Systematic reviews of randomised controlled trials found:

- among women with threatened preterm labour, those whose cervical length had been measured had a significantly lower rate of preterm birth <37 weeks (22.1 vs 34.5%; RR 0.64; 95%CI 0.44 to 0.94; 3 studies); management of women with a cervical length lower than the study threshold differed between studies (further observation in one study and administering tocolytics and antenatal corticosteroids in the other studies) (Berghella et al 2016)
- no difference in incidence of maternal and neonatal infection among women with preterm premature rupture of the membranes who did or did not undergo transvaginal ultrasound of cervical length measurement (Berghella et al 2013).

Systematic reviews of observational studies were heterogeneous in terms of population and cut-off thresholds used but suggest that preterm birth is better predicted at 14 to 20 weeks rather than later, using a shorter cervical length as the cut-off threshold (Crane & Hutchens 2008; Domin et al 2010; Honest et al 2012; Conde-Agudelo & Romero 2015).

The evidence on cervical length measurement is emerging and will be reviewed as part of the next update of these Guidelines (anticipated for release in late 2018).

23.3.2 Holistic preventive strategies

Systematic reviews that evaluated holistic models of care and their effect on preterm birth found:

- a significant effect in reducing risk of preterm birth among women receiving midwifery-led care compared to other models of care for childbearing women and their infants (average RR 0.76, 95%CI 0.64 to 0.91; n=13,238; 8 studies; high quality) (Sandall et al 2016)
- no significant difference among:
  - women receiving group antenatal care compared to those receiving standard care (RR 0.87, 95%CI 0.70 to 1.09; 11 studies) (Carter et al 2016) and (RR 0.75, 95%CI 0.57 to 1.00; 3 3 studies; n=1,888, moderate quality) (Catling et al 2015)
  - women randomised to specialist preterm birth programs compared to those receiving standard care (RR 0.92, 95%CI 0.76 to 1.12; 15 RCTs) (Fernandez Turienzo et al 2016)
  - low risk women receiving a reduced number of antenatal visits (RR 1.02, 95%CI 0.94 to 1.11; 7 studies, n=53,661, moderate quality) (Dowswell et al 2015)
  - women receiving additional social support compared to those receiving standard care (RR 0.92, 95%CI 0.83 to 1.01; 11 RCTs; n=10,429) (Hodnett et al 2010), including adolescent women (RR 0.67; 95%CI 0.42 to 1.05; 4 studies; n=684) (Sukhato et al 2015)
  - women receiving telephone support during pregnancy compared to women receiving routine care or other support (RR 0.91, 95%CI 0.77 to 1.08, 4 RCTs; n=3,992) (Lavender et al 2013)
  - women in preterm labour using relaxation techniques compared to those not using relaxation techniques (RR 0.95; 95%CI 0.57 to 1.59; 11 RCTs; n=833) (Khianman et al 2012)
- successful approaches to increasing access to antenatal care and reducing preterm birth among Aboriginal and Torres Strait Islander women include community-based collaborative antenatal care and community-based support (Rumbold & Cunningham 2008) and partnership between Aboriginal grandmothers, Aboriginal Health Officers, midwives and existing antenatal care services (Bertilone & McEvoy 2015).

23.4 Discussing risk of giving birth preterm

When risk of preterm birth is increased, modifiable risk factors should be addressed (Freak-Poli et al 2009; Kiran et al 2010; Carter et al 2011). Based on the evidence discussed in Section 23.2, discussion with women at risk of preterm birth can include the benefits of:

- having adequate social and emotional support
- quitting tobacco smoking and avoiding exposure to passive smoke
- not drinking alcohol during pregnancy
- having tests for urogenital infections
- participating in regular exercise, particularly if they are overweight or obese.

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Women can also be advised that risk is not reduced by supplementing with Vitamins C or E (Rumbold et al 2015a; Rumbold et al 2015b) or probiotics (Othman et al 2007; Hauth et al 2010).

A Cochrane review found no evidence to support or refute bed rest for prevention of preterm birth (Sosa et al 2015). A subsequent cohort study found that, among women at high risk of preterm birth, activity restriction was associated with increased risk of preterm birth (Levin et al 2017).

23.5 Practice summary: risk of preterm birth

When: A woman has identified risk factors for giving birth preterm

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

Discuss lifestyle factors associated with preterm birth

- ☐ Explain that smoking during pregnancy makes it more likely that the baby will be born preterm and also causes other serious risks to the pregnancy.
- ☐ Explain that not drinking alcohol during pregnancy is the safest option.
- ☐ Offer testing for urogenital infection if the woman has risk factors for preterm birth. If results are positive, consider counselling, contact tracing, partner testing and treatment, and repeat testing.
- ☐ Discuss protective factors
- ☐ Explain that moderate physical activity during pregnancy has a range of health benefits, particularly for women who are overweight or obese.

Take a holistic approach

- ☐ Provide information on relevant community supports (eg smoking cessation programs, drug and alcohol services, physical activity groups).
- ☐ Consider whether a woman may be at increased risk if she has recently arrived from a country with a high prevalence of preterm birth.
- ☐ Provide social and emotional support and access to continuity of carer, where possible

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24 Blood pressure

Measuring blood pressure at the first antenatal visit aims to identify women with chronic hypertension (high blood pressure), which may be related to existing kidney disease. After 20 weeks, high blood pressure and/or proteinuria may indicate pre-eclampsia.

24.1 Background

Healthy pregnancy is characterised by a fall in blood pressure, detectable in the first trimester, usually reaching its lowest point in the second trimester and rising to pre-conception levels towards the end of the third trimester (Lowe et al 2015). Hypertensive disorders during pregnancy include (Lowe et al 2015):

- *chronic hypertension*: blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic confirmed before pregnancy or before 20 completed weeks pregnancy, without a known cause (*essential hypertension*), associated with a secondary cause such as existing kidney disease (*secondary hypertension*) or associated with measurement in a healthcare setting (*white coat hypertension*)
- *gestational hypertension*: new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic) after 20 weeks pregnancy without any maternal or fetal features of pre-eclampsia, followed by return of blood pressure to normal within 3 months after the birth
- *pre-eclampsia*: a multi-system disorder characterised by hypertension and involvement of one or more other organ systems and/or the fetus, with raised blood pressure after 20 weeks pregnancy commonly the first manifestation and proteinuria a common additional feature (although not required to make a clinical diagnosis) (see Chapter 26)
- *superimposed pre-eclampsia*: development of one or more of the systemic features of pre-eclampsia after 20 weeks pregnancy in a woman with chronic hypertension.

24.1.1 Prevalence of high blood pressure

- In Australia in 2014-15 (AIHW 2016), 22% of adult women had measured high blood pressure, excluding those taking medication.
- Among Indigenous adults, 18% of women had measured high blood pressure (AIHW 2016).
- A substantial number of pregnancies (0.2-5%) are complicated by pre-existing hypertension (Lowe et al 2015).
- Pre-eclampsia in the second half of pregnancy occurs in about 22% of women with chronic hypertension (Lowe et al 2015).

24.1.2 Risks associated with high blood pressure during pregnancy

Women with chronic hypertension are at greater risk of pregnancy complications, such as placental abruption, superimposed pre-eclampsia, fetal loss, preterm labour, low birth weight, perinatal death (Jain 1997; Silbai 2002) and gestational diabetes (Hedderson & Ferrara 2008). Other risk factors for pre-eclampsia are discussed in Section 26.2.

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24.2 Measuring blood pressure

Routine measurement of women's blood pressure at the first antenatal visit and throughout pregnancy is recommended in the United Kingdom (NICE 2008; 2010) and Canada (SOGC 2008). This advice reflects the importance of predicting the risk of pre-eclampsia to allow monitoring and preventive treatment. Any woman presenting with new hypertension after 20 weeks pregnancy should be assessed for signs and symptoms of pre-eclampsia (see Section 26.2).

Recommendation	Grade B
22. Measure blood pressure at a woman's first antenatal visit to identify existing high blood pressure.	
Approved by NHMRC in December 2011; expires December 2016	

24.2.1 Measuring blood pressure

Blood pressure should be measured as outlined below (NICE 2008):

- using the woman's right arm (Lowe et al 2015), remove tight clothing and ensure arm is relaxed and supported at heart level
- use cuff of appropriate size (eg use a large cuff if arm circumference is >33cm and a thigh cuff if it is >42cm)
- inflate cuff to 20-30 mmHg above palpated systolic blood pressure
- lower column slowly, by 2 mmHg per second or per beat
- read blood pressure to the nearest 2 mmHg
- measure diastolic blood pressure as disappearance of sounds (phase V; or IV if phase V is absent).

Women with a single diastolic blood pressure reading of 110 mmHg or more, or two consecutive readings of 90 mmHg or more at least 4 hours apart and/or significant proteinuria (1+) require increased monitoring and treatment should be considered. Women with a systolic blood pressure equal to or above 140 mmHg on two consecutive readings at least 4 hours apart require further assessment and treatment should be considered.

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Automated blood pressure measuring devices

Although mercury sphygmomanometry remains the gold standard for measuring blood pressure, due to environmental and safety concerns its use is declining and automated devices are increasingly being used in the general hypertensive population (Brown et al 2011). Few studies have compared these devices with sphygmomanometry in pregnant women (Lowe et al 2015). While they may give similar mean blood pressure values to those obtained with sphygmomanometry, there is wide intra-individual error and their accuracy may be further compromised in pre-eclamptic women (Gupta et al 1997; Brown et al 1998).

The potential errors of automated devices may be offset by comparing blood pressure recordings by routine mercury sphygmomanometry (Brown et al 2011). Considerations with automated devices include:

- using only devices that have been validated for use in pregnancy by the British Hypertensive Society, the Association for the Advancement of Medical Instruments or other accepted and published criteria
- maintaining some mercury sphygmomanometers to allow regular calibration of all devices
- when a pregnant woman uses an automated device for home blood pressure measurements, checking the device against mercury sphygmomanometry to ensure accuracy of readings.

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White coat hypertension

White coat or "office" hypertension occurs in early pregnancy with the same frequency as it does in non-pregnant women (Brown et al 2005). A prospective study (n=241) (Brown et al 2005) found that 32% of women early in pregnancy who were given an initial diagnosis of essential hypertension had white coat hypertension. Half of these women retained this phenomenon throughout pregnancy and had good pregnancy outcomes, 40% developed (benign) gestational hypertension and also had good pregnancy outcomes and 8% developed proteinuric pre-eclampsia, which was significantly fewer than in women with confirmed essential hypertension (22%).

Women with pre-existing hypertension

Women presenting for antenatal care currently on medication for hypertension should have their medicines reviewed to ensure their safety in pregnancy.

24.3 Practice summary: blood pressure

When: At first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the risks associated with high blood pressure in pregnancy**: Discuss the importance of identifying high blood pressure early in pregnancy.
- ☐ **Offer lifestyle advice:** Highlight to women who experience raised blood pressure in pregnancy the benefits of not smoking, maintaining a healthy weight, regular physical activity and a healthy diet.
- ☐ **Arrange treatment or referral if required**: For women with chronic hypertension, further testing may be required to exclude white coat hypertension or kidney disease and treatment may be needed.

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24.4 Resources

British Hypertensive Society *Automatic Digital Blood Pressure Devices for Clinical Use*

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Lowe SA, Bowyer L, KLust K et al (2015) The SOMANZ Guidelines for the Management of Hypertensive Disorders of Pregnancy. *Aust N Z J Obstet Gynaecol* 55(1): 11–16.

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25 Proteinuria

Detection of proteinuria does not predict pre-eclampsia but may lead to identification and treatment of kidney disease or urinary tract infection.

25.1 Background

High amounts of protein in the urine (proteinuria) can be caused by a range of conditions. Proteinuria in the first trimester may suggest underlying kidney disease or the presence of urinary tract infection (see Chapter 38). After 20 weeks pregnancy, proteinuria is associated with pre-eclampsia.

25.1.1 Kidney disease in Australia

- In 2011-12, an estimated 1 in 10 Australians aged 18 and over had biomedical signs of chronic kidney disease (AIHW 2016). Of these, only 10% were aware they had the condition based on self-reported data, reflecting that this is a highly under-diagnosed condition.
- Indigenous Australians were 2.1 times as likely as non-Indigenous Australians to have biomedical signs of chronic kidney disease (AIHW 2016).
- Compared with those living in the highest socioeconomic areas, people living in the lowest socioeconomic areas were 1.6 times as likely to have biomedical signs of chronic kidney disease (AIHW 2016).

25.1.2 Risks associated with proteinuria in pregnancy

- Maternal proteinuria has been strongly associated with preterm birth (Franceschini et al 2005).
- Chronic kidney disease in pregnancy has been associated with pre-eclampsia, preterm labour, small-for-gestational age babies and perinatal death (Bramham et al 2011).

25.2 Testing for proteinuria

25.2.1 Accuracy of tests for detecting proteinuria

The 24-hour urine collection test is considered 'the gold standard' for testing for proteinuria in women during pregnancy, although it is often inconvenient for pregnant women to undertake a 24-hour urine collection. The test is frequently used as a reference point when evaluating the accuracy of other tests such as urine dipstick visual check, urine automated analyser, 2-hour and 12-hour tests, spot protein:creatinine ratio or microalbumin:creatinine ratio (Risberg et al 2004; Price et al 2005; Waugh et al 2005; Schubert et al 2006; Rizk et al 2007; Abebe et al 2008; Côté et al 2008a; Dwyer et al 2008; Kyle et al 2008; Gangaram et al 2009a; 2009b). One study has questioned the accuracy of the 24-hour urine test (Côté et al 2008b).

Studies evaluating other test types have found that:

- *dipstick testing:* is inaccurate in predicting significant proteinuria (Waugh et al 2004; Gangaram et al 2005) and has a high incidence of false positives (Davey & MacGillivray 1988; Phelan et al 2004)
- *2-hour and 12-hour collections*: correlate with 24-hour collections in quantifying proteinuria, with the 12-hour collection having higher sensitivity (89% vs 86%), specificity (93% vs 82%) and positive predictive value (84% vs 77%) and lower false positive (12% vs 18%) and false negative (11% vs 14%) rates than 2-hour collection (Abebe et al 2008)

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- *protein:creatinine ratio:* is a better screening test than automated dipstick urinalysis to detect significant proteinuria (Risberg et al 2004; Dwyer et al 2008), may be useful to rule out clinically significant proteinuria (Waugh et al 2004; Price et al 2005; Côté et al 2008a; Meads et al 2008; Gangaram et al 2009a) and has the advantage of results being available immediately (Kyle et al 2008).

25.2.2 Automated analysis of dipsticks

Due to considerable observer errors involved in dipstick urinalysis, an RCOG Study Group recommended that automated dipstick readers be employed (Shennan & Waugh 2003). This can significantly improve false positive and false negative rates. An initial result of 1+ or greater of protein should be confirmed by a 24-hour urinary protein measurement or a protein:creatinine ratio (Rodriguez-Thompson & Lieberman 2001).

Consensus-based recommendation	
XXII	Routinely offer testing for proteinuria at the first antenatal visit, regardless of stage of pregnancy.
	Approved by NHMRC in December 2011; expires December 2016

Recommendation		Grade B
23.	For point-of-care testing, use an automated analyser if available, as visual inspection of a urinary dipstick is the least accurate method to detect true proteinuria.	
	Approved by NHMRC in December 2011; expires December 2016	

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25.2.3 Repeat testing

Repeat testing for proteinuria is of little or no benefit in predicting pre-eclampsia and should be confined to women with other risk factors such as existing or newly diagnosed high blood pressure and new or pre-existing kidney disease (Beunis et al 2004; Alto 2005; Sirohiwal et al 2009). See also Section 26.2.3.

25.2.4 Testing in rural and remote areas

Considerations in urine testing in rural and remote areas include (Bookallil et al 2005):

- the availability of appropriate storage facilities for dipstick tests and for urine collections for women with abnormal dipstick results (see below)
- if a woman has an abnormal dipstick result, whether specimens can be provided to pathology services within the timeframe in which they can still be cultured (ideally within 24 hours).

25.3 Responding to test results

A finding of 300 mg/24 hours or more or a protein:creatinine ratio of 30 mg/mmol of creatinine is customarily regarded as significant (Ferrazzani et al 1990; Waugh et al 2003). However, a proteinuria threshold of 500 mg/24 hours has been suggested to be more predictive in relation to the likelihood of adverse outcome (Shennan & Waugh 2003).

- Women with abnormal dipstick urine test results (including the presence of leukocytes, nitrites or blood) should have a midstream urine sample sent for microscopic examination, culture and sensitivity testing. If the result is asymptomatic bacteriuria, this should be treated appropriately (Murray et al 2002).
- Women found to have true proteinuria and/or haematuria at their first antenatal visit may have underlying kidney disease, which should be investigated (Murray et al 2002).

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25.4 Practice summary: proteinuria

When: At first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the risks associated with proteinuria in pregnancy**: Discuss the importance of identifying kidney disease or urinary tract infection early in pregnancy.
- ☐ **Arrange treatment or referral if required**: For women with proteinuria, further testing may be required to exclude urinary tract infection or kidney disease and monitoring for pre-eclampsia may be needed.

25.5 Resources

Lowe SA, Bowyer L, KLust K et al (2015) The SOMANZ Guidelines for the Management of Hypertensive Disorders of Pregnancy. *Aust N Z J Obstet Gynaecol* 55(1): 11–16.

NICE (2010) *Hypertension in Pregnancy: the Management of Hypertensive Disorders during Pregnancy*. National Collaborating Centre for Women's and Children's Health. Commissioned by the National Institute for Health and Clinical Excellence. London: RCOG Press.

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26 Risk of pre-eclampsia

Identifying women with risk factors for or clinical signs of pre-eclampsia allows timely provision of advice on prevention and symptoms that may indicate a need for additional care. Antenatal care also provides an opportunity to discuss long-term preventive strategies with women who develop pre-eclampsia.

26.1 Background

26.1.1 Features of pre-eclampsia

Hypertensive disorders during pregnancy are described in Section 24.1. In pre-eclampsia, hypertension is accompanied by one or more of the following features (Lowe et al 2015):

- impaired kidney or liver function
- haematological involvement
- neurological symptoms (persistent headache, visual disturbances, stroke, convulsions)
- pulmonary oedema
- fetal growth restriction and/or
- placental abruption.

Pre-eclampsia is a progressive disorder that worsens if pregnancy continues (Lowe et al 2015). Birth of the baby is the definitive treatment and is followed by resolution, generally over a few days but sometimes much longer (Lowe et al 2015). Decisions about management (eg induction/caesarean section or continuation of the pregnancy) are based on maternal and fetal factors (eg gestational age).

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26.1.2 Prevalence of pre-eclampsia

Australian studies in a range of settings estimated the incidence of any pre-eclampsia as 3.0-3.3% (Thornton et al 2013; Thornton et al 2016), early onset (<34 weeks) pre-eclampsia as 0.4% (Park et al 2013; Park et al 2015) and late-onset (≥34 weeks) pre-eclampsia as 2.4% (Park et al 2013). Studies were consistent in noting a decrease in prevalence and incidence of pre-eclampsia in Western Australia (Hammond et al 2013; Diouf et al 2016) and New South Wales (Thornton et al 2013; Roberts et al 2015) (no studies from the other states and territories were identified).

The prevalence of pre-eclampsia among specific population groups was influenced by:

- *mental health*: a diagnosis of schizophrenia or bipolar disorder conferred a five-fold increased likelihood of having pre-eclampsia (OR 5.28; 95%CI 2.79 to 9.98; p<0.001) (Judd et al 2014) in one study and a three-fold increase in another (9% v 3%; P < 0.0001) (Nguyen et al 2012)
- *body mass index*: prevalence was increased among women with BMI >25 (OR 1.97; 95%CI 0.93 to 4.16) (Vanderlelie et al 2016), BMI >30 (OR 2.86; 95%CI 2.54 to 3.22; p=0.001) (Davies-Tuck et al 2016), BMI 30-34.9 (OR 2.01; 95%CI 1.48 to 2.73; p<0.001), BMI 35-39.9 (OR 2.41; 95%CI 1.68 to 3.47; p<0.001), BMI 40-44.9 (OR 3.32; 95%CI 2.18 to 5.08; p<0.001), BMI ³45 (OR 3.98; 95%CI 2.56 to 6.19; p<0.001) (Magann et al 2013) or BMI >50 (aOR 3.43; 95%CI 1.72 to 6.84) (Sullivan et al 2015)
- *country of birth*: compared with women born in Australia prevalence was lower among women from Western Europe (OR 0.91; 95%CI 0.85 to 0.97), Eastern Europe (OR 0.79; 95%CI 0.67 to 0.94), South Asia (OR 0.58; 95%CI 0.55 to 0.62), East-South-east Asia (OR 0.64; 95%CI 0.58 to 0.71), North Africa and Middle East (OR 0.69;

95%CI 0.63 to 0.77) and similar among those from Sub-Saharan Africa (OR 0.95; 95%CI 0.85 to 1.07) and Latin America and the Caribbean (OR1.06; 95%CI 0.90 to 1.26) (Urquia et al 2014).

Prevalence did not appear to be influenced by:

- *maternal age >45 years*: there was no significant difference in prevalence between women aged >45 years and <45 years though some suggestion of increase with age (OR 1.86; 95% 0.9 to 3.6; p=0.052) (Carolan et al 2013)
- *refugee background*: there was no clear difference in prevalence between refugee background and migration for non-humanitarian reasons among women from North Africa (age-adjusted OR 1.4; 95%CI 0.4 to 4.6; p=0.79), Middle and East Africa (OR 1.1; 95%CI 0.2 to 4.9; p=0.71) and West Africa (4.9% vs 0%) (Gibson-Helm et al 2014)
- *conception by assisted reproductive technology*: after stratification by plurality, the difference in gestational hypertension/pre-eclampsia rates between ART and non-ART mothers was not statistically significant, with aOR 1.05 (95% CI, 0.98-1.12) for mothers of singletons (Wang et al 2016)
- *vaginal bleeding in pregnancy*: prevalence of pre-eclampsia was not associated with the presence or absence of bleeding (aOR 0.96; 95% CI 0.67 to 1.38) (Smits et al 2012).

26.1.3 Risks associated with pre-eclampsia

- Significant pre-eclampsia is associated with serious maternal morbidity and, very rarely, with death. There were nine maternal deaths related to hypertensive disorders of pregnancy between 2008 and 2012 in Australia (Humphrey et al 2015), all of which were due to pre-eclampsia and its complications.
- Women with complicated pre-eclampsia are more likely to have a caesarean section, stillbirth or neonatal death (Bhattacharya & Campbell 2005). In 2012, hypertension or pre-eclampsia were the reasons for 9.0-13.2% of labour inductions in New South Wales, Queensland, South Australia, Tasmania and the Northern Territory and 1.3-2.4% of caesarean sections in Queensland, South Australia, Tasmania and the Northern Territory. Data collection methods varied and, for other states and territories, were unavailable or unpublished (Hilder et al 2014).
- Neonatal complications associated with pre-eclampsia in a large cross-sectional study (n=647,392) (Schneider et al 2011) were small for gestational age, low Apgar scores, acute respiratory distress syndrome and postpartum neonatal hypoglycaemia.
- Women who have had pre-eclampsia are at increased long-term risk of chronic hypertension, ischaemic heart disease, cerebrovascular disease, kidney disease, diabetes mellitus, thromboembolism, hypothyroidism and impaired memory (Williams 2012).

26.2 Assessing risk of pre-eclampsia

Whether a woman will require additional care (eg more frequent antenatal visits) is based on the presence of risk factors for and clinical features of pre-eclampsia.

26.2.1 Identifying women with risk factors for pre-eclampsia

Factors with an established association with a high risk of pre-eclampsia include (Bartsch et al 2016) (low to high quality evidence):

- a history of pre-eclampsia (RR 8.4, 95%CI 7.1 to 9.9) (high quality evidence)
- chronic hypertension (RR 5.1, 95%CI 4.0 to 6.5) (high quality evidence)
- pre-existing diabetes (RR 3.7; 95%CI 3.1 to 4.3) (moderate quality evidence)

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- autoimmune disease such as systemic lupus erythematosus (RR 2.5; 95%CI 1.00 to 6.3) or antiphospholipid syndrome (RR 2.8; 95%CI 1.8 to 4.3) (moderate quality evidence)
- nulliparity (RR 2.1; 95%CI 1.9 to 2.4) (low quality evidence)
- BMI >30 (RR 2.8; 95% 2.6 to 3.6) (low quality evidence)
- pre-existing kidney disease (RR 1.8; 95%CI 1.5 to 2.1) (low quality evidence).

Other factors that are associated with increased risk of pre-eclampsia are maternal family history of pre-eclampsia (eg among mother and sisters) (115% increase in risk) (Boyd et al 2013) and increasing maternal glucose levels (aOR for 1 SD increase 1.19; 95% CI 1.11 to 1.28 for 1-hour plasma glucose; 1.21; 95%CI 1.13 to 1.30 for 2-hour plasma glucose)(HAPO Study Cooperative Research Group 2010).

Recommendation
24. Early in pregnancy, assess all women for clinical risk factors for pre-eclampsia.
Approved by NHMRC in October 2017; expires October 2022

Findings from systematic reviews provided information on associations with additional factors:

- *cardiovascular factors*: women with pre-eclampsia had higher levels of total cholesterol (MD 20.20 mg/dL; 95%CI 8.70 to 31.70; p=0.001), non-HDL-C (MD 29.59 mg/dL; 95%CI 12.13 to 47.06; p=0.001) and triglycerides (MD 80.29 mg/dL; 95%CI 51.45 to 109.13; p<0.0001) in the third trimester (Gallos et al 2013; Spracklen et al 2014), lower levels of HDL-C in the third trimester (MD -8.86 mg/dL; 95%CI -11.50 to -6.21; p<0.0001)(Spracklen et al 2014) and were more likely to have arterial stiffness (SMD 1.62; 95%CI 0.73 to 2.50) (Hausvater et al 2012) than women without pre-eclampsia
- *body mass index*: there was a clear association between overweight (aRR 1.70; 95%CI 1.60 to 1.81, P<0.001), obesity (aRR 2.93; 95%CI 2.58 to 3.33, P<0.001) and severe obesity (aRR 4.14; 95%CI 3.61 to 4.75, P<0.001) and risk of pre-eclampsia (Wang et al 2013)
- *mental health*: there were significant associations between pre-eclampsia and mental stress (OR 1.49; 95%CI 1.27 to 1.74; P<0.001), work stress (OR 1.50; 95%CI 1.15 to 1.97; P=0.003), anxiety or depression (OR 1.88; 95%CI 1.08 to 3.25; P=0.02) (Zhang et al 2013) and depression symptoms alone (OR 1.63; 95%CI 1.32 to 2.02) (Hu et al 2015)
- *blood group*: AB versus non-AB blood group increased risk in women overall (OR 2.42; 95%CI 1.63 to 3.58) and in primigravid women (OR 2.44; 95%CI 1.46 to 4.07) (Alpoim et al 2013)
- *assisted reproductive technology*: in contrast to the findings on prevalence above, systematic reviews suggested that risk was increased in women receiving donor oocytes (OR 4.34; 95%CI 3.10 to 6.06; P<0.0001) (Blazquez et al 2016; Masoudian et al 2016) or sperm (OR 1.63; 95%CI 1.36 to 1.95)(Gonzalez-Comadran et al 2014)
- *immunological factors*: interferon-gamma levels were higher in women with pre-eclampsia than in controls (SMD 0.93; 95%CI 0.07 to 1.79) (Yang et al 2014)
- *micronutrient levels*: levels of vitamin C and E were lower in women with pre-eclampsia than in controls but not when levels in mild and severe subtypes were analysed (Cohen et al 2015); risk was lower among women with vitamin D level >50 nmol/L vs <50 nmol/L (OR 0.58; 95%CI 0.32 to 1.07)(Hypponen et al 2013); and levels of copper were higher (Fan et al 2016) and levels of zinc (SMD -0.587; 95%CI -0.963 to -0.212) (Ma et al 2015) and selenium (MD -6.47 mug/l; 95%CI -11.24 to -1.7; p = 0.008) (Xu et al 2016) lower among women with pre-eclampsia than among controls
- *gynaecological and obstetric factors*: there was no significant association between risk of pre-eclampsia and fetal sex (RR 1.01; 95%CI 0.97 to 1.05) (Jaskolka et al 2016) or interpregnancy interval 2-4 vs <2 years (aOR 1.01; 95%CI 0.95 to 1.07) or 2-4 vs >2 years (aOR 1.10; 95%CI 1.02 to 1.19)(Cormick et al 2016) but a higher risk following chorionic villus sampling compared to amniocentesis (OR 2.47; 95%CI 1.14 to 5.33)(Basaran et al 2016)

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- *periodontal disease*: while reviews of observational studies showed an effect on risk (Sgolastra et al 2013; Wei et al 2013; Huang et al 2014), a review of RCTs found no significant effect (OR 1.00; 95%CI 0.78 to 1.28) (Kunnen et al 2010). A recent Cochrane review found no clear effect of treatment for periodontal disease on risk of pre-eclampsia (RR 1.10; 95%CI 0.74 to 1.62; 3 studies; very low-quality evidence) (Iheozor-Ejiofor et al 2017).

Smoking (RR 0.67; 95%CI 0.60 to 0.75)(Wei et al 2015) and exposure to environmental carbon monoxide (aOR 0.63; 95%CI 0.55 to 0.71)(Zhai et al 2012) appeared to reduce risk of pre-eclampsia but are associated with other negative health effects. There was insufficient evidence to assess the relationship between pre-eclampsia and shift work (Palmer et al 2013).

26.2.2 Preventive measures

Preventive treatment with low-dose aspirin in women at high risk and calcium supplementation in women with low dietary intake is recommended in the United Kingdom (NICE updated 2011), Canada (SOGC 2014) and Australia (Lowe et al 2015) and by the WHO (WHO 2011).

Calcium

There is strong evidence that calcium supplementation is of benefit for women at risk of pre-eclampsia if dietary intake is low (Patrelli et al 2012; Hofmeyr et al 2014). The WHO defines low dietary intake as <900 mg per day and the Australian and New Zealand Nutrient Reference Values recommend an intake of 1,000 mg per day in pregnant women, 1,300 mg if they are younger than 18 years (NHMRC 2005). In Australia, calcium intake is low in relation to recommendations for some girls and women of reproductive age (NHMRC 2011). The sources and recommended number of serves of calcium-rich foods during pregnancy are discussed in Section 11.2.1.

Recommendation		
25.	Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Practice point		
KK	If a woman has a low dietary calcium intake, advise her to increase her intake of calcium-rich foods.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

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Effectiveness of aspirin in preventing pre-eclampsia

Systematic reviews and meta-analyses have found that:

- low-dose aspirin (defined as <75 mg/day) has moderate benefits when used for prevention of pre-eclampsia (RR 0.83; 95%CI: 0.77 to 0.89); higher doses (>75 mg/day) may be more effective but adverse effects may also increase (Duley et al 2007);
- there was a reduction in risk among women at high risk (ie with previous pre-eclampsia) (RR 0.79; 95%CI: 0.65 to 0.97) but not those at low risk with use of low-dose aspirin (defined as 40-160 mg/day) (Trivedi 2011);
- the effect of low-dose aspirin (defined as 50-150 mg/day) was only significant for preterm pre-eclampsia (RR 0.11 95%CI 0.04 to 0.33) (Roberge et al 2012).

Recommendation		
26.	Advise women at moderate-high risk of pre-eclampsia that low-dose aspirin from early pregnancy may be of benefit in preventing pre-eclampsia.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

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Vitamins

There is insufficient evidence that the risk of pre-eclampsia is reduced by supplementing vitamin B2 (Neugebauer et al 2006) or vitamins C and E (Salles et al 2012). A meta-analysis found associations between supplementation with vitamins C (1,000 mg) and E (400 IU) in women at risk of pre-eclampsia and some adverse effects: gestational hypertension (RR 1.11; 95%CI 1.05 to 1.17) and premature rupture of the membranes (RR 1.73; 95%CI 1.34 to 2.23) (Conde-Agudelo et al 2011).

Recommendation		
27.	Advise women that vitamins C and E are not of benefit in preventing pre-eclampsia.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Physical activity

Systematic reviews found a trend towards a protective effect from leisure time or recreational physical activity during pregnancy in case-control studies (RR 0.65, 95%CI 0.47 to 0.89 or OR 0.77, 0.64 to 0.91, p < 0.01) (Kasawara et al 2012; Aune et al 2014) but not in cohort studies (OR 0.99, 0.93 to 1.05, p= 0.81) (Kasawara et al 2012). Physical activity during pregnancy has general health benefits (see Section 11.4).

Salt intake

Reducing salt intake is unlikely to reduce the risk of pre-eclampsia (Duley 2011). However, avoiding foods with added salt has other health benefits (NHMRC 2013).

26.2.3 Identifying women with clinical signs of pre-eclampsia

Routine measurement of blood pressure and testing for proteinuria at each antenatal visit are recommended in the United Kingdom (NICE updated 2016). However, routine testing for proteinuria is not recommended internationally (Tranquilli et al 2014), in the United States (ACOG 2013) or Australia (Lowe et al 2015; RANZCOG 2015).

- *Hypertension*: Women with new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mmHg diastolic) that occurs after 20 weeks pregnancy should be assessed for signs and symptoms of pre-eclampsia (Lowe et al 2015).
- *Proteinuria*: Routine testing for proteinuria is not helpful in predicting pre-eclampsia and should be confined to women with increased blood pressure or sudden weight gain. Proteinuria should not be considered mandatory in making a diagnosis of pre-eclampsia (Lowe et al 2015).

Measurement of blood pressure and testing for proteinuria are discussed in chapters 24 and 25.

Consensus-based recommendations	
XXIII	Routinely measure blood pressure to identify new onset hypertension.
XXIV	Recommend testing for proteinuria at each antenatal visit if a woman has risk factors for or clinical indications of pre-eclampsia, in particular, raised blood pressure.
	Approved by NHMRC in October 2017; expires October 2022

Where possible, women with clinical signs of pre-eclampsia (hypertension, proteinuria, fetal growth restriction) should be referred for specialist assessment and management. Section 26.5 includes resources on the management of hypertensive disorders in pregnancy.

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26.2.4 Predicting pre-eclampsia

Predicting which women will develop pre-eclampsia is an area that is rapidly changing. A range of measures has been used to further predict risk of pre-eclampsia, including biophysical (eg mean arterial pressure, uterine artery pulsatility) and biochemical (eg pregnancy-associated placental protein-A [PAPP-A], free beta-human chorionic gonadotrophin [β-hCG], placental growth hormone [PlGF] and soluble fms-like tyrosine kinase-1 [sFlt-1]:PlGF ratio) markers, both individually and in combination with maternal characteristics. The sFlt:PlGF ratio showed high sensitivity and specificity for onset of pre-eclampsia within 4 weeks at 19-25 weeks (100; 100%), 26-31 weeks (83; 99%) (Ohkuchi et al 2013) and 24-36 weeks (66.2; 83.1%)(Zeisler et al 2016).

While it is clear that maternal characteristics combined with biochemical and biophysical markers are more sensitive in predicting pre-eclampsia than maternal characteristics alone, there is currently insufficient evidence to support a recommendation on any particular approach. Existing algorithms are more effective in predicting early onset pre-eclampsia (which has very low prevalence), have low sensitivity in predicting late onset pre-eclampsia and have a false positive rate of 5-10%. A systematic review noted that the reliability and validity of models may be limited by methodological deficiencies (Brunelli & Prefumo 2015) and an external validation study found lower performance than was reported (Oliveira et al 2014). An analysis of the cost-effectiveness of screening for and diagnosing pre-eclampsia found that routine use of biomarkers will be feasible only when accuracy is significantly increased (Zakiyah et al 2015).

26.3 Discussing risk of pre-eclampsia

It is important that women are given information about the symptoms of pre-eclampsia from early pregnancy.

Practice point	
LL	Give women information about the urgency of seeking advice from a health professional if they experience: headache, visual disturbance (such as blurring or flashing before the eyes), epigastric pain (just below the ribs), vomiting and/or rapid swelling of the face, hands or feet.
	Approved by NHMRC in June 2014; expires June 2019

26.4 Practice summary: pre-eclampsia

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss risk factors for pre-eclampsia early in pregnancy:** Explain that the likelihood of pre-eclampsia is increased if a woman has certain risk factors.
- ☐ **Discuss pre-eclampsia screening:** Explain that if a woman has high blood pressure and/or proteinuria, she will require additional care during the rest of her pregnancy.
- ☐ **Discuss symptoms of pre-eclampsia with women at high risk:** Explain the importance of seeking medical advice immediately if symptoms occur.
- ☐ **Take a holistic approach:** Ask women at risk of pre-eclampsia about how many serves of calcium-rich foods they eat each day (see Chapter 11). Discuss low cost and culturally appropriate strategies for increasing calcium intake. Advise women who develop pre-eclampsia of the need for ongoing surveillance due to their increased risk of developing hypertension.
- ☐ **Consider referral:** Women at risk of pre-eclampsia who have a low dietary calcium intake may benefit from referral to an accredited practising dietitian.
- ☐ **Document and follow-up:** Note risk factors and the results of blood pressure measurement and proteinuria testing in the woman's antenatal record. Further investigations may be warranted if increases in blood pressure or new proteinuria are identified at subsequent visits.

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26.5 Resources

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Conde-Agudelo A, Romero R, Kusanovic JP et al (2011) Supplementation with vitamins C and E during pregnancy for the prevention of preeclampsia and other adverse maternal and perinatal outcomes: a systematic review and metaanalysis. *Am J Obstet Gynecol* 204(6): 503 e1-12.

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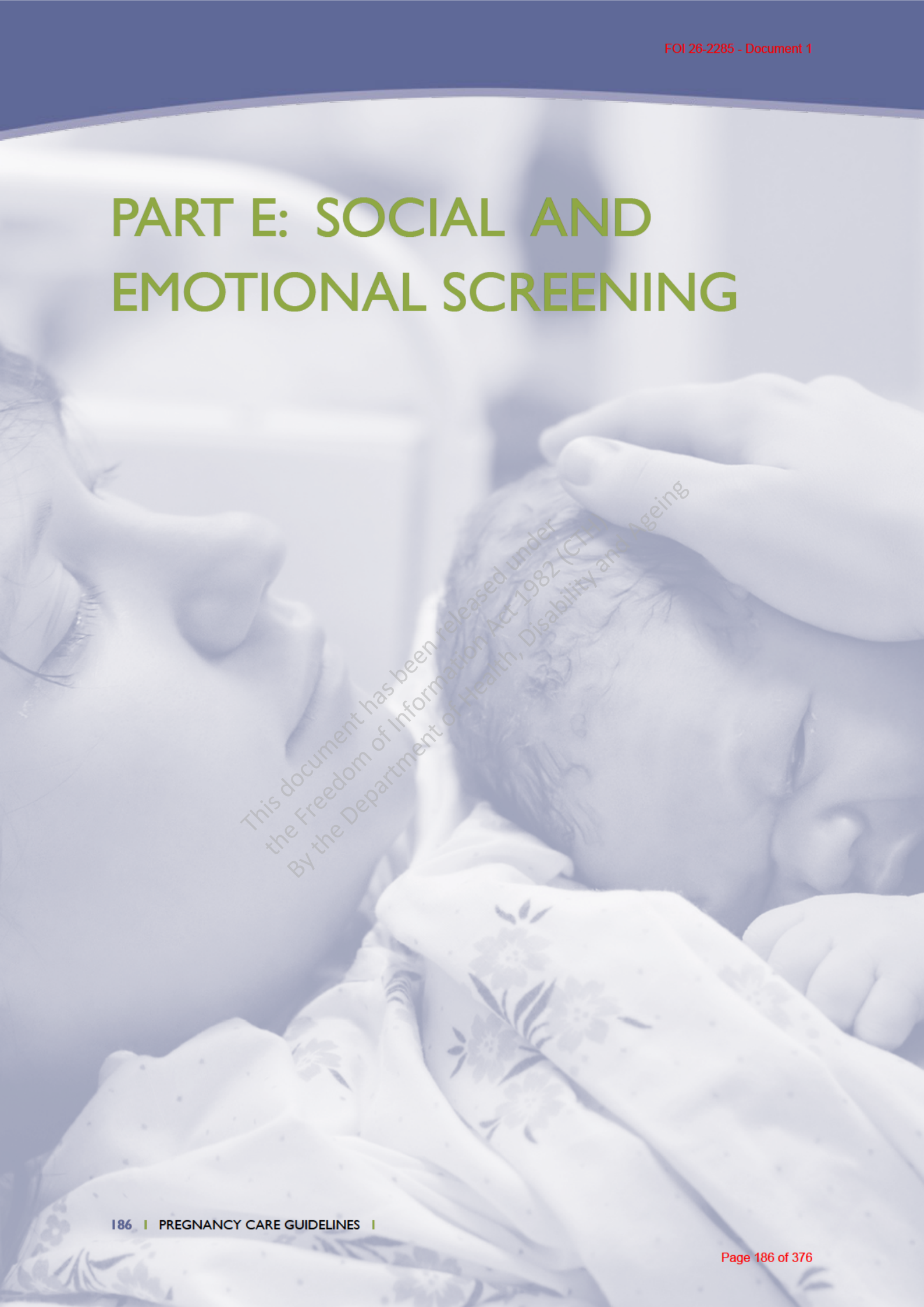
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PART E: SOCIAL AND EMOTIONAL SCREENING



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This section describes screening for depression and anxiety, assessment of psychosocial risk factors and screening for family violence.

Table E1: Summary of advice for women about social and emotional assessments during pregnancy

Assessment	Advice about assessment	Chapter
Depression	Detecting symptoms of depression enables appropriate follow-up	27
Anxiety	Anxiety, either alone or with depression, is common in pregnancy	
Psychosocial risk factors	Assessment of psychosocial factors aims to identify women who are more vulnerable to mental health conditions during pregnancy	28
Family violence	All women are asked about domestic violence during pregnancy to enable access to additional support and care	29

Key considerations for service provision are outlined below.

- *Systems for follow-up and support*: Before screening and assessment is carried out, systems need to be in place to ensure that appropriate health professionals are available to provide follow-up care if required and to assist if there are concerns for the safety of the woman, the fetus or infant or other children in the woman's care. Health professionals will greatly benefit from identifying other professionals from whom they can seek advice, clinical supervision or support regarding mental health care in the perinatal period.
- *Who attends assessment*: Women need to feel safe during screening and assessment, so consideration should be given to other people who may be present. While the presence of significant others is often helpful, sensitivity is required about whether it is appropriate to continue with psychosocial assessment while they are in the room. Screening for family violence should only be conducted when alone with the woman.
- *Informed consent*: An explanation of the purpose of screening and assessment should be given before they take place. It is important to stress that this is part of usual care and results will generally remain confidential. If a woman does not consent to assessment and/or screening, this should be explored and documented and assessment and screening offered at subsequent consultations.
- *Confidentiality*: It should also be explained that confidentiality may not be kept if there is a perceived risk of harm to the woman or her baby as there is a duty of care for this to be communicated to key others. However, in this situation, only information relevant to the risk will be shared.

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27 Screening for depressive and anxiety disorders[19]

Accurately identifying women experiencing symptoms of depression and anxiety enables referral for more formal mental health assessment and suitable follow-up.

27.1 Background

Depressive disorders in the antenatal period are symptomatically the same as those at other times and range from mild to severe. Anxiety disorders at this time include generalised anxiety disorder, obsessive compulsive disorder, panic disorder, social phobia, specific phobia and post-traumatic stress disorder and are often reported as equally prevalent as depressive disorder at this time (Fairbrother et al 2016).

27.1.1 Prevalence of depressive and anxiety disorders

Australian and other studies have reported the 4-year period prevalence[20] of antenatal depression as up to one in ten women (Buist & Bilsztra 2006). Primary anxiety disorders are prevalent and their comorbidity with depression is very high (Wisner et al 2013). Point prevalence of anxiety disorder of one in five in the third trimester of pregnancy has been reported (Giardinelli et al 2012).

Depression may arise in pregnancy or pre-date the pregnancy. In a subset of women in a large US study of women assessed at 6 weeks postnatally, two in five episodes of depression began postnatally, one in three during pregnancy and one in four before pregnancy (Wisner et al 2013). Australian studies have reported persistence of maternal depressive symptoms beyond the first year postpartum, with more mothers reporting depressive symptoms at 4 years follow-up than in the first 12 months postpartum (Woolhouse et al 2015), symptoms persisting from pregnancy to 4 years postpartum in one in eleven women (Giallo et al 2017b) and symptoms persisting from the first year to 6–7 years postpartum in one in six women (Giallo et al 2014a).

27.1.2 Impact of depressive and anxiety disorders

Obstetric complications in women with depression (independent of antidepressant use) are slightly increased risk of preterm birth, low birth weight, gestational hypertension and perinatal death (Grigoriadis et al 2013).

Anxiety disorders during pregnancy may have a negative influence on obstetric, fetal and perinatal outcomes, including more pregnancy symptoms (nausea and vomiting); more medical visits; increased alcohol or tobacco consumption or unhealthy eating habits; pre-eclampsia and preterm birth; and postnatal depression and mood disorders (Marc et al 2011). High levels of maternal anxiety during pregnancy is associated with increased exposure of the fetus to maternal cortisol and risk of adverse neurodevelopmental outcomes (O'Donnell et al 2012).

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19 The information in this chapter is based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence. NHMRC approval of recommendations was for that Guideline.

20 Period prevalence is the prevalence over a specific time period (eg from a longitudinal study) and point prevalence is that a specific point of time (eg from a cross-sectional study).

27.2 Screening for depression

27.2.1 Effectiveness of screening tools

Review of evidence on four screening tools for depression in the antenatal period (the Edinburgh Postnatal Depression Scale [EPDS], the depression module of the Patient Health Questionnaire [PHQ-9], the Whooley Questions and the Kessler Psychological Distress Scale [K-10]) found that:

- a score of 13 or more on the EPDS has moderate sensitivity and high specificity for detecting possible depression in pregnant women and a score of 10 or more has moderate sensitivity and specificity (high quality) (NICE 2015)
- it is uncertain whether the other tools (at relevant cut-offs) have adequate sensitivity or specificity to detect possible depressive disorders in pregnant women (very low to low quality) (NICE 2015).

Assessment of the non-technical characteristics of the tools found that ease of administration and implementability were high for all tools, acceptability was high for the EPDS and unknown but likely to be good for the other tools. The EPDS is the only one of the tools for which effectiveness (defined as positive impact on depressive symptoms, services referred or utilised and impact on a woman's mental health) is rated 'good' and that has been validated in other languages.

Evidence-based recommendations		Strong
28.	Use the Edinburgh Postnatal Depression Scale (EPDS) to screen women for a possible depressive disorder.	
29.	Arrange further assessment of woman with an EPDS score of 13 or more.	
	Approved by NHMRC in October 2017; expires October 2022	

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27.2.2 Other considerations in screening for depression

Timing of screening

The timing of screening should reflect available resources and existing contacts between the woman and the health professionals caring for her. An obvious contact point is the first antenatal visit. However, it is acknowledged that the time available at this visit and the number of other assessments undertaken may limit opportunities for assessment of mental health. Timing of repeat screening is based on results of the initial screen and clinical indications.

Consensus-based recommendations	
XXV	Conduct screening as early as practical in pregnancy and repeat at least once later in pregnancy.
XXVI	For a woman with an EPDS score between 10 and 12, monitor and repeat the EPDS in 4–6 weeks as her score may increase subsequently.
XXVII	Repeat the EPDS at any time in pregnancy if clinically indicated.
	Approved by NHMRC in October 2017; expires October 2022

Mode of assessment

As a self-report tool, the EPDS is usually completed by the woman, preferably without consultation with others. At times it may be appropriate for a health professional to verbally administer the questionnaire (face-to-face or by phone). Electronic screening is an emerging practice.

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Risk of harm

Regardless of the total EPDS score, perinatal women who score positive on Question 10 may be at risk of harming themselves and/or their children and further assessment is necessary.

Consensus-based recommendation	
XXVIII	For a woman with a positive score on Question 10 on the EPDS, undertake or arrange immediate further assessment and, if there is any disclosure of suicidal ideation, take urgent action in accordance with local protocol/policy.
	Approved by NHMRC in October 2017; expires October 2022

27.2.3 Culturally appropriate screening for depression

Aboriginal and Torres Strait Islander women

For Aboriginal and Torres Strait Islander women, EPDS score may be influenced by the woman's understanding of the language used, mistrust of mainstream services or fear of consequences of depression being identified (ie involvement of child protections services). Translations of the EPDS developed in consultation with women from Aboriginal communities have been found to identify a slightly higher number of women experiencing symptoms of depression (Hayes et al 2006; Campbell et al 2008). A recent adaptation of the EPDS assessed in the Kimberley region of Western Australia includes an additional component of psychosocial assessment, acknowledging the contribution that stressful events and social health issues play in mental health (Marley et al 2017). Many elements of the approach taken to adapting this instrument (ie the way in which questions are asked, implementation by Aboriginal health workers) are likely to have broader relevance to urban as well as remote and regional Aboriginal and Torres Strait Islander communities.

If use of the EPDS is considered inappropriate, involvement of an Aboriginal health worker may facilitate assessment of symptoms.

Consensus-based recommendation	
XXIX	When screening Aboriginal and Torres Strait Islander women, consider language and cultural appropriateness of the tool.
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Migrant and refugee women

Scores used to identify possible depression in migrant and refugee women are generally lower than those used in the general Australian population. Specific scores are given in translated versions of the tool.

Cultural practices (such as attending the consultation with a family member) and the perceived degree of stigma associated with depression may also influence the performance of the EPDS.

Consensus-based recommendation	
XXX	Use appropriately translated versions of the EPDS with culturally relevant cut-off scores.
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27.3 Screening for anxiety

The evidence on screening for anxiety is heterogeneous in terms of study characteristics and cut-off values used and firm conclusions cannot be drawn.

In the absence of a freely available practical screening tool for anxiety disorders with adequate evidence in the antenatal period, clinical judgment must be used. This may include consideration of items 3, 4 and 5 of the EPDS (Matthey et al 2013a; Matthey et al 2013b) and relevant items from other tools.

Consensus-based recommendations	
XXXI	Be aware that anxiety disorder is very common in the perinatal period and should be considered in the broader clinical assessment.
XXXII	As part of the clinical assessment, use anxiety items from other screening tools (eg EPDS items 3, 4 and 5; Depression Anxiety Stress Scale anxiety items; and Kessler Psychological Distress Scale items 2, 3, 5 and 6) and relevant items in structured psychosocial assessment tools (eg the Antenatal Risk Questionnaire [ANRQ]).
	Approved by NHMRC in October 2017; expires October 2022

27.4 Practice summary: depression and anxiety

When: As early as practical in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Establish referral pathways**: Identify appropriate health professionals available to provide follow-up care and to assist if there are concerns for the safety of the woman or fetus. Identify other professionals from whom you can seek advice, clinical supervision or support regarding mental health care in the antenatal period.
- ☐ **Seek informed consent**: Explain the purpose of screening for depression and anxiety and emphasise that this is part of usual care and results will generally remain confidential.
- ☐ **Identify level of support needed:** Base decisions on follow-up on clinical judgement and the woman's preferences, taking into consideration that not all women with a score of 13 or more will benefit from follow-up, and that low or high scores may reflect other factors.
- ☐ **Consider safety**: If concerned about the woman's mental health and safety, contact mental health services.

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27.5 Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

COPE online training program

COPE fact sheets for health professionals

27.6 References

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28 Assessing psychosocial factors that affect mental health[21]

Psychosocial assessment allows identification of circumstances (past and present) that affect a woman's mental health. The number and type of factors identified influences the care pathway.

28.1 Background

The experience of pregnancy and parenthood differs for each woman and is influenced by the stability of her relationships and social network. While the biggest risk factor for developing perinatal mental health conditions is a past mental health history, the presence of psychosocial risk factors may be associated with greater risk of onset, relapse or exacerbation of mental health conditions. Women who feel isolated either by distance, culture, or both, are more likely to develop distress or mental health conditions in the perinatal period (Austin et al 2015). The likelihood is also greater for women who have experienced life stressors (eg family problems, loss, family violence or disability) or multiple trauma (Austin et al 2015).

28.2 Psychosocial assessment

Psychosocial assessment can be undertaken as part of the clinical interview and/or using a structured psychosocial assessment tool. Different approaches can be taken to suit the setting, health professional confidence and skills, as well as time constraints. Structured questionnaires are useful in providing a comprehensive, time-efficient overview of the woman's circumstances, especially when the health professional is not experienced in undertaking a detailed psychosocial assessment as part of the broader clinical evaluation.

Practice point	
MM	Assess psychosocial risk factors as early as practical in pregnancy.
	Approved by NHMRC in October 2017; expires October 2022

28.2.1 Psychosocial assessment tools

Tools developed with the aim of identifying psychosocial factors in the antenatal period for which there is moderate to high quality evidence include the Antenatal Risk Questionnaire (ANRQ), the Antenatal Psychosocial Health Assessment (ALPHA) and the Pregnancy Risk Questionnaire (PRQ). Evaluation of these tools for their technical performance and acceptability found the following.

- The ANRQ has acceptable technical performance in identifying women at increased risk of depression or anxiety disorder (OR 6.3 [95% CI 3.5 to 11.5]) and has a positive effect on the rates of referral for mental health assessment (moderate quality) (Austin et al 2013; Reilly et al 2015). Ease of administration and acceptability among women are high.
- In contrast, the ALPHA has limited psychometric properties, is moderately acceptable to users and is effective in identifying family violence (OR 2.7; 95%CI 1.1 to 6.9) and 'high level of psychosocial concern' on the health professional's part (OR 2.8; 95%CI 0.7 to 11.7) but does not have adequate capacity to identify women at increased risk of postnatal depression (moderate quality) (Carroll et al 2005).
- The PRQ has acceptable psychometric properties and is effective in predicting cases of postnatal depression and anxiety (OR 9.18; p <0.001) (moderate quality) but is considered too lengthy for routine use in the public health setting (Austin et al 2005).

21 The information in this chapter is based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence. NHMRC approval of recommendations was for that Guideline.

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28.2.2 Using the ANRQ

The ANRQ is a 13-item structured questionnaire that generates a total psychosocial risk score (cumulative risk) and identifies specific factors that independently put the woman at greater psychosocial risk (past history of trauma or significant mental health condition) (Austin et al 2013; Reilly et al 2015). It covers the relationship with her partner, social support, recent stressful life events, anxiety or perfectionism, history (and treatment) of depression or other mental health conditions, experience of abuse as a child or as an adult, and quality of relationship with her mother in childhood. A cut-off score of 23 or more is recommended but women with a significant mental health history or history of abuse are at increased risk of poor psychosocial outcome irrespective of the total ANRQ score.

Evidence-based recommendation	**Strong**
30.	If using a tool to assess psychosocial risk, administer the ANRQ.
	Approved by NHMRC in October 2017; expires October 2022

Consensus-based recommendation	
XXXIII	Undertake psychosocial assessment in conjunction with a tool that screens for current symptoms of depression/anxiety (eg the EPDS).
	Approved by NHMRC in October 2017; expires October 2022

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28.3 Other considerations in psychosocial screening

As a clinically useful psychosocial assessment tool needs to be brief and to cover the key risk domains, it cannot be fully comprehensive and should be used to 'start the conversation'.

28.3.1 Further exploration and interpretation of psychosocial assessment

Psychosocial risk items endorsed by the woman need to be further explored and documented. The results of the evaluation need to be conveyed to the woman and then (in consultation with the woman) be translated into an approach to referral or monitoring. This will be reliant on the availability of referral pathways.

Practice point	
NN	Ensure that health professionals receive training in the importance of psychosocial assessment and the use of a psychosocial assessment tool.
OO	Ensure that there are clear guidelines around the use and interpretation of the psychosocial tool/ interview in terms of threshold for referral for psychosocial care and/or ongoing monitoring.
	Approved by NHMRC in October 2017; expires October 2022

28.3.2 Education about psychosocial risk factors

Given the potential impact that psychosocial risk factors may have on a woman's mental health, it is important that all women are provided with information about the nature of the different risk factors that may increase her likelihood of experiencing a mental health condition. In turn this provides an opportunity to identify supports (protective factors) to assist in the prevention of mental health conditions, and/or raise awareness of the importance of early symptom recognition to facilitate early detection and intervention.

Practice point	
PP	Discuss with the woman the possible impact of psychosocial risk factors (she has endorsed) on her mental health and provide information about available assistance.
	Approved by NHMRC in October 2017; expires October 2022

28.3.3 Culturally appropriate assessment of psychosocial risk

The psychosocial assessment tools described above are only available in English and no published evidence has been identified describing their use in Aboriginal and Torres Strait Islander or migrant and refugee women. A more conversational approach to psychosocial assessment may be needed in these groups, with a focus on developing rapport and trust.

A South Australian study (of Aboriginal women) found that women were happy to be asked about social health issues, including family and community violence, when questions were asked by Aboriginal women from the community in an interview or when women were given the option to self-complete a questionnaire (Weetra et al 2016). Similarly, involvement of multicultural health workers may be a consideration in the assessment of migrant and refugee women.

Consideration should also be given to psychosocial risk factors that are not covered in the tools but may be relevant to specific groups (eg lack of secure housing, experience of trauma).

Consensus-based recommendation
XXXIV Consider language and cultural appropriateness of any tool used to assess psychosocial risk.
Approved by NHMRC in October 2017; expires October 2022

28.4 Practice summary: psychosocial assessment

When: As early as practical in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Provide information:** Explain that pregnancy can be challenging and that some life factors make it more likely that a woman will experience symptoms of depression or anxiety.
- ☐ **Seek informed consent**: Explain that asking about psychosocial factors is a part of usual care during pregnancy and ask the woman for her consent.
- ☐ **Offer support:** If a woman has psychosocial risk factors ask if she would like help with any issues.

28.5 Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

COPE online training program

COPE fact sheets for health professionals

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29 Family violence

Antenatal care provides an opportunity to ask women about exposure to violence. Asking questions may assist women to disclose their experiences of violence to health professionals and enable access to additional support and care, including community, legal and police support services.

29.1 Background

'Family violence' may involve partners, siblings, parents, children and people who are related in other ways. It includes violence in many family contexts, including violence by a same sex partner, violence by young people against parents or siblings, elder abuse, and violence by carers in a domestic setting against those for whom they are responsible (Royal Commission into Family Violence Victoria 2016). It is also referred to as domestic violence.

'Intimate partner violence' includes any behaviour within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship, including physical aggression, psychological abuse, forced intercourse & other forms of sexual coercion, various controlling behaviours (WHO 2013).

In the context of these Guidelines, family violence is used as the overarching term and intimate partner violence is referred to when this was specified in studies.

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29.1.1 Violence against women in Australia

- *Women in the general population*: The Australian Bureau of Statistics (ABS) estimates that 17% of all women aged 18 and over have experienced intimate partner violence (from either a current or previous partner) since the age of 15 (ABS 2013). Among women who were pregnant at some time during a relationship and experienced violence with their most recent violent partner or their current partner, 54% and 22% respectively reported that they were pregnant at the time of the violence and 25% and 13% reported that violence occurred for the first time during pregnancy (ABS 2013).
- *Aboriginal and Torres Strait Islander women*: The full extent of violence against women in Aboriginal and Torres Strait Islander communities is difficult to determine due to under-reporting, lack of screening by service providers, incomplete identification of gender and Indigenous status in many datasets, and the lack of nationally comparable data on family violence available from police, courts, health or welfare sources (Olsen & Lovett 2016). Despite under-reporting, surveys show that Aboriginal and Torres Strait Islander women report higher levels of violence and suffer higher levels of injury and death as a result of family violence than non-Indigenous women (Olsen & Lovett 2016).

29.1.2 Risks associated with violence in pregnancy

Violence in pregnancy poses significant risks for women. The risk of being a victim of attempted/ completed murder is three-fold higher (aOR 3.08; 95%CI 1.86 to 5.10) among women abused during pregnancy than among those who are not (McFarlane et al 2002).

Intimate partner violence is associated with adverse reproductive outcomes, including multiple unintended pregnancies and/or terminations and delayed pregnancy care (WHO 2013). Women who experience intimate partner violence during pregnancy are 4 times more likely to report depressive symptoms and 10 times more likely to report anxiety symptoms during pregnancy (Brown et al 2008). These symptoms frequently persist in the postnatal period (Woolhouse et al 2012) and affect a woman's ability to form secure infant attachment (1st 1001 Days APPG 2015).

Women who experience violence during pregnancy are at increased risk of miscarriage (Morland et al 2008), pre-term labour and birth (Shah et al 2010) and having low birthweight infants (El Kady et al 2005; Yost et al 2005; Silverman et al 2006; Shah et al 2010). Women physically assaulted during pregnancy also have higher risks of placental abruption, caesarean section, haemorrhage and infection than women without a history of being assaulted (El Kady et al 2005). In addition, violence before pregnancy is a major independent risk factor for hypertension, oedema, vaginal bleeding, placental problems, severe nausea and vomiting, dehydration, diabetes, kidney infection and/or urinary tract infection, as well as premature rupture of membranes (Silverman et al 2006).

29.2 Assessing for family violence

Recent guidelines in New Zealand (NZ MoH 2016) and the United States (USPSTF 2013) recommend routine enquiry about intimate partner violence among women of childbearing age (the latter noting a need for further research). However, guidelines in Canada (Canadian Task Force on Preventive Health Care 2003) and the United Kingdom (Feder et al 2009) do not recommend routine screening for family violence.

Some Australian states and territories have policies in place to support routine (New South Wales, Northern Territory) or targeted (Victoria) screening for family violence. While most states/territories do not have a dedicated screening tool for family violence in pregnancy, these are in development (Queensland), a tool that is used in other settings is recommended for use (Western Australia) or there are other mechanisms that prompt questioning (eg hand-held pregnancy records in South Australia, public hospital computerised recording system in Tasmania) (AIHW 2015).

While the screening approaches vary considerably between jurisdictions, there are some common questions in use across the tools. Questions used in at least four jurisdictions are listed in Table E2.

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Table E2: Questions used in assessment of family violence

Within the last year, have you (ever) been hit, slapped or hurt in other ways by your partner or ex-partner? OR (In the last year,) has (your partner or) someone in your family or household ever pushed, hit, kicked, punched or otherwise hurt you?
Are you (ever) afraid of your partner or ex-partner (or someone in your family)?
(In the last year) has (your partner or) someone in your family or household ever (often) put you down, humiliated you or tried to control what you can or cannot do?
(In the last year), has your partner or ex-partner (ever hurt or) threatened to hurt you (in any way)?
Would you like help with any of this now?
Are you safe to go home when you leave here?

Source: (AIHW 2015)

A review of validated screening tools that have been tested within a health-care setting and used in a antenatal context (either in part or full) found that Hurt, Insult, Threaten, Scream (HITS) and Humiliation, Afraid, Rape, Kick (HARK) tools were both considered potentially useful to recommend for national use in the antenatal context (AIHW 2015). Both have been recommended for routine screening of women of childbearing age by the United States Preventative Services Task Force and cover a number of domains of family violence. However, a systematic review of ten screening tools found that three (Women Abuse Screen Tool [WAST], Abuse Assessment Screen [AAS] and HARK) had strong psychometric properties but that further testing and validation are critically needed, particularly in relation to cultural and gender sensitivities (Arkins et al 2016).

29.2.1 Effectiveness of screening

A Cochrane review (O'Doherty et al 2015) found that screening by health professionals increased identification of women experiencing intimate partner violence (OR 2.95, 95% CI 1.79 to 4.87, moderate quality evidence) but did not have a clear effect on increasing referrals (low quality evidence). Face-to-face screening was not clearly more effective in women disclosing than written/computer-based techniques (OR 1.12, 95% CI 0.53 to 2.36, moderate

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quality evidence). Another systematic review (Hussain et al 2015) also found that face-to-face screening was not clearly more effective than either computer-based screening or self-administered written screening (with some overlap in included studies).

29.2.2 Acceptability to women

Studies found that women were largely supportive of routine enquiry:

- being asked was considered acceptable (Roelens et al 2008; Roelens 2010; Spangaro et al 2011b; Lutgendorf et al 2012; Baird et al 2013; Stockl et al 2013; Salmon et al 2015)
- family violence was considered an important domain of enquiry (Rietveld et al 2010; Ben Natan et al 2011; Salmon et al 2015)
- women would be willing to disclose if asked (Decker et al 2013).

However, women may not always feel able to disclose immediately (Salmon et al 2015). Reasons for not disclosing include not considering the violence serious enough, fear of the offender finding out and not feeling comfortable with the health professional (Spangaro et al 2010). Beneficial encounters are characterised by familiarity with the health professional, acknowledgement of the violence, respect and relevant referrals (Liebschutz et al 2008) and direct asking and care (defined as showing interest and a non-judgemental attitude) (Spangaro et al 2016). Multiple assessments for family violence during pregnancy increase reporting (O'Reilly et al 2010).

As women should be assessed for family violence without the partner present, strategies need to be developed so that a woman's partner can be involved in other domains of enquiry when assessment for psychosocial risk factors that affect mental health is conducted (Rollans et al 2016).

Recommendation	
31.	Explain to all women that asking about family violence is a routine part of antenatal care and enquire about each woman's exposure to family violence.
	Approved by NHMRC in October 2017; expires October 2022

Consensus-based recommendation	
XXXV	Ask about family violence only when alone with the woman, using specific questions or the tool used in your state/territory.
	Approved by NHMRC in October 2017; expires October 2022

29.2.3 Acceptability to health professionals

While many health professionals think screening is important (DeBoer et al 2013), some are reluctant to enquire about family violence (Roelens 2010; Ben Natan et al 2011; Shamu et al 2013). Factors increasing a health professional's likelihood of screening women included having previously screened women (Ben Natan et al 2011), having a therapeutic relationship with the woman (LoGiudice 2015), knowledge of prior abuse (Lutgendorf et al 2010), recognising silent cues (LoGiudice 2015), having scripted questions (Spangaro et al 2011a), interdisciplinary collaboration (Chang et al 2009; Kulkarni et al 2011; Mauri et al 2015) and access to resources (Chang et al 2009) and referral services (Spangaro et al 2011a).

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29.2.4 Barriers to screening

The most commonly recognised barrier to screening was lack of training (Garcia & Fisher 2008; Chang et al 2009; Lazenbatt et al 2009; Lutgendorf et al 2010; Roelens 2010; Kulkarni et al 2011; Spangaro et al 2011a; DeBoer et al 2013; Shamu et al 2013; Salcedo-Barrientos et al 2014; Baird et al 2015; Infanti et al 2015; Mauri et al 2015). Other barriers identified included:

- variations in timing and the manner in which screening takes place (LoGiudice 2015)
- lack of peer support (Garcia & Fisher 2008), confidence (Lazenbatt et al 2009) or continuity of care (Lauti & Miller 2008)
- presence of the woman's partner (LoGiudice 2015)
- women's unwillingness to disclose (Mauri et al 2015)
- time constraints (Chang et al 2009; Lutgendorf et al 2010; Roelens 2010)
- cultural taboos (Mauri et al 2015)
- health professionals' attitudes to violence (Ben Natan et al 2011; Salcedo-Barrientos et al 2014)
- concerns about privacy and confidentiality (Lauti & Miller 2008)
- uncertainty regarding management and referral options (Lutgendorf et al 2010; LoGiudice 2015)
- need for debriefing (Lauti & Miller 2008), guidelines and employer support (Finnbogadottir & Dykes 2012).

The WHO recommends that all health professionals be trained in first-line response to family violence. The steps are to: listen, believe, inquire about needs, validate the person's experience, enhance safety and offer ongoing support.

Consensus-based recommendation
XXXVI Undertake and encourage regular and repeat training of health professionals, as training programs improve confidence and competence in identifying and caring for women experiencing family violence.
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Health service support for health professionals includes provision of regular training, support and debriefing, provision of private screening spaces, documentation, policies and protocols, quality assurance and funding.

29.2.5 Interventions

There is insufficient evidence to assess the effectiveness of interventions for family violence on pregnancy outcomes (Jahanfar et al 2014). However, brief advocacy interventions (providing information and support to access community resources, including legal, police, housing and financial services) may provide small short-term mental health benefits and reduce physical abuse (Rivas et al 2015). Home visits from nurses or community health workers may also reduce episodes of physical abuse (Prosman et al 2015; Sharps et al 2016). In the context of antenatal care in Australia, safety assessment (see Section 29.4), referral to relevant support services (eg women's resource centres or refuges) is an appropriate response to disclosure of family violence.

29.3 Discussing and responding to family violence

Discussion of family violence requires rapport between the health professional and the woman. Women experiencing abuse may not speak up when the subject is first raised but may choose to open up later when they feel sufficient trust and confidence in the health professional, possibly at a subsequent visit with the same person. It is important for health professionals to enquire about family violence in private and in a sensitive manner and provide a response that takes into consideration the complexity of women's needs.

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If a woman discloses that she is experiencing family violence, an immediate response is needed, with the woman's safety a primary consideration.

Table E3: Key considerations in discussing and responding to family violence

Enquire about family violence when alone with the woman
Explain that the woman's responses will be kept confidential (subject to legal requirements)
Actively listen to what the woman tells you
Do not blame or judge the woman or her partner
Inform the woman that she is not alone, there are other women experiencing family violence
Affirm that the woman has made an important step by discussing her experiences
Reinforce that family violence is against the law
Reinforce that the woman should not self-blame
Affirm that the decision to discuss family violence is a major step to enhance her safety
Assist the woman to assess her safety and that of children in her care
Discuss options for safe temporary accommodation if needed and available (eg safe house, family or friends, hospital, women's refuge)
Encourage the woman to access specialist support services (eg woman's health centre, social worker, counsellor, mental health service, family violence and sexual assault service)
Inform the woman of her legal right to protection and provide information on legal support services
Inform the woman that disclosure of family violence may require further discussion and possible reporting in relation to child protection issues[22]
Be aware of security supports that can be used to protect the woman and yourself if needed
Document a woman's responses (ensuring that records are kept confidential and secure)
Report any incidents of violence according to organisational policy and jurisdictional legislation

Sources: Adapted from (Eastern Perth Public and Community Health Unit 2001) and (NHMRC 2002).

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Health professionals with limited experience in responding to family violence can enhance their practice by:

- seeking training and support (eg clinical supervision) where available (see Section 29.4)
- planning a response to disclosure of violence, including considerations of safety, confidentiality, sensitivity and informed support
- being familiar with specialised counselling services, emergency housing agencies and legal support services in the local area.

Practice point	
QQ	Be aware of family and community structures and support, and of community family violence and sexual assault services that can be called for urgent and ongoing support.
	Approved by NHMRC in October 2017; expires October 2022

29.3.1 Considerations in Aboriginal and Torres Strait Islander communities

In Indigenous communities, violence against women is conceptualised within extended families and the wider community (Olsen & Lovett 2016). Family violence is understood to be the result of, and perpetuated by, a range of community and family factors, rather than one individual's problematic behaviour within an intimate partnership.

No one causal factor can explain violence against Aboriginal and Torres Strait Islander women (Olsen & Lovett 2016). Instead, a number of interrelated factors have been identified, highlighting the complex and cumulative

22 Legislation around mandatory reporting to police and child protection in relation to disclosure of domestic violence varies. Health professionals need to be aware of the relevant laws and requirements in their jurisdiction.

nature of violence and victimisation including colonisation and the breakdown of culture, intergenerational patterns of violence, alcohol and other drugs, and socioeconomic stressors (Olsen & Lovett 2016). These factors also influence responses to disclosure of family violence by Aboriginal and Torres Strait Islander women. Confidentiality and privacy are important considerations. Women should be asked about who they would like to be involved in their care and offered a clear choice about referral options, including both Aboriginal-specific services and mainstream services.

It is important to respect and understand that, despite the disproportionate burden of violence against Aboriginal and Torres Strait Islander women, violence is not normal or customary in these communities (Olsen & Lovett 2016). Indigenous Australians are diverse peoples who, while having a number of areas of commonality, differ in their languages, culture and history. Not all Aboriginal and Torres Strait Islander women are subjected to violence and not all communities have high rates of violence.

Practice point	
RR	Responses to assisting Aboriginal and Torres Strait Islander women who are experiencing family violence need to be appropriate to the woman and her community.
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Approaches to addressing factors underlying family violence in Aboriginal and Torres Strait Islander communities are beyond the scope of these Guidelines. Some relevant resources are identified in Section 29.4.

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29.3.2 Considerations among migrant and refugee women

Women from migrant and refugee backgrounds who are experiencing violence may be disadvantaged by a lack of knowledge about their rights, lack of good support systems, and social isolation (Taft 2013). They may be experiencing abuse by multiple people, including in-laws and intimate partners.

Small studies have noted the need to focus on the individual woman beyond ethnicity and cultural differences (Byrskog et al 2015) and to consider different definitions of violence (Byrskog et al 2015), cultural factors influencing disclosure (Wellock 2010) and the need for involvement of independent interpreters (Wellock 2010) or bicultural health workers.

Cultural taboos may surround the issue of violence in families and this may make it difficult for women to disclose without additional encouragement, support and sensitivity (Taft 2013). The building of a trusting therapeutic relationship is essential to facilitate this disclosure. Cultural sensitivity but, equally importantly, non-judgemental and supportive practice will make it 'culturally safe' for women to find the appropriate moment to speak about their concerns with a health professional.

29.3.3 Considerations in rural and remote areas

Assisting women experiencing family violence in rural and remote areas may be complex due to:

- limited resources to call on for advice or an immediate response
- limited specialised services to assist in the woman's ongoing care
- difficulties ensuring confidentiality in smaller towns and communities
- difficulties when the health professional has a relationship with the woman (eg through family, kinship or friendship), particularly if mandatory reporting is required.

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29.4 Practice summary: assessing for family violence

When: As early as practical and at subsequent antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss assessment for family violence:** Explain that enquiry about family violence is a routine part of antenatal care and that it aims to identify women who would like assistance. Explain confidentiality and provide opportunities for the woman to discuss family violence in privacy (eg without her partner present).
- ☐ **Take a holistic approach**: If a woman affirms that she is experiencing family violence, other considerations include counselling and ongoing support. The safety of the woman and children in her care should be assessed and referral to other services (eg police, emergency housing, community services) made as required.
- ☐ **Learn about locally available support services:** Available support services for women who are experiencing family violence will vary by location.
- ☐ **Document the discussion:** Document in the medical record any evidence of injuries, treatment provided because of injuries, referrals made and any information the woman provides. If woman-held records are used, the information included in these should be limited and more detailed records kept at the health service.
- ☐ **Seek support:** Depending on your skills and experience in discussing family violence with women and assisting them if they are experiencing family violence, seek advice and support through training programs, clinical supervision, mentoring and/or helplines.
- ☐ **Be aware of relevant legislation**: Each state and territory has requirements about reporting violence as set out in its legislation.

29.5 Resources

Training

DV-Alert Lifeline offers nationally recognised training and non-accredited training across all states and territories in Australia. DV-alert is funded by the Department of Social Services and is free for front-line community and health workers.

Guidance

Family Violence Risk Assessment and Risk Management. Identifying Family Violence. Maternal and Child Nurses' Training Handbook. An initiative of the Victorian Government Family Violence Reform program developed by Domestic Violence Resource Centre (Victoria) Swinburne University of Technology.

Futures without Violence: online tools

Eastern Perth Public and Community Health Unit (2001) Responding to Family & Domestic Violence A Guide for Health Care Professionals in Western Australia. Perth: Department of Health, Government of Western Australia.

NHMRC (2002) When It's Right in Front of You. Assisting Health Care Workers to Manage the Effects of Violence in Rural and Remote Australia. Canberra: National Health and Medical Research Council.

RACGP (2014) Abuse and Violence. Working with our Patients in General Practice.

Strengthening Hospital Responses to Family Violence

WHO (2014) Health care for women subjected to intimate partner violence or sexual violence. A Clinical Handbook.

Safety assessment

Danger Assessment helps to determine the level of danger to a woman experiencing abuse.

Indigenous communities

Olsen A & Lovett R (2016) Existing knowledge, practice and responses to violence against women in Australian Indigenous communities: Key findings and future directions. Sydney: Australia's National Research Organisation for Women's Safety Limited Available at: anrows.org.au.

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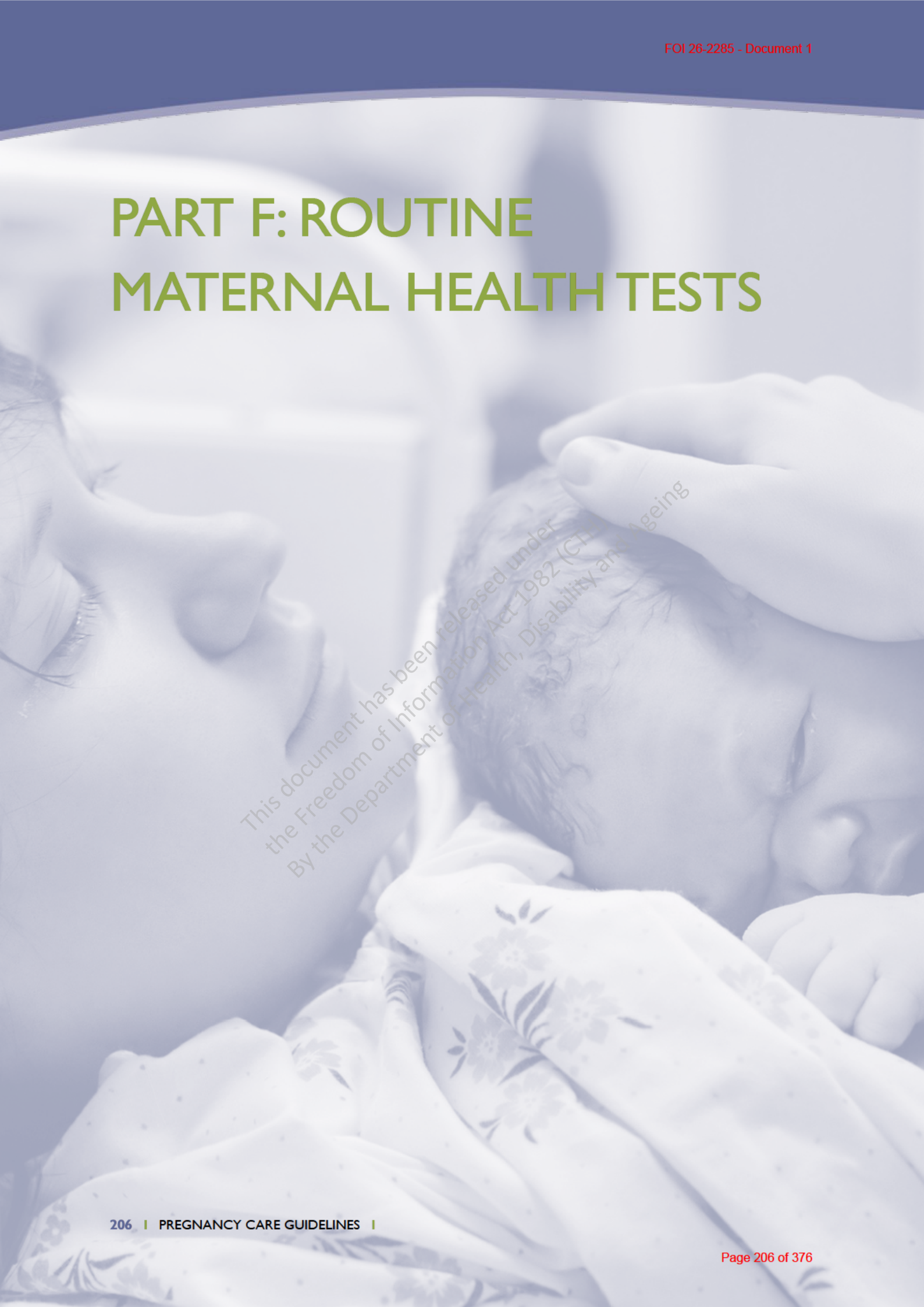
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PART F: ROUTINE MATERNAL HEALTH TESTS



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This section discusses the evidence for offering women a range of tests as part of usual care (see Table F1).

Recommendations are based on evidence about the diagnostic accuracy of available tests, the effectiveness of interventions to prevent mother-to-child transmission of infection or other effects on the unborn baby, and the availability of treatments.

For notifiable infections (HIV, hepatitis B, hepatitis C, rubella, syphilis), diagnoses are required to be reported to the National Notifiable Diseases Surveillance System. This allows analysis of trends in jurisdictions and groups at risk, although data quality varies for the different conditions and reporting of Indigenous status is incomplete in some States and for some conditions. Evidence on the prevalence and incidence of other conditions is generally from observational studies and may not be representative of the Australian population or groups within the population. While incidence or prevalence data are not always available, each chapter includes a brief discussion that aims to give health professionals an indication of the likelihood that women in their community will be affected.

Table F1: Summary of advice on tests offered to all women during pregnancy[23]

Condition	Test(s)	Follow-up/rationale	Chapter
Anaemia	Haemoglobin concentration	Full blood count and consideration of possible nutrient deficiencies for women with low haemoglobin concentrations	30
Haemoglobin disorders	Full blood count	Further investigations for women with abnormal red cell indices, family history or origin in a high-risk country	31
Gestational diabetes	Plasma glucose (fasting or following 75 g glucose loading)	Treatment of gestational diabetes reduces the risk of perinatal complications	32
HIV**	EIA and Western blot	Antiretroviral treatment in pregnancy reduces risk of transmission	33
Hepatitis B**	Blood test for HbsAg#	Vaccination of newborn reduces risk of infection	34
Hepatitis C**	Blood test for hepatitis antibody RNA if antibodies detected	Avoiding certain interventions among women who test positive reduces risk of mother-to-child transmission and direct-acting antiviral therapy used postpartum (or post breastfeeding) is highly curative protecting future pregnancies	35
Syphilis#	Treponemal EIA tests Onsite tests	Treatment benefits mother and prevents congenital syphilis	36
Rubella	Blood test for rubella antibody	Vaccination after birth protects future pregnancies. Inadvertent vaccination in early pregnancy is highly unlikely to harm the baby	37
Asymptomatic bacteriuria	Midstream urine culture	Treatment reduces risk of pyelonephritis	38
Group B streptococcus*	Self-collected vaginal-rectal swab culture	Identification of colonisation allows treatment during labour to reduce transmission to the baby	40

* According to organisational policy.

** Specialist care and psychosocial support are required for women with HIV, hepatitis B or hepatitis C.

Psychosocial support, partner testing and contact tracing needed for women with sexually transmitted infections.

EIA=enzyme immunoassay; HbsAg=hepatitis B surface antigen; HIV=human immunodeficiency virus.

23 Tests are offered in the context of engagement and consultation with women. Health professionals must use standard precautions for infection prevention and control. Tests evolve with advances in technology and health professionals must keep up-to-date with the latest developments and evidence.

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Considerations before testing

Before tests are carried out, it is essential that:

- women are informed that it is their choice to have tests
- women are able to give informed consent: verbal discussion should cover the reasons for testing, harms and benefits and associated treatments and be supported by appropriate resources (eg written materials, audio or video) and efforts should be made to ensure that women have understood the information they are given
- women have opportunities to ask questions about tests and treatments
- women are reassured that test results remain confidential (unless the condition is notifiable, in which case they are given information about the notification process)
- discussions about consent are documented by the health professional involved
- women who decline testing are offered the opportunity to discuss any concerns they may have without being coerced to reconsider the test
- there are processes for follow-up of women with a positive test result, their babies and, in some situations, partners.

Discussion of testing should be approached with sensitivity, particularly when there is a potential for testing to raise maternal anxiety or if testing is for a sexually transmitted infection.

Considerations after a positive test result

- *Psychosocial support:* Diagnosis of a condition that may affect pregnancy and/or the health of the baby can be distressing, particularly if there are no interventions that can change outcomes. Women should be given information about available supports and assisted to access these.
- *Referral for specialist care:* For some conditions, such as haemoglobin disorders and thyroid dysfunction, specialist involvement will be required.
- *Sexually transmitted infections:* If a sexually transmitted infection is identified, there is an increased risk of other sexually transmitted infections. Testing and treatment of sexually transmitted infections and contract tracing have public health benefits as transmission to partners is reduced.
- *Blood-borne infections:* Specific supports are likely to be required for women identified as using intravenous drugs.
- *Notification:* State/Territory legislation on notification of communicable diseases must be followed.

Type of test

The tests discussed in this section are those currently in use in Australia. With continuous advances in technology and testing, techniques change rapidly. The most appropriate test may also depend on the clinical setting.

Testing in rural and remote areas

It is acknowledged that in Australia, access to tests may vary (eg due to distance from pathology services), storing tests and samples appropriately may be challenging (eg due to high temperatures or humidity) and there may be difficulties in recalling women to receive test results. In these situations, resources should be focused on responding to local needs (eg ensuring that tests are available to identify highly prevalent conditions).

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30 Anaemia

Antenatal care provides an opportunity to identify women with possible anaemia. If anaemia is diagnosed, supplementation with the deficient nutrient (most commonly iron) may be advised where indicated.

30.1 Background

Anaemia is a lower than normal concentration of haemoglobin or number of red blood cells, which results in reduced capacity of the blood to carry oxygen. During pregnancy, the WHO criteria for mean minimum normal haemoglobin concentration in healthy pregnant women is 110 mg/dL in the first half of pregnancy and 105 mg/dL in the second. Iron deficiency is the most common cause of anaemia in pregnancy worldwide (WHO 2001), but other deficiencies may also cause anaemia:

- *iron deficiency*: demand for iron is increased during pregnancy (NPS 2010) and insufficient iron intake or absorption (eg diet poor in iron-rich foods and/or rich in foods that diminish iron absorption) or blood loss (eg due to gastrointestinal parasites) (ACOG 2008) can result in microcytic anaemia
- *folate deficiency*: demand for folate is also increased during pregnancy and inadequate dietary intake, prolonged vomiting or impaired absorption (eg due to gastric bypass surgery or gastrointestinal conditions) can result in macrocytic anaemia
- *vitamin B_{12} deficiency*: prolonged inadequate intake (eg limited access to source foods or vegetarian diet) or impaired absorption (eg due to gastric bypass surgery, pernicious anaemia or gastrointestinal conditions) can result in macrocytic anaemia
- *haemoglobinopathies*: these include sickle cell anaemia and thalassaemia (see Chapter 31).

Symptoms of anaemia include general weakness and tiredness but the threshold concentrations of haemoglobin at which these symptoms occur in pregnancy is not known (Reveiz et al 2011).

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30.1.1 Prevalence of iron, folate and vitamin B_{12} deficiency during pregnancy

- Estimates suggest that one-quarter of the world's population has anaemia. The burden of anaemia is considerably higher among indigenous populations compared to the general population (Khambalia et al 2011).
- The prevalence of iron-deficiency anaemia during pregnancy is generally low (< 20%) in developed countries (van den Broek 2003) and higher (35-75%) in developing countries (Africa, Asia, South America) (van den Broek 2003; Kalaivani 2009) and areas of socioeconomic disadvantage (USPSTF 2006). Reported predictors for having anaemia by 32 weeks gestation include young maternal age, non-white ethnic origin and increasing parity (Barroso et al 2011).
- Few studies have reported the prevalence of iron-deficiency anaemia during pregnancy in Australia. Iron-deficiency anaemia was identified in 18% of pregnant women in a Tasmanian study (n=2,654) (Khalafallah et al 2010) and in 11% of pregnant women in a South Australian study (n=430) (Zhou et al 2006).
- Data from Queensland suggest higher prevalence of iron-deficiency anaemia during pregnancy among Aboriginal than non-Indigenous women (Wills & Coory 2008). Smaller studies have found a prevalence of anaemia during pregnancy among Aboriginal women of 50% in remote Northern Territory communities (Bar-Zeev et al in press), 12% across 34 Aboriginal community health services (range 3-22%) (n=535) (Rumbold et al 2011) and 10% in Brisbane (n=1,523) (Stapleton et al 2011).

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- Data from Western Australia and South Australia show higher prevalence of iron-deficiency anaemia during pregnancy among adolescent (14%) than adult women (6%) and among Aboriginal (23–25%) compared with non-Indigenous (8–10%) adolescent women (Westernberg et al 2002; Lewis et al 2009).
- Mandatory fortification of flour with folic acid has reduced the prevalence of low folate levels among Australian women of childbearing age (0.16% in 2010) (Brown et al 2011). A Western Australian study found low folate levels in 10% of Aboriginal women before flour fortification (Maxwell et al 2012).
- Vitamin B_{12} deficiency is common in most of the developing world (Stabler & Allen 2004; Allen 2009). Few studies have examined the prevalence of vitamin B_{12} deficiency in Australia (Flood et al 2006). However, there is emerging evidence of vitamin B_{12} deficiency among refugees due to limited or no sources of animal foods before resettlement (Benson et al 2010; Benson et al 2013).

Preventing iron deficiency (through inclusion of iron-rich foods in the diet and/or iron supplementation) is discussed in Section 11.3.2.

30.1.2 Risks associated with iron, folate and vitamin B_{12} deficiency during pregnancy

Severe iron-deficiency anaemia (haemoglobin concentration <70 mg/dL) can cause cardiac failure, (Lops 1995; WHO 1992; Williams & Wheby 1992) and reduce tolerance of blood loss associated with birth. It is unclear whether mild to moderate anaemia is associated with poor outcomes (Reveiz et al 2011).

Deficiencies of folate (De-Regil et al 2011) or vitamin B_{12} (Molloy et al 2008) during pregnancy are associated with neural tube defects.

30.2 Testing for anaemia

Routinely offering a full blood count early in pregnancy and at 28 weeks is recommended in the United Kingdom (NICE 2008) and in Australia (RANZCOG 2009). Initial haemoglobin concentration is usually assessed in the context of this full blood count.

30.2.1 Assessing haemoglobin concentration

During pregnancy, maternal red cell mass and plasma volume increase and the haemoglobin concentration is reduced (NICE 2008). Haemoglobin is therefore checked against gestation-related thresholds.

Table F2: Assessing haemoglobin concentration during pregnancy

Gestational age	Minimum haemoglobin concentration
0–20 weeks	110 mg/dL
20+ weeks	105 mg/dL

Source: WHO (1993).

Consensus-based recommendation	
XXXVII	Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.
	Approved by NHMRC in June 2014; expires June 2019 — UNDER REVIEW

Practice point	
SS	In areas where prevalence of iron-deficiency anaemia is high consider testing ferritin at the first antenatal visit.
	Approved by NHMRC in June 2014; expires June 2019 — UNDER REVIEW

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30.2.2 Further investigations

Haemoglobin concentration is not sensitive enough to be the sole means of diagnosing anaemia. Diagnostic tests include:

- full blood count (if this has not already been conducted)
- serum ferritin, which is the most sensitive single test to detect adequate iron stores (90% sensitivity at a cut-off of 30 mg/litre) (Breymann 2002)
- specific tests for folate and vitamin B_{12}, if mean cell volume is high.

Practice point	
TT	Further investigation is required for women with a low haemoglobin concentration for their gestational stage. Repeat testing at 36 weeks may also be required for women who have symptoms or risk factors for anaemia or who live in or have come from an area of high prevalence.
	Approved by NHMRC in June 2014; expires June 2019

30.3 Treating iron-deficiency anaemia

30.3.1 Effectiveness and safety of treatments for iron-deficiency anaemia

The evidence on treatments for iron-deficiency anaemia covers a very wide range of supplements, doses and routes of administration and focuses on changes in maternal haemoglobin concentration.

- Iron supplementation improves maternal haemoglobin concentrations, but there is a lack of evidence about the overall benefits of treating mild iron-deficiency anaemia in pregnancy (Reveiz et al 2012).
- Oral iron can cause gastrointestinal adverse effects (eg nausea, constipation) (Reveiz et al 2012). Intramuscular or intravenous iron is more effective than oral iron, but may have adverse effects (venous thrombosis and allergic reactions for intravenous treatment and pain, discolouration and allergic reactions for intramuscular treatment) (Reveiz et al 2012).

Iron as part of general nutritional supplementation is discussed in Section 11.3.2. Given the lack of evidence on outcomes, the recommendation is not to routinely offer iron supplementation to women during pregnancy.

Recommendation		Grade B
32.	Advise iron supplementation for women identified as having iron-deficiency anaemia.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Practice point		
UU	Oral iron remains first-line treatment for iron-deficiency anaemia identified in the antenatal period. Intravenous iron should be offered to women who do not respond to oral iron or are unable to comply with therapy. In some remote settings, intramuscular iron may be administered by a health professional who does not have intravenous endorsement or where intravenous iron cannot be accessed.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

30.3.2 Dose of supplementation

Recent studies provide high-level evidence on lower doses of iron supplementation. Iron supplements that are low dose (eg 20 mg) or taken less often than daily appear to be effective in treating anaemia in pregnancy with fewer gastrointestinal side effects compared with high-dose (eg 80 mg) or daily supplements (de Souza et al 2004; Sharma et al 2004; Zhou et al 2009; Reveiz et al 2012).

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Recommendation 20	Grade B
33. Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.	
Approved by NHMRC in June 2014	UNDER REVIEW

30.3.3 Other considerations

Treatment for hookworm infestation should also be considered in areas of high prevalence.

30.4 Discussing anaemia

When haemoglobin concentration is low, points for discussion include:

- while anaemia in pregnancy is most commonly associated with iron deficiency, deficiencies of folate or vitamin B_{12} also result in anaemia and further tests are required to identify the cause
- if a deficiency is identified, supplementation with the appropriate nutrient can correct the deficiency
- supplements can be combined with foods rich in the relevant nutrient:
  - iron-rich foods include meat, seafood and poultry; including a vitamin C rich fruit or vegetable in each meal and limiting tea and coffee to between meals aids absorption (Marsh et al 2009)
  - foods rich in folate include fortified bread and cereals, dried beans and peas, dark green vegetables and citrus fruit and juice
  - foods that contain vitamin B_{12} include meat, eggs, milk and cheese.

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30.5 Practice summary: anaemia

When: Early in pregnancy and at 28 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the reasons for testing for anaemia:** Explain that anaemia causes tiredness and can have other effects on the pregnancy.
- ☐ **Explain the causes of anaemia:** Iron-deficiency anaemia is common during pregnancy. Other causes of anaemia may be a consideration for women who live in or have come from areas where folate or vitamin B_{12} deficiencies are common.
- ☐ **Take a holistic approach:** Consider the availability of iron-rich foods appropriate to the woman's cultural practices and preferences and the affordability of supplements. For women taking supplements for iron-deficiency, explore culturally appropriate, low cost ways for women to increase their fibre and fluid intake if they are experiencing constipation.
- ☐ **Consider referral:** If there is concern about the quality of dietary iron intake or if the woman would like information about nutrition for herself and her family, consider referral to an accredited dietitian.
- ☐ **Document and follow-up:** When a woman is tested for anaemia, tell her the results and note them in her antenatal record. Have a system in place so that women with iron-deficiency anaemia during pregnancy are given information about iron supplementation and receive ongoing follow-up, including further investigation if anaemia does not resolve after pregnancy.

30.6 Resources

Anaemia (weak blood) in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

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31 Haemoglobin disorders

While identifying parents who are carriers for haemoglobin disorders before conception is preferable, discussing testing and the implications of carrier status early in pregnancy enables women and their partners to make informed choices.

31.1 Background

Mutation of the genes that contain the information for cells to make haemoglobin can result in low or absent production of normal adult haemoglobin (thalassaemias) or changes in the structure of the haemoglobin protein (haemoglobin variants such as sickle cell disease).

When babies inherit mutated globin genes from both parents, they may be affected by or be a carrier for a haemoglobin disorder. It is very unlikely that the baby will be affected when only one parent is a carrier for a haemoglobin disorder, but the baby may be a carrier.

31.1.1 Prevalence of haemoglobin disorders

- Globally, over 330,000 affected infants are born each year (83% sickle cell disorders and 17% thalassaemias), around 7% of pregnant women are carriers of haemoglobin disorders and over 1% of couples are at risk (Modell & Darlison 2008).
- The risk of being a carrier for a haemoglobin disorder varies with ethnicity (Gaff et al 2007):
  - alpha thalassaemia is most prevalent among people of Chinese and South-East Asian origin but occurs in many other ethnic groups, including people from Southern European countries, the Middle East, the Indian subcontinent, Pakistan, Africa, the Pacific Islands and New Zealand (Maori)
  - beta thalassaemia is prevalent among people from the Middle East, Southern Europe, Indian subcontinent, Central and South-East Asia and Africa
  - sickle cell disease is seen in many populations including people from Africa, the Middle East, Southern Europe, India, Pakistan, South America and the Caribbean.
- In Australia (Gaff et al 2007):
  - alpha thalassaemia has been identified in some Aboriginal and Torres Strait Islander communities in the Northern Territory and northern Western Australia
  - sickle cell disease has been most commonly seen in individuals of Southern European and Middle-Eastern origin (especially Lebanese and Turkish) but is becoming more prevalent with increasing immigration from sub-Saharan Africa and the Indian subcontinent.

31.1.2 Risks associated with haemoglobin disorders

- Thalassaemias vary in severity depending on the number of faulty globin genes (CGE 2007). Symptoms range from mild anaemia to severe anaemia that requires blood transfusions lifelong. A baby with alpha thalassaemia, if born alive, does not usually survive for long after the birth (Bart's hydrops fetalis).
- Sickle cell anaemia is characterised by chronic anaemia, bone and chest pain, organ damage, failure to thrive, repeated infections and painful swelling of the hands and feet (CGE 2007).

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31.2 Testing for haemoglobin disorders

In Australia, RANZCOG recommends that local policies for testing for haemoglobin disorders take into account the ethnic mix of women tested (RANZCOG 2009).

31.2.1 Discussing ethnicity

It is not possible to assume ethnicity from country of birth or surname. More information can be obtained by asking women where their parents, grandparents or great-grandparents were born (Gaff et al 2007). An RCT in the United Kingdom found that a questionnaire listing a range of ethnicities was more effective in ascertaining ancestry than a simple question about ethnic origins outside the United Kingdom (Dyson et al 2006).

31.2.2 Test

The RANZCOG recommends that mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) be tested in all women (RANZCOG 2009). A small study found that MCV had a sensitivity of 92.9% and specificity of 83.9% for thalassaemia testing (Sirichotiyakul et al 2005).

Testing using MCV and MCH will identify some but not all carriers of alpha and beta globin gene changes. It should be noted that some beta globin gene changes (eg sickle cell trait) result in normal red cell indices and detection relies on haemoglobin electrophoresis.

31.2.3 Harms and benefits of testing

Narrative reviews indicate testing of women at increased risk of being carriers for haemoglobin disorders can identify couples who are both carriers and have a 25% risk of having a pregnancy with a significant genetic disorder for which antenatal diagnosis is possible (Langlois et al 2008). No studies identified harms associated with testing. One study found that being well informed about haemoglobin disorders may reduce anxiety in women who are subsequently identified as carriers (Brown et al 2011).

31.2.4 Timing of testing

Narrative reviews suggest that the ideal time for testing for haemoglobin disorders would be preconception (Gaff et al 2007). If this is not possible, testing should take place as early as possible in pregnancy. Studies have found that when testing was offered in primary care (eg as part of the pregnancy confirmation visit), women were tested at an earlier gestation (Thomas et al 2005; Dormandy et al 2010a; Dormandy et al 2010b).

31.2.5 Cost-effectiveness of testing

Studies have found that antenatal testing in populations with a high prevalence of haemoglobin disorders is cost effective (Leung et al 2004; Koren et al 2009). While testing at confirmation of pregnancy may require additional resources, it increases the number of women tested by 10 weeks gestation (Dormandy et al 2010a). Cost-effectiveness studies support testing of fathers after a woman has been identified as a carrier for a haemoglobin disorder rather than on confirmation of pregnancy (Dormandy et al 2010a; Bryan et al 2011).

Consensus-based recommendation	
XXXVIII	As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer testing (full blood count).
	Approved by NHMRC in June 2014; expires June 2019

Practice point	
VV	Consider offering ferritin testing and haemoglobin electrophoresis as part of initial testing to women from high-risk population groups.
	Approved by NHMRC in June 2014; expires June 2019

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31.3 Further investigations

Further testing is recommended for women who (Gaff et al 2007):

- have a MCV ≤80 fL and/or MCH ≤27 pg
- have a family history of anaemia, thalassaemia or other abnormal haemoglobin variant and/or
- originate from high-risk population groups: Southern Europe, Middle East, Africa, China, South-East Asia, the Indian subcontinent, Pacific Islands, New Zealand (Maori), South America and some Aboriginal and Torres Strait Islander communities in northern Western Australia and the Northern Territory.

Relevant tests include:

- ferritin testing to exclude iron-deficiency anaemia
- electrophoresis or high pressure liquid chromatography, to identify haemoglobin variants (red cell indices can be normal in carriers for some haemoglobin disorders).

Further studies (eg DNA analysis) may be carried out for final clarification of the carrier state.

Diagnosis of an affected baby is generally by chorionic villus sampling, usually in the first trimester (Gaff et al 2007). A small study (n=777) found that ultrasound markers (middle cerebral artery peak systolic velocity plus fetal cardiothoracic ratio) had a low false positive rate in diagnosing alpha thalassaemia (Leung et al 2010).

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31.4 Discussing haemoglobin disorders

Providing women with sufficient information about haemoglobin disorders enables informed choices about testing (Brown et al 2011). Discussion to inform a woman's decision-making about testing for haemoglobin disorders should take place before testing and include:

- people can be carriers of haemoglobin disorders without being affected by the condition or may be only mildly affected
- people from some ethnic groups are more likely to be carriers of or affected by haemoglobin disorders
- if only one parent is a carrier, it is unlikely that the baby will be affected but he or she may be a carrier
- if both parents are carriers for a haemoglobin disorder, there is a chance that the baby will be affected by the condition
- there are implications for the health of an affected baby.

31.5 Practice summary: haemoglobin disorders

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the reasons for testing for haemoglobin disorders:** Explain that when both parents are carriers for a haemoglobin disorder, the baby may be affected (1 in 4 chance) with possible serious consequences.
- ☐ **Offer testing to fathers:** If a woman is identified as a carrier of a significant haemoglobin disorder, testing should be offered to the father. Other family members may also benefit from an offer of testing.
- ☐ **Take a holistic approach**: Arrange counselling for parents when both are identified as carriers of haemoglobin disorders.
- ☐ **Document and follow-up:** Ensure that women receive timely notice of the results of any tests carried out. Have a system in place so that women identified as carriers of haemoglobin disorders receive ongoing support.

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31.6 Resources

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32 Hyperglycaemia

Identifying the risk or presence of hyperglycaemia in pregnancy enables women to receive early testing if risk factors are present and lifestyle advice, education, blood glucose monitoring and appropriate treatment if diabetes is identified.

32.1 Background

Hyperglycaemia (raised blood glucose level) in pregnancy is defined here as pre-existing type 1 diabetes, pre-existing type 2 diabetes (either previously diagnosed or diagnosed during pregnancy) and gestational diabetes (developing during pregnancy). Gestational diabetes can recur in subsequent pregnancies, and women who develop gestational diabetes are at high risk of developing type 2 diabetes in later life.

This section does not address the care of women diagnosed with Type 1 or type 2 diabetes before pregnancy as the Guidelines cover the antenatal care of healthy pregnant women (ie those who do not have identified pre-existing conditions). For women with diagnosed type 1 or type 2 diabetes, preconception counselling is recommended.

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32.1.1 Prevalence of hyperglycaemia in pregnancy

The prevalence of hyperglycaemia in pregnancy varies with the characteristics of the population being tested and the diagnostic criteria used. Population-based studies have estimated prevalence ranging from 1% to 50% (Hartling et al 2012). The prevalence of hyperglycaemia in pregnancy has increased over the past decades in parallel with the increase in rates of obesity (BMI > 30 kg/m2) and type 2 diabetes and this trend is expected to continue (Aljohani et al 2008; Hartling et al 2012).

Among women who gave birth in Australia in 2009-11, 0.7% had known pre-existing diabetes (type 1 or type 2 diabetes) and 5.8% developed gestational diabetes (AIHW 2014).

In 2013, rates of known pre-existing diabetes were (AIHW 2016):

- lowest among women aged <20 years (0.4%) and highest among women aged ≥40 years
- lower among nulliparous women (1.0%) than among women of higher parity (ie 1.9% for parity of four)
- higher among Aboriginal and Torres Strait Islander women (4.4%) than among non-Indigenous women (1.1%) (age-standardised)
- higher among women born overseas (1.2%) than among women born in Australia (0.9%).

32.1.2 Risks associated with diabetes in pregnancy

Cohort studies have found an independent relationship between hyperglycaemia during pregnancy and adverse outcomes for mother and baby (Sacks et al 1995; Sermer et al 1998; Schmidt et al 2001; HAPO Study Cooperative Research Group 2008). The most comprehensive of these studies, the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study, showed a continuum of risk across maternal glucose levels for adverse pregnancy outcomes, including pre-eclampsia, caesarean section, birth trauma, high birth weight (>90th centile) and percentage of body fat as well as premature birth (HAPO Study Cooperative Research Group 2008). High birth weight babies are at risk of birth complications (eg shoulder dystocia) (Crowther et al 2005; Falavigna et al 2012), jaundice (Nold & Georgieff 2004) and of long-term effects including childhood overweight (Li et al 1987; Langer et al 1989) and metabolic factors that may increase risk of type 2 diabetes and cardiovascular disease (Garner et al 1997).

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In Australia in 2005–07 (AIHW 2010):

- women with pre-existing type 1 or type 2 diabetes were more likely to have preterm birth, induced labour, caesarean birth, hypertension and hospital stay longer than 7 days than women with gestational diabetes or without type 1 or type 2 diabetes identified in pregnancy and their babies had higher rates of stillbirth, high birth weight, low Apgar score and admission to special care nursery/neonatal intensive care unit
- women with gestational diabetes had a higher risk of induced labour, preterm birth, caesarean section, hypertension and longer hospital stay than women without gestational diabetes, and their babies were more likely to be admitted to a special care nursery/neonatal intensive care unit
- Aboriginal and Torres Strait Islander mothers with pre-existing diabetes or gestational diabetes were at the greatest risk of preterm birth, induced labour, caesarean section and hypertension and their babies had higher rates of stillbirth, low Apgar score and admission to neonatal intensive care unit than non-Indigenous babies of mothers with pre-existing diabetes or gestational diabetes.

While hyperglycaemia is the principal concern of diabetes in pregnancy, hypertension and dyslipidaemia associated with diabetes also contribute to the risk of adverse outcomes.

32.2 Assessing risk of diabetes

32.2.1 Identifying women at risk of diabetes during pregnancy

The risk factors for undiagnosed type 2 diabetes are similar to those for gestational diabetes. There is a considerable body of evidence supporting an independent association between increased risk of gestational diabetes and the following factors.

- *Age*: Risk increases with maternal age (Scott et al 2002; Gonzalez-Clemente et al 2007; Iqbal et al 2007; Cypryk et al 2008; Karcaaltincaba et al 2009; Yang et al 2009; Ogonowski & Miazgowski 2010; Yogev et al 2010; Ismail et al 2011; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Far et al 2012; Hartling et al 2012; Makgoba et al 2012; Ramos-Levi et al 2012).
- *Weight*: Risk increases with increased BMI (Scott et al 2002; Gonzalez-Clemente et al 2007; Rudra et al 2007; Cypryk et al 2008; Kwak et al 2008; Radesky et al 2008; Torloni et al 2009; Yang et al 2009; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Schneider et al 2011; Teede et al 2011; Teh et al 2011; Far et al 2012; Hartling et al 2012; Hedderson et al 2012; Heude et al 2012; Lagerros et al 2012; Makgoba et al 2012; Ramos-Levi et al 2012; Singh et al 2012) or percentage of body fat (Iqbal et al 2007). BMI thresholds for increased risk vary by ethnic group (ie are lower among Asian women) (Hedderson et al 2012). Excessive weight gain early in pregnancy also contributes to risk (Hedderson et al 2010b; Ogonowski & Miazgowski 2010; Ismail et al 2011; Carreno et al 2012; Gibson et al 2012; Heude et al 2012).
- *Polycystic ovary syndrome*: The glucose metabolism alterations associated with polycystic ovary syndrome lead to an increased risk of gestational diabetes (Boomsma et al 2006; Toulis et al 2009; Hartling et al 2012; Reyes-Munoz et al 2012).
- *Previous obstetric history*: Risk is increased among women with previous gestational diabetes (Gonzalez-Clemente et al 2007; Radesky et al 2008; Getahun et al 2010; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Hartling et al 2012), a previous high birth weight baby (Cypryk et al 2008; Ogonowski & Miazgowski 2010; Waugh et al 2010; Nanda et al 2011; Hartling et al 2012) or previous pregnancy losses, including spontaneous miscarriage and unexplained stillbirth (Hartling et al 2012)
- *Family history*: Family history of diabetes, especially maternal family history (Scott et al 2002; McLean et al 2006; Gonzalez-Clemente et al 2007; Cypryk et al 2008; Yang et al 2009; Waugh et al 2010; Ismail et al 2011; Teede et al 2011; Teh et al 2011; Mao et al 2012; Ramos-Levi et al 2012) or type 2 diabetes in a first-degree relative (Ogonowski & Miazgowski 2010; Nanda et al 2011; Hartling et al 2012), increases the risk of developing gestational diabetes.

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- *Ethnic origin*: Risk of gestational diabetes is increased among women who originate from an ethnic group with a high prevalence of type 2 diabetes (Waugh et al 2010). These include Aboriginal and Torres Strait Islander peoples (Porter et al 2012) and people who are of Hispanic, African, Native American, South or East Asian or Pacific Island origin (Scott et al 2002; Nanda et al 2011; Teede et al 2011; Teh et al 2011; Hartling et al 2012; Makgoba et al 2012; Singh et al 2012).
- *Migration*: Being a migrant (including entering another country as a refugee) rather than being native to the country is associated with increased risk (Hedderson et al 2010a; Gagnon et al 2011; Schneider et al 2011).

A recent systematic review (NZ MoH 2014) had similar findings and noted that it is likely that interactions between risk factors, rather than any single risk factor, predispose a woman to gestational diabetes.

Recommendation	
34. In the first trimester, assess a woman's risk of hyperglycaemia including: her age, body mass index, previous gestational diabetes or high birth weight baby, family history of diabetes, presence of polycystic ovarian syndrome and whether she is from an ethnic group with high prevalence of diabetes, such as Aboriginal and Torres Strait Islander peoples.	
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32.2.2 Lifestyle interventions for preventing gestational diabetes

- *Physical activity*: A Cochrane review (Han et al 2012) concluded that exercise programs had no clear effect on preventing gestational diabetes among healthy pregnant women. An RCT found that a physical activity intervention did not reduce the risk of healthy pregnant women developing gestational diabetes but reduced maternal weight gain, risk of caesarean section and high birth weight (Barakat et al 2013).
- *Dietary interventions*: A systematic review of RCTs found that a low glycaemic index diet reduced the risk of a high birth weight baby, that any dietary counselling was effective in reducing the incidence of gestational diabetes compared to standard care and that dietary counselling with probiotics was more effective in reducing incidence of gestational diabetes than dietary counselling alone (Oostdam et al 2011). An RCT found that a low glycaemic index diet during pregnancy did not reduce the risk of having a high birth weight baby among women at risk of gestational diabetes but had a beneficial effect on maternal weight gain and glucose intolerance (Walsh et al 2012).
- *Combined interventions*: RCTs into the effect of advice on diet and physical activity in preventing gestational diabetes have inconsistent results. In some studies, intervention did not reduce the risk of gestational diabetes among women at high risk but resulted in lower weight gain among women at high risk and healthy pregnant women (Korpi-Hyovalti et al 2011; Phelan et al 2011; Vinter et al 2011; Hui et al 2012). Other studies found that combined interventions reduced the risk of gestational diabetes and weight gain among women who were overweight or obese (Petrella et al 2013) and the incidence of high birth weight newborns among women at high risk (Luoto et al 2011).
- *Management plans*: An Australian study reported that a four-step management plan (including continuity of carer, weighing at each visit, brief food technologist intervention and clinical psychology management) aiming to reduce maternal weight gain among women who were obese reduced the incidence of gestational diabetes and maternal weight gain (Quinlivan et al 2011).

Qualified recommendation	
35. Advise women that physical activity and healthy eating during pregnancy help to reduce excessive weight gain but do not appear to directly reduce the risk of diabetes in pregnancy.	
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Chapter 11 includes advice on nutrition and physical activity and Chapter 19 advice on weight management.

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32.3 Testing for hyperglycaemia

There is no agreement among current guidelines on whether testing for hyperglycaemia should be offered to all women or only to women with risk factors. However, a number of major international guidelines recommend universal testing for gestational diabetes at 24-28 weeks gestation, including the Australasian Diabetes in Pregnancy Society (ADIPS) (Nankervis et al 2013), the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG 2014), the Endocrine Society (USA) (Blumer et al 2013), the International Association of Diabetes and Pregnancy Study Groups (IADPSG) (Metzger et al 2010), the United States Preventive Services Task Force (USPSTF 2014), the World Health Organization (WHO 2013), the International Federation of Gynecology and Obstetrics (Hod et al 2015) and the International Diabetes Federation (IDF 2015).

The decision to test all pregnant women or only those with risk factors depends on the background frequency of abnormal glucose metabolism in the population and on local circumstances (Metzger et al 2010). The WHO guidelines leave it to local health authorities to specify the testing coverage according to local burden, resources and priorities (WHO 2013). Whether testing is universal or risk factor based, it is important that organisational protocols are consistently followed and outcomes audited.

A technical report from the United Kingdom concluded that testing for hyperglycaemia in pregnancy is worthwhile due to the costs of managing pregnancies complicated by diabetes (Waugh et al 2010). An Australian study suggested that treating mild gestational diabetes involved additional costs to hospitals and women but resulted in reductions in perinatal mortality and serious perinatal complications (Moss et al 2007).

These Guidelines recommend a two-stage approach to testing, with women at risk of hyperglycaemia tested early in pregnancy and women who are not part of this group tested later at 24-28 weeks gestation.

32.3.1 Early testing for hyperglycaemia

Detection and treatment of undiagnosed type 1 or type 2 diabetes in early pregnancy has the potential to reduce immediate and long-term harm to the baby and have a positive effect on maternal health (Hughes & Moore 2013). For these reasons, it has been recommended that women with risk factors for type 2 diabetes be tested for hyperglycaemia at the first antenatal visit (Simmons & Campbell 2007; ADA 2013).

In New Zealand, it is recommended that all women are offered glycated haemoglobin (HbA1c) testing at the first antenatal visit (NZ MoH 2014). Prospective cohort studies in New Zealand since the introduction of the recommendation have found that:

- HbA1c ≥41 mmol/mol (5.9%) had a sensitivity of 100% (95%CI 91.8 to 100) and specificity of 97.4% (95%CI 95.5 to 99.2) for detecting diabetes and that women with HbA1c of 41-46 mmol/mol (5.9-6.4%) (n=200) had poorer pregnancy outcomes than those with HbA1c <41 mmol/mol (n=7,897; very low quality evidence) (Hughes et al 2014)
- earlier treatment (<24 weeks) for women with an HbA1c of 41-49 mmol/mol (5.9-6.6%) was associated with a reduced risk of pre-eclampsia (but not other pregnancy or neonatal outcomes) compared with treatment ≥24 weeks (1.5 vs 8.0%, adjusted P=0.03; very low quality evidence) (Rowan et al 2016).

However, the evidence on HbA1c as a test in early pregnancy is limited and it is not currently included in the Medicare Benefits Schedule as a diagnostic test in pregnancy. Further research is needed to evaluate the benefit of early treatment for hyperglycaemia in pregnancy.

Consensus-based recommendation	
XXXIX When a woman has risk factors for hyperglycaemia in the first trimester, suitable tests are glycated haemoglobin (HbA1c) or fasting blood glucose.	
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Suggested thresholds for identifying hyperglycaemia in early pregnancy are given in Table F3.

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Table F3: Suggested thresholds for glycated haemoglobin and fasting plasma glucose to identify hyperglycaemia in early pregnancy

Test	Suggested threshold
HbA1c	≥41 mmol/mol (5.9%)
Fasting plasma glucose	6.1 to 6.9 mmol/L

Sources: (NZ MoH 2014; McIntyre et al 2016).

32.3.2 Testing for gestational diabetes

A lack of an agreed gold standard for diagnosing hyperglycaemia creates challenges for assessing the accuracy of tests, making comparisons between them and establishing clear thresholds (Hartling et al 2012). There is currently no universally accepted testing or diagnostic regimen. A Cochrane review concluded that, although gestational diabetes was more likely to be detected when all women were tested, the effects of subsequent management on health outcomes are unclear (Tieu et al 2014). A large retrospective cohort study concluded that selective testing would miss one third of women with gestational diabetes (Cosson et al 2013). As the condition is prevalent, asymptomatic and benefits from treatment, universal testing is generally recommended. However, at present, the benefits of treating early hyperglycaemia in pregnancy are uncertain.

International consensus guidelines recommend the use of fasting plasma glucose or plasma glucose 1 hour and 2 hours after 75 g glucose loading for testing for gestational diabetes (Metzger et al 2010; WHO 2013; Hod et al 2015; IDF 2015). HbA1c lacks sensitivity as a test for gestational diabetes (NZ MoH 2014).

Consensus-based recommendation		
XL	Between 24 and 28 weeks gestation, advise testing for hyperglycaemia to all women who have not previously been tested in the current pregnancy. Advise repeat testing to women who were tested early in pregnancy due to risk factors and who had a normal result on an initial test.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

32.3.3 Diagnostic thresholds

The optimal diagnostic threshold for diabetes in pregnancy is uncertain and difficult to determine based on the available evidence.

After review of the findings of the HAPO Study, the IADPSG defined diagnostic values on the basis of an odds ratio of 1.75 for adverse neonatal outcomes (see Table F4). These criteria use a one-step approach to testing for gestational diabetes and have been adopted by the WHO (WHO 2013) and the American Diabetes Association (ADA 2013). Recent ADIPS guidelines on diagnosis of gestational diabetes also include these criteria (Nankervis et al 2013). Other documents, including the RACGP/Diabetes Australia *Diabetes Management in General Practice* (RACGP/Diabetes Australia 2013) and a US National Institutes of Health consensus development conference statement (VanDorsten et al 2013) support the use of a two-step approach to testing and higher thresholds.

Table F4: WHO/ IADPSG criteria for diagnosis of diabetes in pregnancy

Diabetes in pregnancy: one or more of the following criteria are met	
Fasting plasma glucose	≥ 7.0 mmol/l (126 mg/ dl)
2-hour plasma glucose	≥ 11.1 mmol/l (200 mg/dl) following a 75g oral glucose load
Random plasma glucose	≥ 11.1 mmol/l (200 mg/ dl) in the presence of diabetes symptoms
Gestational diabetes: one or more of the following criteria are met at any time during pregnancy	
Fasting plasma glucose	5.1-6.9 mmol/l (92 -125 mg/dl)
1-hour plasma glucose	≥ 10.0 mmol/l (180 mg/dl) following a 75g oral glucose load
2-hour plasma glucose	8.5-11.0 mmol/l (153 -199 mg/dl) following a 75g oral glucose load

Source: WHO 2013.

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Consensus-based recommendation		
XLI	Use the World Health Organization/International Association of Diabetes and Pregnancy Study Groups tests and criteria to diagnose diabetes and gestational diabetes in pregnancy.	
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The WHO criteria for diagnosing pre-existing diabetes are based on the risk of developing microvascular complications, predominantly retinopathy. There are no data available to assess diagnostic accuracy of current diabetes diagnostic criteria if used in pregnancy in untreated women (WHO 2013). The WHO grade the quality of the evidence supporting the criteria for diagnosing gestational diabetes as very low (WHO 2013). The criteria are not based on diagnostic accuracy because there is no reference test to define disease status.

A systematic review found evidence to support a positive association between increasing plasma glucose on a 75 g or 100 g oral glucose tolerance test and high birth weight and primary caesarean section but clear thresholds for increased risk were not identified (Hartling et al 2012). Another systematic review found that the risk of these adverse events was similar between the WHO/IADPSG and former WHO criteria (Wendland et al 2012). Cohort studies have found that women classified as having gestational diabetes under the WHO/ IADPSG criteria but not under former criteria had a significantly increased risk of caesarean section (Lapolla et al 2011; O'Sullivan et al 2011), hypertensive complications (O'Sullivan et al 2011) and having a high birth weight baby (Morikawa et al 2010; O'Sullivan et al 2011). However, no RCTs have compared the outcomes of management following diagnosis under the two criteria.

While a full cost-effectiveness analysis has not been published, two studies that modelled the cost effectiveness of the WHO/IADPSG criteria concluded that they would only be cost effective if detection of gestational diabetes reduced the rate at which type 2 diabetes subsequently developed (Werner et al 2012) or if the rate of caesarean section was reduced (Mission et al 2012).

It is acknowledged that using the WHO/ IADPSG criteria has the potential to increase the diagnosis of gestational diabetes in Australia, with resource implications. However, calculations of the prevalence in populations may increase or decrease with changes to both testing criteria and uptake, as well as changes in population demographics. For example:

- a prospective study in Wollongong comparing the use of the previous ADIPS criteria with the WHO/ IADPSG criteria found that prevalence varied between the public and private sectors: 8.6% vs 9.1% (public sector), 10.5% vs 16.2% (private sector) and 9.6% vs 13.0% (overall) (Moses et al 2011)
- an analysis of the HAPO sites in Australia using the WHO/ IADPSG criteria found a prevalence of gestational diabetes of 13.2% in Brisbane and 13.6% in Newcastle (Sacks et al 2012)
- an analysis of oral glucose tolerance test results from women in two Area Health Services in the Sydney area found that using the WHO/IADPSG criteria rather than the previous ADIPS criteria would increase rates of diagnosis and therefore affect the health service workload for management of gestational diabetes (Flack et al 2010)
- in a cohort of Aboriginal and Torres Strait Islander women in Far North Queensland, gestational diabetes prevalence increased threefold over 2 years due to enhanced testing practices, but prevalence would have been lower if the WHO/ IADPSG criteria had been in place at the time (Davis et al 2013).

Increased diagnosis also has implications for women. Gestational diabetes occurs across a continuum with a variety of potential threshold points. The risk of labelling a woman with gestational diabetes needs to be weighed against any potential benefits to the woman and baby, particularly if lifestyle advice is likely to be the first treatment option. There is a need for evidence on the risks and benefits of testing at different thresholds.

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32.4 Discussing diabetes in pregnancy (gestational diabetes, type 1 or type 2 diabetes)

Discussion to inform a woman's decision-making about testing for diabetes should take place before testing and include that:

- undetected and uncontrolled diabetes during pregnancy is associated with risks to the mother (eg high blood pressure, pre-eclampsia) and to the baby in the short term (eg stillbirth, preterm birth, high birth weight, congenital anomalies, birth complications) and the longer term (childhood overweight and development of diabetes)
- a diagnosis of diabetes in pregnancy may lead to increased monitoring and interventions during pregnancy and labour (eg induced labour, caesarean section).

If diabetes is diagnosed during pregnancy, points for discussion include:

- the role of diet, physical activity and body weight in managing diabetes
- the role of insulin or oral hypoglycaemic agents in the management of diabetes (ie if diet and physical activity do not adequately control blood glucose levels)
- the importance of monitoring and controlling blood glucose levels during pregnancy, labour, birth and early feeding of the baby to reduce the likelihood of the baby having low blood glucose levels after the birth and the associated risks
- the possibility of the baby having low blood glucose levels in the period after the birth, which may require admission to a special care nursery/neonatal intensive care unit
- the risk of the baby developing obesity, heart disease and/or diabetes in the future
- the woman's increased risk of developing type 2 diabetes and the importance of regular assessment for glucose tolerance and maintaining a healthy weight
- the benefits of registering with the National Gestational Diabetes Register (eg annual reminders for glucose tolerance assessment)
- the benefits of breastfeeding in reducing the risk of the woman developing type 2 diabetes in the future
- whether the woman understands the information she has been given.

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32.5 Practice summary: diabetes in pregnancy

When: Assess risk of undiagnosed diabetes or prediabetes at the first antenatal visit and offer testing to women with risk factors

At 24-28 weeks offer testing to women not already tested and repeat testing to women with risk factors with a previous normal blood glucose level

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited practising dietitian, diabetes educator; endocrinologist; accredited exercise physiologist

- ☐ **Discuss the reasons for testing blood glucose levels:** Explain that diabetes in pregnancy can have effects on the pregnancy and the baby and that early identification and taking steps to manage raised blood glucose as soon as possible can reduce the risk of these effects.
- ☐ **Take a holistic approach:** Provide women with practical advice on healthy eating and physical activity (see Chapter 11), taking into consideration the availability of foods and ways of being physically active that are appropriate to the woman's cultural practices and preferences. Consider a health promotion program to improve community understanding of the effects of diabetes in pregnancy and the importance of healthy lifestyle patterns.

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- ☐ **Consider referral:** Where possible, women diagnosed with pre-existing diabetes should be referred for specialist assessment (by an endocrinologist or obstetric physician) and education on nutrition, monitoring and management (eg to a multidisciplinary team involving an accredited practising dietitian, diabetes educator, endocrinologist, obstetric physician). Where specialist allied health professionals are not available, other sources of information (eg written information, video or audio resources, telehealth services) may be useful.
- ☐ **Document and follow-up:** When a woman's blood glucose is tested, tell her the results and note them in her antenatal record. Have a system in place so that women diagnosed with diabetes receive ongoing follow-up, including further testing of blood glucose levels after pregnancy. Postnatal education and support are important in preventing or delaying the onset of diabetes in the future and women should be encouraged to attend postnatal testing.

32.6 Resources

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National Gestational Diabetes Register

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33 Human immunodeficiency virus

Testing for HIV in pregnancy enables measures to be taken to reduce the risk of mother-to-child transmission and for the woman to be offered treatment and psychosocial support.

33.1 Background

Human immunodeficiency virus (HIV) is a blood-borne infection that is initially asymptomatic but involves gradual compromise of immune function, eventually leading to acquired immunodeficiency syndrome (AIDS). The time between HIV infection and development of AIDS ranges from a few months to 17 years in untreated patients (PHLS 1998). Undiagnosed HIV infection during pregnancy has serious implications for the health of both the woman and her child. Early HIV diagnosis can reduce the risk of mother-to-child transmission and the rate of disease progression in the mother (NICE 2008).

33.1.1 HIV in Australia

- *Rates of diagnosis of HIV*: The number of notifications of newly diagnosed HIV among women in Australia has remained stable for the past 10 years and was 0.7 per 100,000 women in 2016 (The Kirby Institute 2017a). In 2016, notification rates were more than three times higher among Aboriginal and Torres Strait Islander women than among Australian-born non-Indigenous women (1.1 vs 0.3 per 100,000) (The Kirby Institute 2017b).
- *Geographical distribution*: Recent trends in the population rate of newly diagnosed HIV have differed across jurisdictions. Over the past 10 years (2007-2016) rates per 100,000 fluctuated in Victoria (range 4.4 to 5.3; 2016 rate 5.0), Queensland (range 3.9 to 5.3; 2016 rate 4.1), Western Australia (range 3.0 to 4.3; 2016 rate 3.6), Tasmania (1.0 to 4.2), the Northern Territory (2.6 to 8.1) and the Australian Capital Territory (range 1.8 to 4.2; 2016 rate 3.0) and declined in New South Wales (from 5.8 to 4.2) (The Kirby Institute 2017a).
- *Country of origin*: In overseas born populations, HIV notification rates per 100,000 in 2016 were 17.3 for people born in the Americas (North and South America), 17.1 for people born in South-East Asia, 10.9 for people born in sub-Saharan Africa and 7.3 for people born in North-East Asia and (The Kirby Institute 2017a).
- *Risk factors*: Transmission of HIV in Australia continues to occur primarily through sexual contact between men. In 2015, 20% of new HIV diagnoses were attributed to heterosexual sex and 3% to injecting drug use (The Kirby Institute 2016). Of new diagnoses attributed to heterosexual sex, 36% were in people from high-prevalence countries or with partners from high prevalence countries.
- *Perinatal exposure*: Among 223 women with HIV who gave birth in the 5-year period 2012-2016, the transmission rate to newborns was 2%, compared to 39% in the period 1985-1991 and 28% in 1992-1996 (The Kirby Institute 2017a). In the past 10 years, the transmission rate has dropped from 9% in 2007 to 0% in 2016.

33.1.2 Risks associated with HIV infection in pregnancy

Globally, most children with HIV acquire infection through mother-to-child transmission during pregnancy, during birth or through breastfeeding (Volmink et al 2007). Maternal viral load is a strong independent determinant of transmission risk (Khouri et al 1995; Mofenson 1995; John & Kreiss 1996; Warszawski et al 2008).

33.2 Testing for HIV infection in pregnancy

Universal testing for HIV in pregnancy is recommended in the United Kingdom (de Ruiter et al 2008; NICE 2008; RCOG 2010), the United States (Branson et al 2006) and Canada (SOGC 2006; CPS 2008). These policies are based on the availability of accurate diagnostic tests and effectiveness of antiretroviral treatment in preventing mother-to-child transmission. They also reflect the fact that testing based on risk factors would miss a substantial proportion of women with HIV (Chou et al 2005).

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33.2.1 Diagnostic accuracy of tests

Tests for HIV diagnosis in pregnant women include:

- standard tests: the enzyme immunoassay and Western blot protocol is highly (>99%) sensitive and specific (Samson & King 1998; Butlerys et al 2004; Chou et al 2005; Chappel et al 2009)
- rapid HIV tests, which have similar accuracy (Butlerys et al 2004; Chou et al 2005) and provide results within hours without requiring a return visit (Tepper et al 2009), with blood-based tests having greater sensitivity than tests using oral fluids (Pai et al 2007).

The sensitivities and specificities of various commercial HIV assays can be found at the *Therapeutic Goods Administration website*.

33.2.2 Interventions to prevent mother-to-child transmission

Cochrane reviews into the effectiveness of interventions in preventing mother-to-child transmission have found that:

- short courses of certain antiretroviral medicines are effective and are not associated with any safety concerns in the short term (Volmink et al 2007)
- caesarean section before labour and before ruptured membranes is effective among women with HIV not taking antiretrovirals or taking only zidovudine (Read & Newell 2005)
- vitamin A supplementation is not effective in preventing transmission (Wiysonge et al 2011)
- there is no evidence of an effect of vaginal disinfection (Wiysonge et al 2005)
- complete avoidance of breastfeeding is effective in preventing mother-to-child transmission of HIV (Horvath et al 2009)
- if breastfeeding is initiated, the combination of exclusive breastfeeding during the first few months of life and extended antiretroviral prophylaxis to the infant is effective (Horvath et al 2009).

Prospective cohort studies and meta-analyses have not found a significant association between antiretroviral treatments and intrauterine growth restriction (n=8,192) (Briand et al 2009), congenital anomalies (n=8,576) (Townsend et al 2009), or preterm birth (n=20,426) (Kourtis et al 2007).

Recommended interventions appear to be acceptable to pregnant women and are associated with mother-to-child transmission rates of 1% to 2% (Chou et al 2005). In Australia between 1982 and 2005, uptake of interventions to reduce mother-to-child transmission of HIV was high (Giles et al 2008).

Recommendation		Grade B
36.	Routinely offer and recommend HIV testing at the first antenatal visit as effective interventions are available to reduce the risk of mother-to-child transmission.	
	Approved by NHMRC in December 2011; expires December 2016	

Practice point	
WW	A system of clear referral paths ensures that pregnant women who are diagnosed with an HIV infection are managed and treated by the appropriate specialist teams.
	Approved by NHMRC in December 2011; expires December 2016

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33.3 Pre-test and post-test discussions

Pre- and post-test discussions are an integral part of HIV testing.

33.3.1 Considerations before testing

Providing information and support associated with testing aims to minimise the personal and social impact of HIV infection. The Australian Department of Health and Ageing HIV testing guidelines recommend that (DoHA 2006):

- antenatal testing only be performed with the informed consent of the woman
- all women contemplating pregnancy or seeking antenatal care be made aware of the benefits of diagnosis of HIV infection and management, and prevention strategies available for both the mother and the baby
- women receive materials (in written and other formats) outlining the tests that will be offered antenatally and explaining the testing procedure
- women with limited literacy or for whom English is a second language receive appropriate educational resources (eg using media such as video, audio, multimedia or in languages other than English)
- women with a first language other than English be offered access to accredited interpreting services.

Women most at risk of HIV may decline testing (Boxhall 2004; Plitt 2007) or may not access testing and available interventions (Ferguson et al 2008; Struik 2008). Women who decline testing should be given opportunities to discuss any concerns.

33.3.2 Considerations after testing

- Women who accept testing may experience anxiety while waiting for the initial test result or while waiting for results of repeat testing.
- Unexpected detection of HIV can result in distress, which is exacerbated in the context of pregnancy. Health professionals delivering the test result should use their best judgement when deciding the most appropriate way to deliver the test result (DoHA 2006).

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33.4 Testing in rural and remote areas

Rapid tests improve the availability of HIV testing in situations where there is limited access to pathology services and returning for results may be difficult (DoHA 2006). However, the use of these tests should be limited to situations where (DoHA 2006):

- testing is conducted in, or backed up by, a clinical setting
- testing is conducted under the auspice of a National Association of Testing Authorities/Royal College of Pathologists of Australia medical testing accredited laboratory
- reliable Therapeutic Goods Administration approved rapid tests are available
- high quality information on the tests and their use is available and provided
- the health professional performing the test is suitably trained in conducting and interpreting the test and has the skills to provide pre- and post-test information/discussion (if conducted outside an accredited laboratory)
- quality assurance programs are available to ensure ongoing competency of healthcare professionals performing the tests.

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33.5 Practice summary: HIV

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss HIV testing:** Explain that it is important to find out whether a woman has HIV because of the risk of transmission to the baby. Testing also gives the woman the opportunity to receive appropriate treatments.
- ☐ **Document and follow-up:** Note the results of HIV testing in the woman's record and have a follow-up system in place so women who have HIV have access to counselling to discuss the test results and available interventions to prevent transmission during pregnancy.
- ☐ **Take a holistic approach**: If a woman is found to have HIV, specialist advice on management is required. Other considerations include psychosocial support, contact tracing, partner testing, testing for other sexually transmitted infections and continuing follow-up.

33.6 Resources

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34 Hepatitis B

Testing in pregnancy allows arrangements to be made for vaccinating the newborn if the mother is found to have hepatitis B.

34.1 Background

Hepatitis B virus is a global acute and chronic communicable disease that causes major hepatic disease (Beasley & Hwang 1984). The virus has an incubation period of 6 weeks to 6 months and is excreted in various body fluids including blood, saliva, vaginal fluid and breast milk. These fluids may be highly infectious. Adults who have hepatitis B may have no symptoms. After infection, some people do not clear the virus; they become carriers and may infect other people.

34.1.1 Hepatitis B in Australia

- *Rates of notification of hepatitis B:* The notification rate for hepatitis B has declined by 17% in the past 10 years (from 33.0 to 27.4 per 100,000). Rates have been consistently higher among males than females, and were 29.9 and 24.8 per 100,000 in 2016, respectively (The Kirby Institute 2017a). In 2016, the age-standardised notification rate of newly diagnosed hepatitis B infection among Aboriginal and Torres Strait Islander women was 1.2 times as high as that for non-Indigenous women (25.3 vs 20.5 per 100,000) (The Kirby Institute 2017b).
- Age: Among women, the hepatitis B notification rate in 2016 was highest in the 30-39 age group (57.0 per 100,000) followed by the 25-29 age group (47.0 per 100 000) but, in the latter group, declined by 45% (from 85.0 per 100,000 in 2007). The hepatitis B notification rates also decreased in the 0-14, 15-19 and 20-24 age groups by 50%, 38% and 54% respectively. Rates have been stable in the 30-39 age group over the past 10 years (The Kirby Institute 2017a).
- *Geographical distribution*: The notification rate for hepatitis B infection in Australia has consistently been highest in the Northern Territory, but declined by 64% between 2007 and 2016 (from 118.7 to 43.1 per 100,000) (The Kirby Institute 2017a). In most other jurisdictions, the rate of hepatitis B diagnosis has fluctuated over this period, with small declines in New South Wales (19%, 38.3 to 31.1 per 100,000), Victoria (18%, 37.4 to 30.5 per 100,000) and Western Australia (10%, from 28.9 to 26.1 per 100,000).
- *Country of origin*: The prevalence of hepatitis B carriage varies between and within countries (NHMRC 2009). Carrier rates vary from 0.1-0.2% among Caucasians in the United States, northern Europe and Australia, 1-5% in the Mediterranean countries, parts of eastern Europe, China, Africa, Central and South America, and greater than 10% in many sub-Saharan African, south-east Asian and Pacific island populations (Mast et al 2004; Wood et al 2005; Clements et al 2006). First-generation immigrants usually retain the carrier rate of their country of origin, but subsequent generations show a declining carrier rate irrespective of vaccination (Mast et al 2004).
- *Risk factors*: Routes of transmission of hepatitis B virus include sharing injecting equipment (such as occurs in injecting drug use), needle-stick injury and sexual contact (NHMRC 2009). Based on reported cases, hepatitis B transmission in Australia in 2015 continued to occur predominantly among people with a recent history of injecting drug use (The Kirby Institute 2016).
- *Hepatitis B in pregnancy:* A retrospective cohort study (n=14,857) found around 2% of women to HbsAg positive (Guirgis et al 2009). A prevalence study in the NT found 3.7% of Aboriginal and Torres Strait Islander women and 0.98% of non-Indigenous women to be HbsAg positive (Schultz et al 2008).

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34.1.2 Risks associated with hepatitis B in pregnancy

Mother-to-child transmission occurs frequently either in the uterus, through placental leakage, or through exposure to blood or blood-contaminated fluids at or around the time of birth (Lee et al 2006). Perinatal transmission is believed to account for 35–50% of hepatitis B carriers (Yao 1996).

The risk of perinatal transmission is associated with the hepatitis B envelope antigen (HbeAg) status of the mother. If a woman is both hepatitis surface antigen (HbsAg) and HbeAg positive, 70–90% of her children will develop hepatitis B (Stevens et al 1975; Akhter et al 1992). If the mother is HbsAg positive but HbeAg negative, the risk is reduced (Okada et al 1976; Beasley et al 1977; Beasley et al 1983; Nayak et al 1987; Aggarwal & Ranjan 2004). In a cohort study of HbsAg-positive, hepatitis B DNA-positive women in Sydney (n=313) (Wiseman et al 2009), transmission rates were 3% among hepatitis B DNA-positive women overall, 7% among HbeAg-positive mothers and 9% among women with very high hepatitis B DNA levels.

It has been estimated that people who are chronic carriers of HbsAg are 22 times more likely to die from hepatocellular carcinoma or cirrhosis than noncarriers (95%CI 11.5 to 43.2) (Beasley & Hwang 1984).

34.2 Testing for hepatitis B infection in pregnancy

Testing of all pregnant women for hepatitis B is recommended in the United Kingdom (NICE 2008) and the United States (Mast et al 2005; Lin & Vickery 2009; USPSTF 2009). The Australian Immunisation Handbook, while making recommendations on vaccination rather than testing, notes that routine antenatal testing for hepatitis B allows appropriate measures to be implemented to prevent newborn infants developing chronic HBV infection (ATAGI 2017).

Testing of all women is supported by the findings of observational studies into selective testing:

- testing using risk factors to identify 'high-risk' women for HbsAg would miss about half of all pregnant women with HbsAg infection (Summers et al 1987)
- of women offered examination for hepatitis B at 18 weeks pregnancy (n=4,098), one third of women at risk of hepatitis B were not identified by selective testing (Jensen et al 2003)
- universal testing resulted in an estimated detection of 50 additional pregnant women carrying hepatitis B each year who would not have been detected through selective testing (Cowan et al 2006).

A recent systematic review (Lin & Vickery 2009) found no new evidence on the benefits or harms of testing for hepatitis B infection in pregnant women.

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Recommendation	Grade A
37. Routinely offer and recommend hepatitis B virus testing at the first antenatal visit as effective postnatal intervention can reduce the risk of mother-to-child transmission.	
Approved by NHMRC in December 2011; expires December 2016	

34.2.1 Testing method

Testing of blood samples is the accepted standard for antenatal detection of hepatitis B virus (NICE 2008) and consists of stages (Balmer et al 2000) testing for HbsAg and confirmatory testing with a new sample upon a positive result.

34.2.2 Other considerations

- Mother-to-child transmission of the hepatitis B virus is approximately 95% preventable by administering vaccine and hepatitis B immunoglobulin to the baby at birth (Beasley et al 1983; Nair et al 1984; Wong et al 1984; Lo et al 1985; Xu et al 1985; Sehgal et al et al 1992; Zhu 1997; Lee et al 2006).

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- While a meta-analysis (n=5,900) found that multiple hepatitis B immunisation injections in women with a high degree of infectiousness in late pregnancy reduced rates of intrauterine transmission (Shi et al 2010), all studies included were carried out in China and the findings may not be applicable in the Australian context.
- For women with high viral loads (>log 7 IU/mL), discussion with a hepatologist or hepatitis B specialist and maternal antiviral treatment in the third trimester are considerations.

34.3 Practice summary: hepatitis B testing

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss hepatitis B testing**: Explain that it is important to find out whether a woman has or is carrying hepatitis B because of the risk to the baby.
- ☐ **Document and follow-up**: Note the results of hepatitis B testing in the woman's record and have a follow-up system in place so that the babies of women who are found to have hepatitis B are vaccinated on the day of birth.
- ☐ **Take a holistic approach**: If a woman is found to have or be a carrier of hepatitis B, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and continuing follow-up. Consider testing other children, depending on circumstances.

34.4 Resources

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35 Hepatitis C

While there is currently no way of preventing mother-to-baby transmission of hepatitis C, identifying women who have hepatitis C during pregnancy means that interventions that increase the risk of transmission to the baby can be avoided and effective treatments commenced after the birth or cessation of breastfeeding.

35.1 Background

Hepatitis C is a blood-borne virus that is one of the major causes of liver cirrhosis, hepatocellular carcinoma and liver failure. Perinatal transmission is the main source of hepatitis C in Australian children. Babies with hepatitis C are mostly born to mothers who used intravenous drugs, had invasive procedures overseas or have tattoos (Ridley et al 2010).

35.1.1 Hepatitis C in Australia

- *Rates of notification of hepatitis C*: Overall there was a 15% decline in the hepatitis C notification rate in Australia between 2007 and 2016 (from 58.8 to 49.9 per 100,000) (The Kirby Institute 2017a). However, since 2012, the rate has increased by 12% (from 44.5 to 49.9 per 100,000), with most of this increase occurring in 2015 and 2016.[24] In contrast, the age-standardised notification rate of newly diagnosed hepatitis C infection in the Aboriginal and Torres Strait Islander population increased by 25% between 2012 and 2016 (from 138.1 to 172.7 per 100,000) (The Kirby Institute 2017b).
- *Age*: Among women, rates of notification remained stable between 2012 and 2016 in the 40 years and over age group (from 36.9 to 35.6 per 100,000) and declined in the 25-39 age group (from 88.5 to 56.5 per 100,000) and the 15-24 age group in 2016 (45.5 to 25.2 per 100,000) (The Kirby Institute 2017a).
- *Geographical distribution*: The notification rate of newly diagnosed hepatitis C in 2016 was highest in the Northern Territory (76.0 per 100,000), followed by Queensland (58.7 per 100,000), New South Wales (55.0 per 100,000), and Tasmania (54.4 per 100,000). Hepatitis C notification rates either remained stable or increased slightly between 2012 and 2016. In New South Wales, rates increased by 17% between 2015 and 2016 (from 47.1 to 55.0 per 100,000). Rates of notification in 2016 were higher in inner and outer regional areas (65.3 per 100 000) than in remote and very remote areas (46.8 per 100 000) and major cities (41.2 per 100 000) (The Kirby Institute 2017a).

Observational studies conducted in Australia also identified people who inject drugs (Liu et al 2009; Iversen et al 2010; Islam et al 2013; Graham et al 2016) and people in prison (van der Poorten et al 2008; Miller et al 2009; Teutsch et al 2010; Reekie et al 2014; Graham et al 2016) as at higher risk of testing positive for hepatitis C antibodies or infection.

35.1.2 Risks associated with hepatitis C in pregnancy

The clearest and most serious risk associated with maternal hepatitis C in pregnancy is transmission of the infection to the baby. There are several factors that influence the risk of mother-to-infant transmission:

- risk of transmission is estimated to be 5.8% (95%CI 4.2 to 7.8%) among antibody-positive and RNA-positive women (Benova et al 2014)
- the highest reported transmission rates occur in infants born to mothers who are both hepatitis C and HIV positive, with rates as high as 36% (Panda et al 2010; Benova et al 2014)

24 The recent increase in notification rates may reflect increased testing in response to availability of new direct-acting antiviral treatments.

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- risk of transmission is increased with a higher maternal viral load of hepatitis C (Panda et al 2010; Valladares et al 2010; Garcia-Tejedor et al 2015)
- risk is increased with intrapartum invasive procedures (fetal scalp blood sampling or internal electronic fetal heart rate monitoring via scalp electrode) (OR 10.1; 95% CI 2.6 to 39.02) and episiotomy (OR 4.2; 95%CI 1.2 to 14.16) (Panda et al 2010; Gagnon et al 2014; Rac & Sheffield 2014; Garcia-Tejedor et al 2015)
- transmission does not appear to be influenced by mode of birth (Panda et al 2010; Ghamar Chehreh et al 2011; Cottrell et al 2013; Rac & Sheffield 2014) or gestational age at birth (Panda et al 2010)
- prolonged rupture of membranes may increase the risk of transmission (Panda et al 2010; Cottrell et al 2013), however this could be related to maternal viral load and length of membrane rupture (Rac & Sheffield 2014)
- amniocentesis in women infected with hepatitis C does not appear to significantly increase the risk of vertical transmission but very few studies have properly addressed this possibility (Panda et al 2010; Gagnon et al 2014; Rac & Sheffield 2014)
- there is no evidence that breastfeeding is associated with an increased risk of hepatitis C transmission to the newborn (Panda et al 2010; Valladares et al 2010; Cottrell et al 2013; ASHM 2015), unless the nipples are cracked and/or bleeding (Rac & Sheffield 2014; ASHM 2015).

35.2 Testing for hepatitis C infection in pregnancy

Internationally, routine testing of pregnant women for hepatitis C has not been recommended (CPS 2008; ACOG reaffirmed 2016; NICE updated 2016). In Australia, RANZCOG suggests that all pregnant women be tested for hepatitis C (RANZCOG 2016).

35.2.1 Targeted versus universal testing

Studies were largely consistent in finding that hepatitis C seropositivity was associated with the following risk factors:

- injecting drug use (McDermott et al 2010; Diab-Elschahawi et al 2013; Lambert et al 2013; Wilson & Beckmann 2015)
- receipt of blood transfusion or organ transplant (Diab-Elschahawi et al 2013; Wilson & Beckmann 2015)
- history of tattooing or body piercing (Diab-Elschahawi et al 2013; Lambert et al 2013)
- use of intranasal cocaine (Diab-Elschahawi et al 2013; Lambert et al 2013)
- incarceration (Diab-Elschahawi et al 2013)
- origin from a country of high prevalence (Diab-Elschahawi et al 2013; Lambert et al 2013); these include Africa and central and east Asia (WHO 2016).

Additional findings were:

- only high severity risk factors (exposure to intravenous drug use or to the blood of a hepatitis C-positive individual) were significantly associated with testing positive for hepatitis C antibodies (P=0.002) (McDermott et al 2010)
- age, history of prior pregnancy and healthcare employment were additional considerations (El-Kamary et al 2015).

However, studies have estimated that, compared to universal testing, targeted testing would fail to identify 2.5 to 27% of seropositive women (Diab-Elschahawi et al 2013; Lambert et al 2013; El-Kamary et al 2015; Wilson & Beckmann 2015).

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35.2.2 Clinical utility of testing

The clinical utility of testing for hepatitis C in pregnancy is limited by the lack of effective treatment options to avoid mother-to-child transmission during pregnancy or childbirth (Dunkelberg et al 2014; Rac & Sheffield 2014; Poliquin et al 2015; Aebi-Popp et al 2016).

However, new treatment options (direct-acting antiviral agents) for people living with hepatitis C have become available and were recently listed on the Australian Pharmaceutical Benefits Scheme (PBS). While these treatments have not been proven to be safe in pregnancy or during breastfeeding (Rac & Sheffield 2014; Aebi-Popp et al 2016), women who are diagnosed with hepatitis C during pregnancy could commence such curative treatment after completion of breastfeeding (or immediately after the birth if the infant is not breastfed), thus reducing their risk of significant liver disease and the risk of perinatal infection for subsequent pregnancies.

In addition, knowledge of a woman's hepatitis C status means interventions that may increase the risk of mother-to-baby transmission (fetal scalp blood sampling, internal electronic fetal heart rate monitoring via scalp electrode, episiotomy) can be avoided.

35.2.3 Costs of testing

No cost-effectiveness studies relevant to the Australian context were identified. A study in the Netherlands found a modest cost-effective outcome for testing first-generation non-Western women (Coretti et al 2015) and a study conducted in the United States (Hahne et al 2013) found that universal testing was not cost-effective with or without elective caesarean section. However, a study in the United Kingdom found that antenatal testing and postnatal treatment was feasible and effective at an acceptable cost (Selvapatt et al 2015).

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Consensus-based recommendation	
XLII	At the first antenatal visit, recommend testing for hepatitis C.
	Approved by NHMRC in October 2017; expires October 2022

35.2.4 Planned invasive procedures

Testing of women who are to have a planned invasive procedure has been recommended, due to the risk of hepatitis C transmission to the baby.

Practice point	
XX	For women who have not previously been tested and who are having a planned invasive procedure (eg chorionic villus sampling), recommend testing for hepatitis C before the procedure.
	Approved by NHMRC in October 2017; expires October 2022

35.2.5 Testing process

If an initial test for hepatitis C antibodies is positive, a confirmatory hepatitis C ribonucleic acid (RNA) test will allow assessment of the potential implications and associated risks for the woman and her baby (ASHM 2015).

35.2.6 Other considerations

For a woman with a diagnosis of hepatitis C during pregnancy, referral to an infectious diseases specialist or hepatologist, as well as to hepatitis support groups for information and advice, should be made during the pregnancy (ASHM 2015). This will facilitate provision of accurate information, counselling and linkages for follow-up and treatment if desired after the birth.

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35.3 Practice summary: hepatitis C testing

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss hepatitis C testing:** Explain that if hepatitis C is identified during pregnancy, interventions that increase the risk of transmission can be avoided and that effective treatment can be started after pregnancy/breastfeeding.
- ☐ **Document and follow-up:** If hepatitis C testing is undertaken, note the results in the woman's record and advise the woman of her result. Have a system in place so that women who test positive receive education about further transmission (eg to family members) and ongoing support and their babies are followed up after birth.
- ☐ **Take a holistic approach**: If a woman is found to have hepatitis C, specialist advice on management may be required depending on the severity of disease and the health professional's expertise. Other considerations include counselling and follow-up.

35.4 Resources

Ministerial Council on Drug Strategy (2006) National Clinical Guidelines for the Management of Drug Use During Pregnancy, Birth and the Early Development Years of the Newborn. Sydney: NSW Health.

35.4.1 Websites

Hepatitis NSW

Hepatitis SA

Hepatitis Victoria

Hepatitis Queensland

Hepatitis WA

Northern Territory AIDS and Hepatitis C Council

Hepatitis ACT

Tasmanian Council on AIDS, Hepatitis C and Related Diseases

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36 Syphilis

Testing for syphilis in pregnancy aims to detect women who have the infection so that they can be treated and transmission to babies prevented.

36.1 Background

Syphilis is a sexually acquired infection caused by *Treponema pallidum*. In pregnancy, it can result in spontaneous miscarriage or stillbirth or cause congenital syphilis infection. Syphilis in pregnancy can be safely treated with antibiotics, which can prevent these complications (Walker 2001).

36.1.1 Syphilis in Australia

- *Rates of diagnosis of syphilis*: Between 2007 and 2014, notification rates for infectious syphilis among women were below 2.0 per 100,000. Rates rose to 2.5 per 100,000 in 2015 and 3.6 per 100,000 in 2016 (The Kirby Institute 2017b).[25] Rates among women in 2016 were highest in the 15–19 year (11.5 per 100,000), 20–24 year (9.5 per 100,000) and 25–29 year (9.9 per 100,000) age groups. The rate of notification for infectious syphilis among Aboriginal and Torres Strait Islander women was 39 times that among non-Indigenous women (57.1 vs 1.5 per 100,000) (The Kirby Institute 2017a).
- *Geographical distribution:* In 2016, infectious syphilis notification rates were highest in remote and very remote areas of residence (49.4 per 100 000) (The Kirby Institute 2017b). Increases in notification rates occurred in all regions of residence between 2012 and 2017, with the sharpest increase in regional areas (209%) followed by remote areas (176%). Rates of notification among Aboriginal and Torres Strait Islander people were highest in the Northern Territory (229.6 per 100,000) and Queensland (99.3 per 100,000) (The Kirby Institute 2017a), corresponding with regions in which there has been an outbreak of infectious syphilis.
- *Congenital syphilis*: Australia is a country of low prevalence for congenital syphilis. However, coinciding with peaks in infectious syphilis notifications, there have been peaks in cases of congenital syphilis, with four cases in 2015, declining from a high of eleven in 2006 (The Kirby Institute 2016). Three of the four cases were in Aboriginal and Torres Strait Islander babies.
- *Refugee background*: An Australian cohort study found higher prevalence among women from humanitarian source countries than among women from non-humanitarian source countries in Africa (1.2-7.5% vs 0–0.3%) and Africa and Asia (2.5% vs 0.4 $p < 0.001$) (Gibson-Helm et al 2014; Gibson-Helm et al 2015).
- *Risk factors:* Syphilis in Australia continues to be an infection primarily of men having male-to-male sex in urban settings, and of young heterosexual Aboriginal and Torres Strait Islander people in remote communities (The Kirby Institute 2016).

36.1.2 Risks associated with syphilis in pregnancy

Maternal syphilis infection results in congenital infection in at least two-thirds of cases (Zenker & Rolfs 1990; Chakraborty & Luck 2008; Woods 2009). Congenital infection can occur at any stage of maternal disease, including during incubation (Doroshenko et al 2006), as early as 9–10 weeks of pregnancy and at any subsequent time during pregnancy (Woods 2005).

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25 An expanded infectious syphilis national case definition was implemented in July 2015 in all jurisdictions except for New South Wales, where it was implemented in July 2016. The new case definition includes a new subcategory of 'probable' infectious syphilis to capture infectious syphilis cases in people without a prior testing history, particularly young people aged 15–19 years. The probable infectious syphilis cases are included in the number of infectious syphilis notifications in 2015 and 2016.

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Congenital syphilis is a serious condition that, if not fatal at a young age, can cause permanent impairment, debilitation and disfigurement (Chakraborty & Luck 2008; Richens & Mabey 2008). Pancreatitis and inflammation of the gastrointestinal tract are common (Woods 2005).

36.2 Syphilis testing

36.2.1 Effectiveness of universal testing

Universal syphilis testing programs have been shown to significantly increase the detection of pregnant women who have syphilis compared with selective testing of women considered to be a high-risk (Cameron et al 1997; Duthie et al 1990; Villar & Bergsjo 1997; Hurtig et al 1998). Based on convincing observational evidence, universal testing of pregnant women is recommended by the United States Preventive Services Task Force (USPST 2009; Wolff et al 2009), the World Health Organization (WHO 2004), the International Union against Sexually Transmitted Infections (IUSTI)(French et al 2009) and the United Kingdom national guidelines on the management of syphilis (Kingston et al 2008) as it decreases the proportion of babies with clinical symptoms of syphilis infection.

Universal testing for syphilis has been shown to be cost-effective (Garland & Kelly 1989; Abyad 1995; Cameron et al 1997; Connor et al 2000; Walker 2001) even in areas of low prevalence.

Recommendation		Grade B
38.	Routinely offer and recommend syphilis testing at the first antenatal visit as treating syphilis benefits both mother and baby.	
	Approved by NHMRC in December 2011; expires December 2016	UNDER REVIEW

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36.2.2 Type of test

There are two main classifications of serological tests for syphilis (NICE 2008):

- non-treponemal tests, which detect non-specific treponemal antibodies and include the Venereal Diseases Research Laboratory (VDRL) and rapid plasma reagin (RPR) tests
- treponemal tests, which detect specific treponemal antibodies and include EIAs, *T. pallidum* haemagglutination assay (TPHA) and the fluorescent treponemal antibody-absorbed test (FTA-abs).

The NICE guidelines reviewed the evidence on syphilis testing in pregnancy and found:

- treponemal IgG EIA tests have high sensitivity (98%) and specificity (99%) at all stages of syphilis (except early primary syphilis), are useful for detecting syphilis antibodies in patients who are infected with HIV, and are comparable to the VDRL and TPHA combination in terms of sensitivity and specificity (Young et al 1989; 1992)
- non-treponemal tests may result in false negatives, particularly in very early or late syphilis, in patients with reinfection or those who are HIV positive, and have poor positive predictive value when used alone in low prevalence populations
- neither type of test will detect syphilis in its incubation stage (PHLS 1998).

The initial test is usually a test for antibodies of treponema (eg enzyme immunoassay), which identifies women with current untreated or incompletely treated infection or previous history of treated syphilis. If the test is positive, a non-treponemal test will be performed by the laboratory to confirm diagnosis and enable a quantitative value of disease activity to guide treatment.

36.2.3 Testing in rural and remote areas

On-site syphilis tests are being developed to allow results to be given and overcome the barrier to treating pregnant women who have to return to the clinic for tests results and treatments. The tests evaluated

appear to have adequate sensitivity and specificity to be useful in remote areas or where equipment and lab equipment is not available (Mabey et al 2006; Marongoni et al 2005) and, in one study, reduced delays in treatment (Myer et al 2003).

36.3 Follow-up for women who test positive to syphilis

Not all women who test positive will have syphilis, as these serological tests cannot distinguish between different treponematoses (eg syphilis, yaws, pinta and bejel). Therefore, positive results should be interpreted with caution. Following confirmation of a reactive specimen, a second specimen should be tested to verify the results and ensure correct identification of the woman.

Practice point		
YY	Because syphilis is a rare condition in most parts of Australia and a positive result does not necessarily mean that a woman has syphilis, expert advice regarding the care of women who test positive and their partners should be sought. Assessment/testing for other sexually transmitted infections in women with positive serology is advisable.	
	Approved by NHMRC in December 2011; expires December 2016	UNDER REVIEW

36.4 Outbreak management

In January 2011, an increase of infectious syphilis notifications among young Aboriginal and Torres Strait Islander people was identified in the North-West region of Queensland. Subsequent increases in notifications were reported in the Northern Territory and Western Australia in July 2013 and June 2014 respectively, following sustained periods of low notification rates (Bright & Dups 2016).

The disease control interventions that have been implemented include: opportunistic and community testing, particularly among young sexually active people aged less than 35 years; immediate treatment of people who are symptomatic (eg genital ulceration), have tested positive for syphilis or are sexual contacts of cases; and antenatal testing for syphilis (Bright & Dups 2016). Public health alerts, health protection and education and campaigns, and active follow-up of cases are also being conducted.

Over the course of the recent outbreak (January 2011 to December 2015), the rate of congenital syphilis (including both confirmed and probable cases) in the Aboriginal and Torres Strait Islander populations for all of Queensland, the Northern Territory and Western Australia averaged 23.0 cases per 100,000 live births, which was lower than that recorded in the 5 years prior to the outbreak (2006 to 2010) at 38.2 cases per 100,000 live births (Bright & Dups 2016).

Point-of-care rapid syphilis testing has been used with good effect in recent outbreaks in remote Australia, both in the context of community-wide testing and to increase opportunistic testing within primary care services (CDNA 2015). Guidance on responding to a notifiable disease event is included in Section 36.6.

36.4.1 Notification of congenital syphilis

One study found that 95% of babies in the Northern Territory meeting Communicable Disease Network Australia (CDNA) criteria for probable congenital syphilis were not notified between 2009 and 2014 and that improved education regarding CDNA criteria for notification of congenital syphilis is necessary for clinicians and public health staff.

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36.5 Practice summary: syphilis

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss the reasons for syphilis testing:** Explain that it is important to find out whether a woman has syphilis because of the effects that infection can have on the pregnancy and the baby.
- ☐ **Document and follow-up:** Note the results of syphilis testing in the woman's record, including whether the syphilis is newly diagnosed or was previously treated. Have a follow-up system in place so that infected women receive timely treatment or referral.
- ☐ **Take a holistic approach:** If a woman is found to be infected with syphilis, important considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up.

36.6 Resources

ASHA (2016) Australian STI Management Guidelines for Use in Primary Care. Australasian Sexual Health Alliance. Accessed: 23 October 2017. stiguidelines.org.au

CDNA (2015) *Syphilis CDNA National Guidelines for Public Health Units*. Canberra: Communicable Diseases Network Australia.

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37 Rubella

Rubella testing in pregnancy does not attempt to identify current affected pregnancies. Instead, it aims to identify women who are non-immune, so that they can be vaccinated after the birth and future pregnancies are protected against rubella infection and its consequences.

37.1 Background

Rubella (German measles) is usually a mild self-limiting disease with few complications. However, if contracted during the first trimester, it can affect the pregnancy and lead to congenital rubella syndrome at birth. Preventing congenital infection relies on maintaining high levels of immunity to rubella in the general population. There is no treatment to prevent or reduce mother-to-child transmission of rubella once infection has been detected in pregnancy. Rubella vaccination is contraindicated in pregnancy.

37.1.1 Rubella infection and immunity in Australia

- *Diagnoses of rubella*: In 2014, there were 17 diagnoses of rubella (0.1 per 100,000 population) (NNDSS 2016). Most notified cases were women (65%), with 64% being of childbearing age (15-44 years).
- *Geographical distribution*: Rates of diagnosis of rubella were low and fairly consistent across jurisdictions in 2014, ranging from no reported diagnoses in the Australian Capital Territory, Northern Territory and Tasmania to 0.1 per 100,000 population in Queensland, Victoria, New South Wales, South Australia and Western Australia (NNDSS 2016).
- *Congenital rubella syndrome*: This is rare in Australia and in recent years has mainly occurred among infants of women who were born overseas (NNDSS 2016).
- *Risk factors*: In Australia, populations at risk of non-immunity to rubella have been identified as including:
  - women born overseas who may not have received rubella vaccines in their countries of birth (Francis et al 2003; Sathanandan et al 2005) and are twice as likely to be non-immune than Australian-born women, with a higher likelihood of non-immunity among women born in Asia (Sathanandan et al 2005)
  - Aboriginal and Torres Strait Islander women from rural and remote communities, with fewer than 75% of women tested antenatally having adequate levels of immunity (compared with more than 90% of women living in an urban area) (Hunt & Lumley 2004)
  - women 35 years of age or older, who were found to be twice as likely to be non-immune as younger women, possibly due to declining immunity over time (Sathanandan et al 2005).

37.1.2 Risks associated with rubella infection in pregnancy

Maternal rubella infection can result in spontaneous miscarriage, fetal infection, stillbirth, or fetal growth restriction (Reef et al 2000). Congenital infection is most likely if the maternal infection occurs in the first 16 weeks of pregnancy, with congenital rubella syndrome occurring in all fetuses infected before the 11th week and in 35% of those infected at 13-16 weeks (Miller et al 1982). If infection occurs after 16 weeks of pregnancy, the risk of fetal damage is negligible.

Features of congenital rubella syndrome include cardiac defects, deafness, ocular defects, thrombocytopenic purpura, haemolytic anaemia, enlarged liver and spleen, and inflammation of the meninges and brain (Sanchez et al 2010). Pneumonitis, diabetes, thyroid dysfunction and progressive panencephalitis are other late expressions of the syndrome (Weil et al 1975; Cooper et al 1995).

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37.2 Testing for rubella non-immunity

The NICE guidelines reviewed the evidence on rubella testing in pregnancy and found:

- high sensitivity and specificity of tests for immunity (Grangeot-Keros & Enders 1997)
- high rates of congenital infection among babies born to women with symptoms of rubella in the first 12–16 weeks of pregnancy (Miller et al 1982; Grillner et al 1983)
- no association between congenital infections and inadvertent rubella vaccination in pregnancy (CDC 2001).

The lack of association between inadvertent vaccination in pregnancy and congenital rubella syndrome has been substantiated in subsequent prospective cohort studies (Bar-Oz et al 2004; Hamkar et al 2006; Badilla et al 2007), with no cases reported.

Recommendation	**Grade B**
39.	Routinely offer and recommend testing for rubella immunity at the first antenatal visit to identify women at risk of contracting rubella and enable postnatal vaccination to protect future pregnancies.
	Approved by NHMRC in December 2011; expires December 2016

Recommendation	**Grade A**
40.	Inform women who have been vaccinated against rubella before they were aware of the pregnancy that the baby is highly unlikely to have been affected by the vaccine.
	Approved by NHMRC in December 2011; expires December 2016

Practice point	
ZZ	Women identified as non-immune to rubella antenatally should be advised to avoid contact with people experiencing possible symptoms of rubella.
	Approved by NHMRC in December 2011; expires December 2016

37.3 Practice summary: rubella testing

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss rubella non-immunity:** Explain that it is important to find out whether a woman is immune to rubella because of the effects that infection can have on the pregnancy and the baby.
- ☐ **Document and follow-up:** Note the results of rubella testing in the woman's record. Have a follow-up system in place so that non-immune women are offered vaccination after the birth. Some women may not develop immunity even after repeated vaccination.
- ☐ **Take a holistic approach**: If a woman is found to be non-immune to rubella, offer advice on symptoms and transmission of rubella so that she can avoid contact as far as possible. Advise vaccination of family members who may also be non-immune.
- ☐ **Report inadvertent vaccination:** Report inadvertent vaccination with MMR (or MMRV) to the jurisdictional immunisation unit to enable follow-up and collection of data on adverse events following immunisation with this vaccine during pregnancy.

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37.4 Resources

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38 Asymptomatic bacteriuria

Testing for asymptomatic bacteriuria in pregnancy allows treatment to be offered to reduce the risk of progression to pyelonephritis.

38.1 Background

Asymptomatic bacteriuria is the persistent bacterial colonisation of the urinary tract (usually by *Escherichia coli*) without symptoms. It is common in pregnancy.

38.1.1 Asymptomatic bacteriuria in Australia

- *Incidence*: Incidence of asymptomatic bacteriuria during pregnancy has been reported to be 2-10% in the United States (Andrews & Gilstrap 1992; Sweet 1977) and 2-5% in the United Kingdom (Little 1966; Campbell-Brown et al 1987; Foley et al 1987). In Australia, available estimates suggest that asymptomatic bacteriuria during pregnancy may be more common among Aboriginal and Torres Strait Islander women (Hunt 2004; Bookallil et al 2005; Panaretto et al 2006).
- *Risk factors*: The prevalence of infection is most closely related to socioeconomic status and is similar in pregnant and non-pregnant women (Turck et al 1962; Whalley 1967). Other factors associated with an increased risk of bacteriuria include a history of recurrent urinary tract infections, diabetes and anatomical abnormalities of the urinary tract (Golan et al 1989).

38.1.2 Risks associated with asymptomatic bacteriuria in pregnancy

While asymptomatic bacteriuria in non-pregnant women is usually benign, in pregnancy it increases the likelihood of kidney involvement (pyelonephritis), with an incidence of around 30% in affected women (Whalley 1967).

An association between untreated asymptomatic bacteriuria and low birth weight and preterm birth has also been suggested (LeBlanc & McGanity 1964; Kincaid-Smith & Bullen 1965; Little 1966; Savage et al 1967). However, while a reduction in preterm birth and low birth weight is consistent with understanding of the role of infection in pregnancy complications (Smaill 2007; Smaill & Vasquez 2007), other factors may be involved (eg other asymptomatic genitourinary infections) (Campbell-Brown et al 1987; Maclean 2001) or links with socioeconomic status (Romero et al 1989). There may only be an association between asymptomatic bacteriuria and preterm birth if the infection progresses to pyelonephritis (Meis et al 1995).

38.2 Testing for asymptomatic bacteriuria

Universal testing for asymptomatic bacteriuria in pregnancy is recommended in the United Kingdom (NICE 2008), the United States (USPSTF 2004; Nicolle et al 2005), Canada (Nicolle 1994) and Scotland (SIGN 2006), based on the effectiveness of available treatments and the reduced risk of pyelonephritis.

38.2.1 Benefits of testing

Testing for asymptomatic bacteriuria has been shown to reduce the number of women per 1,000 who experience pyelonephritis from 23.2 with no testing, to 16.2 with dipstick testing and 11.2 with urine culture (Rouse et al 1995). Both tests were found to be cost beneficial compared to no testing.

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38.2.2 Effectiveness of interventions to treat asymptomatic bacteriuria

A Cochrane review found that antibiotic treatment compared with placebo or no treatment is effective in clearing asymptomatic bacteriuria (RR 0.25; 95%CI 0.14 to 0.48). The incidence of pyelonephritis was reduced by 75% (RR 0.23; 95%CI 0.13 to 0.41) (Smaill & Vasquez 2007).

Recommendation	Grade A
41. Routinely offer and recommend testing for asymptomatic bacteriuria early in pregnancy as treatment is effective and reduces the risk of pyelonephritis.	
Approved by NHMRC in December 2011; expires December 2016	

38.2.3 Testing method

Midstream urine culture is considered the standard for diagnosis of asymptomatic bacteriuria in pregnancy.

Dipstick urinalysis of nitrites may be useful for excluding asymptomatic bacteriuria but is not accurate for diagnosis (Deville et al 2004). A meta-analysis (Deville et al 2004) and a small number of RCTs (Teppa & Roberts 2005; Karabulut 2007; Eigbefoh et al 2008; Mignini et al 2009) have shown high specificity (89-100%) but low sensitivity (33-98%), with a mid range around 50%. Lower level studies have had similar results.

Recommendation	Grade A
42. Use urine culture testing wherever possible, as it is the most accurate means of detecting asymptomatic bacteriuria.	
Approved by NHMRC in December 2011; expires December 2016	

38.2.4 Timing of the test

There is no consensus in the literature about the optimal timing and testing frequency for asymptomatic bacteriuria. However, in a prospective study (n=3,254), a single urine specimen obtained between 12 and 16 weeks gestation identified 80% of women who ultimately had asymptomatic bacteriuria (Stenqvist et al 1989).

38.2.5 Testing in rural and remote areas

Due to difficulties in transporting specimens to laboratories, dipstick tests are commonly used in remote areas to 'rule out' asymptomatic bacteriuria, with samples from women testing positive then sent for culture to confirm infection. While urine culture is the preferred method of testing, this process has been found to be cost effective (Rouse et al 1995). However, factors specific to conditions in rural and remote Australia (eg high humidity and ambient temperatures) may contribute to under diagnosis and overtreatment. Considerations in testing for asymptomatic bacteriuria in these areas include (Bookallil et al 2005):

- whether specimens can be provided to pathology services within the timeframe in which they can still be cultured (ideally within 24 hours)
- the availability of appropriate storage facilities for dipstick tests
- the consequences of treating all women with a positive dipstick result given the high rate of false positives and the risk of increased resistance to antibiotics associated with over-prescribing
- recall systems for women with a positive result on culture.

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Practice point	
AAA	Where access to pathology services is limited, dipstick tests may be used to exclude infection, with positive results confirmed by urine culture. Appropriate storage of dipsticks is essential to the accuracy of these tests.
	Approved by NHMRC in December 2011; expires December 2016

38.2.6 Repeat testing

Although most guidelines recommend a single urine culture at the first antenatal visit, two prospective studies have concluded that urine should be cultured in each trimester of pregnancy to improve the detection rate of asymptomatic bacteriuria (McIsaac et al 2005; Tugrul et al 2005). There has been no prospective evaluation of repeated testing during pregnancy (Schnarr & Smaill 2008).

38.3 Practice summary: testing for asymptomatic bacteriuria

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss testing for asymptomatic bacteriuria:** Explain that identifying urinary tract infection enables women to be treated with antibiotics and avoids the risk of complications.
- ☐ **Document and follow-up:** Note the results of testing in the woman's record and have a follow-up system in place so that appropriate treatment is provided if a woman is found to have bacteriuria.

38.4 Resources

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39 Group B streptococcus

Identifying women who are at risk of having a baby with Group B streptococcus enables treatment to be given during labour to prevent transmission of infection to the baby.

39.1 Background

Group B streptococcus is a common bacterium that can colonise people of all ages without symptoms. It is generally found in the gastrointestinal tract, vagina and urethra. The bacteria can be passed from mother to baby during labour and lead to infection in the first week of life (early onset infection). Late onset infection can develop up to 3 months of age. Prevention focuses on early onset, which is the most common cause of serious infection in newborn babies.

39.1.1 Prevalence and incidence

- *Maternal colonisation*: A systematic review estimated rates of maternal colonisation in Europe to range from 6.5% to 36% (Barcaite et al 2008; 2012), with one-third of included studies reporting rates greater than 20%. Lower level studies in Europe and other regions have found similar rates (Whitney et al 2004; Chohan et al 2006; Valkenburg-van den Berg et al 2006; Busetti et al 2007; Konrad & Katz 2007; Hakansson 2008; Jahromi 2008; Rausch et al 2009; Hong et al 2010; Lee et al 2010; Kunze 2011; Yu et al 2011). Australian studies have identified colonisation rates in the range of 20% to 24% (Hiller et al 2005; Angstetra et al 2007). A study of antenatal care for Aboriginal and Torres Strait Islander women in Townsville (n=456) identified Group B streptococcus as a complication of pregnancy in 15.2% of women (Panaretto et al 2006), with a testing rate of around 60% (Panaretto et al 2006; 2007).
- *Group B streptococcus infection in the newborn*: The incidence of neonatal Group B streptococcus infection ranges from 0.2/1,000 live births to 1.71/1,000 live births (Ali 2004; Kenyon et al 2004; Mifsud et al 2004; Trotman & Bell 2006; Berardi et al 2007; Konrad & Katz 2007; Trijbels-Smeulders et al 2007; Carbonell-Estrany et al 2008; Berardi et al 2010; Vergnano et al 2010; Kunze 2011; Yu et al 2011).
- *Risk factors*: Risk factors for early onset Group B streptococcus infection of the newborn include maternal colonisation during the pregnancy, previous infant with Group B streptococcus infection, preterm birth, prolonged rupture of the membranes and maternal fever during labour (Ohlsson & Shah 2009). There is low-level evidence that Group B streptococcus colonisation in a previous pregnancy may be a risk factor for recolonisation in a subsequent pregnancy (Cheng et al 2008; Turrentine & Ramirez, 2008; Tam et al 2012) but this association was not found in all studies (Weintraub et al 2011). HIV infection does not appear to increase the risk of colonisation (Shah et al 2011).

39.1.2 Risks associated with Group B streptococcus colonisation during pregnancy

- A positive result for Group B streptococcus on urine culture may be a risk factor for preterm labour, premature rupture of the membranes, intrapartum fever and chorioamnionitis (Kessous et al 2012).
- Early onset Group B streptococcus may affect babies before birth and increase the risk of preterm birth or caesarean section (Tudela et al 2012). In the newborn, the infection is usually evident as respiratory disease, general sepsis, or meningitis within the first week after birth. Population-based surveillance in the United States suggests a neonatal death rate of around 5% of affected babies (CDC 2012).

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39.2 Preventing Group B streptococcus

Intravenous antibiotic treatment during labour has been shown to prevent early onset Group B streptococcus infection in 86-89% of newborns of mothers colonised before birth (Lin et al 2001; Schrag et al 2002). Preventive approaches involve offering treatment to all women with a previous infant with Group B streptococcus infection and to other women based on:

- *colonisation as identified by routine antenatal culture of vaginal-rectal swabs*: recommended in the United States (Verani et al 2010; Cagno et al 2012; Randis & Polin 2012) and Canada (SOGC 2004); or
- *risk factors for transmission during labour* (preterm birth, maternal body temperature >38°C, membrane rupture > 18 hours): recommended in the United Kingdom (NICE 2008; RCOG 2012).

Both routine antenatal testing and risk-based treatment approaches are currently used in Australia.

39.2.1 Benefits and harms of preventive approaches

While there is no high-level evidence on the benefits of approaches to prevent transmission of Group B streptococcus, prospective and retrospective studies have identified reductions in the incidence of Group B streptococcus in the newborn associated with both routine antenatal testing (Angstetra et al 2007; Chen et al 2005; Eberly & Rajnik, 2009; Phares et al 2008; Puopolo et al 2005) and risk-based testing (Trijbels-Smeulders et al 2007).

Narrative reviews have identified limitations associated with routine antenatal testing including a lack of predictive certainty that a positive Group B streptococcus culture will lead to infection of the newborn, the potential for a false negative result and maternal anxiety (Daley & Garland 2004; Konrad & Katz 2007; Berardi et al 2010).

Both preventive approaches increase exposure of mother and baby to antibiotics, with possible harmful effects (eg allergic reactions, increase in drug-resistant organisms) (Ohlsson & Shah 2009). However, anaphylaxis following penicillin treatment is rare (4/10,000-4/100,000 women with no known allergy) and the risk is greatly offset by the reduced incidence of neonatal and maternal sepsis (Schrag et al 2002).

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Recommendation		Grade C
43.	Offer either routine antenatal testing for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

39.2.2 Cost-effectiveness

In the United Kingdom, available modelling on cost-effectiveness does not support introducing routine antenatal testing (Colbourn et al 2007; Kaambwa et al 2010). A French study found that PCR testing during the birth was associated with lower hospital costs than antenatal testing (El Helali et al 2012). No Australian evidence on the cost-effectiveness of approaches to preventing early onset Group B streptococcus was identified in the systematic literature review.

An economic analysis carried out to inform the development of these Guidelines (see separate document on economic analyses) found that the benefits of testing do not outweigh the costs involved, whatever approach is taken. This is because of the relatively low number of newborns affected and the absence of robust data on severe or long-term health effects in the event of an infection. Of the strategies evaluated, routine testing only is slightly more cost-effective than routine testing with treatment for certain risk factors, when compared to 'doing nothing'.

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39.2.3 Timing of antenatal testing

A systematic review (Valkenburg-van den Berg et al 2010) into the optimal timing of antenatal testing found cultures collected in late pregnancy had a high positive predictive value for colonisation during labour. These findings are supported by other smaller studies (Hiller et al 2005; Towers et al 2010).

Recommendation		Grade B
44.	If offering antenatal testing for Group B streptococcus, arrange for testing to take place at 35–37 weeks gestation.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

39.2.4 Type of antenatal test

Detection rates of Group B streptococcus are higher when a combined vaginal-rectal swab is taken (Kovavisarach et al 2007; Daniels et al 2009; Verani et al 2010; RANZCOG 2011), with a sensitivity of 84% compared to 58% for a vaginal swab and 71% for a rectal swab (Daniels et al 2009). Limited low-level evidence suggests vaginal-perianal swabs may be an alternative to vaginal-rectal swabs as culture yields are similar and collection causes less discomfort to the woman (Jamie et al 2004; Trappe et al 2011).

Self-collection of vaginal-rectal specimens has been found to have similar culture yields to collection by a health professional (Arya et al 2008; Hicks & Diaz-Perez 2009; Price et al 2006), without the need for standardised or lengthy information about specimen collection methods (Hicks & Diaz-Perez 2009).

Recommendation		Grade C
45.	Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

39.2.5 Organisational practice

Prospective studies evaluating the effects of introducing routine antenatal testing have found that, although testing had been extensively and successfully adopted, early onset Group B streptococcal infection still occurred due to culture detection failure, deviation from protocol (Berardi et al 2010) or missed testing (Van Dyke et al 2009; Faro et al 2010). This highlights the importance of consistently following organisational protocols and auditing outcomes.

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39.3 Discussing Group B streptococcus

Discussion about Group B streptococcus should take place at around 35 weeks gestation so that women have received information about preventive treatment before they go into labour. This timing also enables testing at 35–37 weeks and receipt of test results, if testing is being offered. Points for discussion include:

- Group B streptococcus is part of the normal bacteria that live in the body and anyone can become colonised with Group B streptococcus without having symptoms
- Group B streptococcus is transmitted to the baby during the birth in 1–2 per 1,000 live births and can cause serious infection in the newborn
- treatment with intravenous antibiotics during labour reduces the risk of transmission of the infection to the baby
- women may be advised to remain in hospital for at least 24 hours after the birth so that the baby can be observed for signs of Group B streptococcus infection.

39.4 Practice summary: Group B streptococcus

When: At around 35 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss prevention:** Explain that treatment during labour is offered to women who are identified as being colonised with Group B streptococcus, have previously had a baby with Group B streptococcus infection and/or have risk factors for transmission during labour.
- ☐ **If testing is offered, give information about the test:** Discuss how the test is carried out and, unless the woman would prefer to have the specimen collected by a health professional, provide the test for her to carry out in the health care setting or at home. For women who choose to self-collect, provide clear explanation of how this is done (eg using diagrams or pictures).
- ☐ **Take a holistic approach:** Explain the implications of a positive test result or a previous baby with Group B streptococcus (eg a woman may not be able to give birth in the setting she had planned, treatment may not be possible if labour is very short). If a woman needs to travel to give birth, explain the importance of the test being carried out at 35–37 weeks (ie she needs to plan to have the test before she travels or arrange to have it where she will give birth).
- ☐ **Document and follow-up:** If antenatal testing is carried out, tell the woman the results and note them in her antenatal record. Have a system in place so that a woman with a positive test result or a previous infant with Group B streptococcus infection is informed about the importance of relaying this information to the health professionals who will care for her during labour.

39.5 Resources

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PART G: TARGETED MATERNAL HEALTH TESTS

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This section discusses the evidence for offering women a range of tests for women identified as at increased risk (see Table G1). Recommendations are based on evidence about the diagnostic accuracy of available tests, the effectiveness of interventions to prevent mother-to-child transmission of infection or other effects on the unborn baby, and the availability of treatments.

For notifiable infections (chlamydia, gonorrhoea), diagnoses are required to be reported to the National Notifiable Diseases Surveillance System. This allows analysis of trends in jurisdictions and groups at risk, although data quality varies for the different conditions and reporting of Indigenous status is incomplete in some States and for some conditions. Evidence on the prevalence and incidence of other conditions is generally from observational studies and may not be representative of the Australian population or groups within the population. While incidence or prevalence data are not always available, each chapter includes a brief discussion that aims to give health professionals an indication of the likelihood that women in their community will be affected.

Table G1: Summary of advice on tests offered to women at increased risk

Condition	Offer test to:	Test(s)	Rationale/follow-up	Chapter
Chlamydia*	Women younger than 25 years; all pregnant women in areas of high prevalence	First pass urine NAAT	Treatment may reduce the risk of preterm birth, premature rupture of the membranes and low birth weight	40
Gonorrhoea*	Women with known risk factors or living in areas where prevalence is high	Vaginal, urine or endocervical specimens NAAT	Treatment may prevent neonatal infection	41
Trichomoniasis*	Women with symptoms	PCR testing of vaginal swabs	Treatment may prevent certain infections in the newborn but is associated with adverse effects	42
Toxoplasmosis	Women may request testing based on exposure to sources	Studies into tests are limited and inconclusive	Insufficient evidence on treatment. Advice on prevention may reduce the risk of infection	43
Cytomegalovirus	Women who have frequent contact with large numbers of very young children	Studies into tests are limited and inconclusive	Insufficient evidence on treatment. Advice on prevention may reduce the risk of infection	44
Hyperglycaemia	Women with risk factors for hyperglycaemia	Glycated haemoglobin or fasting blood glucose	Hyperglycaemia can be minimised during pregnancy to improve outcomes	32
Asymptomatic bacterial vaginosis	Women with a previous preterm birth	High vaginal swab Amsel's criteria Nugent's criteria	Early treatment (<20 wks) may reduce risk of premature rupture of the membranes and low birth weight	45
Thyroid function	Women with symptoms or risk factors	Blood test for thyroid-stimulating hormone	Treatment improves maternal and newborn outcomes	46
Vitamin D status	Women considered to be at risk	Blood test for serum 25-OHD	Women at high risk of deficiency may benefit from supplementation	47
Human papilloma virus	Women who have not had a cervical screen in the recommended time period	Pap smear	Allows detection of precancerous cervical abnormalities	48

* Psychosocial support, partner testing and contact tracing are required for women with sexually transmitted infections.

25-OHD=25-hydroxyvitamin D; NAAT=nucleic acid amplification test; PCR=polymerase chain reaction; RNA=ribonucleic acid.

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40 Chlamydia

Chlamydia is a common sexually transmitted infection that can cause long-term complications and, in pregnancy, may cause adverse maternal and neonatal outcomes. Antenatal care provides opportunities for testing women from population groups with a high prevalence of the infection.

40.1 Background

Chlamydia is caused by the bacterium *Chlamydia trachomatis*. Genital chlamydial infection remains asymptomatic in at least 70% of women and most infections probably clear spontaneously without morbidity (Geisler et al 2008; Rogers et al 2008). Complications that may arise for women include chronic pelvic pain, pelvic inflammatory disease, infertility and ectopic pregnancy.

40.1.1 Prevalence of chlamydia

- *Rates of diagnosis:* Chlamydia is the most frequently reported notifiable condition in Australia. The notification rate for chlamydia increased steadily between 2007 and 2011, remained relatively stable between 2011 and 2015 and increased by 8% in 2016 (The Kirby Institute 2017b). Notifications have been higher in women than in men in all years (457.6 vs 364.3 per 100,000 in 2016). The rate of notification in the Aboriginal and Torres Strait Islander population has remained relatively stable since 2012 but in 2016 was more than three times that in the nonIndigenous population (1,193 vs 419 per 100,000) (The Kirby Institute 2017a).
- *Age*: The trends in notification rates vary by age group. Among women, rates in the 15-19 year age group have declined (from 2,415 in 2011 to 1,932 per 100,000 in 2016), rates in the 20-24 year age group have remained relatively stable (2,265 in 2011 and 2,399 in 2016) and rates in the 25-29 year age group increased steadily between 2006 and 2016 (from 644 to 1,086 per 100,000) (The Kirby Institute 2017b). The chlamydia notification rate in Aboriginal and Torres Strait Islander women aged 15-19 and 20-29 years in 2016 was four times and three times higher, respectively, than in the non-Indigenous population (The Kirby Institute 2017a).
- *Geographical distribution:* After a steady increase in notifications between 2007 and 2011 in all jurisdictions, between 2012 and 2016 chlamydia notification rates were more stable, except in Queensland, where there was a steady increase (from 410.7 to 480.4 per 100,000). Chlamydia notification rates rose between 2015 and 2016 in New South Wales (14%) and Western Australia (7%) (The Kirby Institute 2017b). Between 2012 and 2016, notification rates were highest and remained stable in remote and very remote regions (806.6 per 100 000 in 2016). Notification rates also remained stable in major cities in the same period (327.0 per 100 000 in 2016) but declined by 13% in inner and outer regional areas (419.5 to 367.2 per 100 000) (The Kirby Institute 2017b). A similar pattern was seen in both males and females but in females there was a larger decline in inner and outer regional areas (16%) and rates also declined (11%) in the major cities.
- Data on diagnoses of chlamydia are incomplete and may provide a distorted view of population rates in Australia. Differences in rates of diagnosis between areas and populations may reflect a range of factors, including variations in approaches to offering testing, access to services, and recording of Indigenous status.

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40.1.2 Risks associated with chlamydia in pregnancy

Chlamydia infection during pregnancy has been associated with adverse outcomes including higher rates of preterm birth (OR 1.6; 90% CI 1.01-2.5) and intrauterine growth restriction (OR 2.5; 90% CI 1.32-4.18) (John Hopkins Study Team 1989). Left untreated, it has also been associated with increased low birth weight and infant mortality (Ryan et al 1990).

Babies born to mothers who have cultured positive to C. trachomatis, may subsequently also culture positive (approximately 25%) and have been reported to have higher rates of neonatal conjunctivitis, lower respiratory tract infections and pneumonia (Schachter et al 1986; Preece et al 1989).

However, the NICE guidelines note that the causal link between chlamydia infection and adverse outcomes of pregnancy has not been established and the evidence remains difficult to evaluate in relation to neonatal morbidities (NICE 2008).

40.2 Chlamydia testing in pregnancy

The NICE guidelines reviewed the evidence on diagnostic accuracy and effectiveness of testing methods in identifying genital chlamydia and found no good evidence to support routine antenatal testing.

40.2.1 Diagnostic accuracy

The evidence on diagnostic accuracy was limited to prospective cohort studies. The accuracy of antigen detection tests using endocervical specimens (Stamm et al 1984; Baselski et al 1987; Smith et al 1987) and of nucleic acid amplification tests using first-void urine and endocervical specimens (Thejls et al 1994; Andrews et al 1997; Garland et al 2000; Macmillan et al 2003; Renton 2006) was supported. While nucleic acid hybridisation test (DNA probe test) may be accurate, the evidence is limited and of moderate quality (Yang et al 1991; Hosein et al 1992). Based on limited evidence, Gram staining (Asbill et al 2000) and Pap smear (Spence et al 1986) had insufficient accuracy to detect chlamydia.

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40.2.2 Effectiveness of testing

Review of the effectiveness of testing in reducing adverse outcomes for the pregnancy and the neonate found limited evidence (one RCT [Martin et al 1997] and five cohort studies [Macmillan et al 1985; Black-Payne et al 1990; Cohen et al 1990; Ryan et al 1990; Rivlin et al 1997]) to indicate that treating chlamydia infection during pregnancy is effective in reducing the incidence of premature rupture of the membranes, preterm birth and low birth weight babies. There was no significant evidence to show that treating chlamydia infection during pregnancy leads to decreased incidence of adverse neonatal outcomes (conjunctivitis, pneumonia).

The literature review conducted to inform these Guidelines found no additional systematic reviews or RCTs to support or refute the findings presented in the NICE guidelines. However, there is additional information from systematic reviews and prevalence studies from 2008-2010 to suggest a specific population-based testing program (eg for those at highest risk). This evidence is discussed below.

40.2.3 Groups at higher risk

Antenatal care provides an opportunity to discuss chlamydia testing with young women. Other considerations before testing is offered include whether the pregnancy is unplanned, the number of recent male sexual partners and antibiotic use in the previous 3 months (Chen et al 2009).

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In the United Kingdom and the United States, chlamydia testing is recommended for pregnant women younger than 25 years (NICE 2008) and younger than 24 years (USPSTF 2007), respectively. Testing of young women in Australia is supported by:

- the high prevalence of chlamydia in young people in Australia (Vajdic et al 2005; NCHECR 2009) and modelling that predicts a reduction in prevalence through testing of people aged 25 years or younger (Regan et al 2008)
- estimates of the prevalence of chlamydia during pregnancy in young Australian women, which range from 3.2% (95% CI 1.8 to 5.9) among women aged 16–24 (n=403) (Chen et al 2009) to 13.7% among women aged 20 years or younger (n=212) (Cheney & Wray 2008)
- qualitative research conducted as part of a prospective, cross-sectional study of pregnant women aged 16–25 years, which found a high level of acceptability of testing (Bilardi et al 2010).

Recommendations		Grade C
46.	Do not routinely offer chlamydia testing to all women as part of antenatal care.	
47.	Routinely offer chlamydia testing at the first antenatal visit to pregnant women younger than 25 years.	
	Approved by NHMRC in December 2011; expire December 2016	UNDER REVIEW

While data are lacking to support routine testing, the prevalence of chlamydia is regionally variable and, in some areas, high prevalence may occur with that of other sexually transmitted infections, such as gonorrhoea. While testing of young women should take place in all areas, it is also important for health professionals to be aware of the rates of sexually transmitted infection in their community and develop local protocols accordingly.

Practice point		
BBB	Testing for chlamydia and other sexually transmitted infections regardless of age should be considered for women who live in areas where their prevalence is high. An understanding of local prevalence will inform planning for population testing when this is indicated.	
	Approved by NHMRC in December 2011; expire December 2016	UNDER REVIEW

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40.2.4 Type and timing of test

As discussed above, antigen detection (eg nucleic acid amplification tests) are accurate in diagnosing chlamydia. Study of the acceptability of these tests to young woman found a preference for non-invasive methods. Both urine and vulval swab methods were highly sensitive, acceptable, and not affected by pregnancy status (Macmillan et al 2003). However, women may be unable to produce urine on demand and unrefrigerated transport time has been reported to influence sensitivity of testing. There is also preliminary evidence that urine has the lowest organism load when compared to endocervical, self-collected vaginal, and urethral specimens.

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40.3 Practice summary: chlamydia

When: At the first contact with women younger than 25 and women in high prevalence areas

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss chlamydia:** Explain the association between chlamydia and preterm birth and low birth weight, that tests for the infection are available and that it is easily treated with antibiotics.
- ☐ **Take a holistic approach**: If a woman tests positive for chlamydia, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up.
- ☐ **Learn about locally available resources:** Available testing services and support organisations will vary by location.

40.4 Resources

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41 Gonorrhoea

Gonorrhoea is a sexually transmitted infection that can cause complications in pregnancy. Antenatal care provides opportunities for women from population groups with a high prevalence of the infection to be offered testing.

41.1 Background

Gonorrhoea is a sexually acquired infection caused by *Neisseria gonorrhoeae*. In women it may be asymptomatic, or present as an abnormal vaginal discharge, pelvic pain and/or difficulty urinating. Women with untreated gonorrhoea infection can have high morbidity (eg pelvic inflammatory disease, chronic pelvic pain). In pregnancy, gonorrhoea infection can cause adverse obstetric and neonatal outcomes. There is evidence that tests can accurately detect gonorrhoea infection and that antibiotics are effective in its treatment (USPSTF 2005).

41.1.1 Diagnoses of gonorrhoea in Australia

- *Rates of diagnosis*: Between 2012 and 2016, there was a 63% increase in notification rates (from 61.9 to 100.8 per 100,000), with a 43% increase among women (from 25.7 to 55.9 per 100,000) (The Kirby Institute 2017a). By 2012, most laboratories had switched to using dual chlamydia and gonorrhoea tests where, if a chlamydia test was ordered, a gonorrhoea test would be conducted automatically. The emphasis on testing for chlamydia in young people has therefore led to a substantial rise in the number of tests conducted for gonorrhoea, which may explain the increase in diagnoses in women before 2012 but not since then.

  In 2016, The gonorrhoea notification rate for Aboriginal and Torres Strait Islander women was 15 times that of nonIndigenous women (611.8 vs 41.8 per 100,000; data do not include New South Wales) (The Kirby Institute 2017b). However, since 2012, the rate of notification of gonorrhoea decreased by 17% in the Aboriginal and Torres Strait Islander population, compared with a 125% increase in the non-Indigenous population.

- *Age:* Between 2012 and 2016, the notification rate of gonorrhoea increased in all age groups 20 years and above (The Kirby Institute 2017a). Among women, the largest increases were in the 30-39 year (94%), 25-29 year (93%) and 20-24 year (39%) age groups.

- *Geographical location*: Between 2007 and 2016, gonorrhoea notification rates increased in all jurisdictions except the Northern Territory, where rates fluctuated (The Kirby Institute 2017a). In 2016, gonorrhoea notification rates were highest in the Northern Territory (699.6 per 100,000), followed by Western Australia (132.8 per 100,000). Notification rates increased in major cities (99% increase) and inner and outer regional areas (15% increase) but declined in remote and very remote areas (8% decline). In 2016, gonorrhoea notification rates were highest in remote areas (532.5 per 100,000), followed by major cities (101.3 per 100,000) and regional areas (50.7 per 100,000).

- *Country of origin:* In 2008, the World Health Organization estimated the incidence of gonorrhoea per 1,000 women aged 15-49 years to be 50 in Africa, 35 in the Western Pacific, 19 in the Americas, 16 in South-East Asia and 8 in Europe (WHO 2012).

- *Incidence in pregnancy:* The incidence of gonorrhoea in pregnant women who are not at high risk for infection is generally low. However, it varies by population; approximately 1% among pregnant women in the United States (Goldenberg et al 2005) (range 0.2-4%) (CDC 2004), 3.3% in a developing country setting (Sullivan et al 2004) and 3.4% among adolescent women in a low-income area in the United States (Niccolai et al 2003).

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- *Risk factors:* Increased risk of gonorrhoea has been associated with previous gonorrhoea infection or other sexually transmitted infection, new or multiple sex partners and inconsistent condom use, commercial sex work and drug use and living in communities with a high prevalence of gonorrhoea (USPSTF 2005).

41.1.2 Risks associated with gonorrhoea in pregnancy

Untreated gonorrhoea during pregnancy is associated with adverse outcomes including ectopic pregnancy, septic spontaneous miscarriage, chorioamnionitis, premature rupture of membranes, preterm labour and postpartum infection (Hollier & Workowski 2005; USPSTF 2005).

N. gonorrhoeae can be transmitted from the mother's genital tract to the newborn at the time of birth and occasionally, when there is prolonged rupture of the membranes, it can be transmitted to the baby before birth (Brocklehurst 2009). The usual manifestation of neonatal infection is conjunctivitis (ophthalmia neonatorum), which begins in the first days of life and, if left untreated, may lead to blindness (Brocklehurst 2009). The risk of transmission from an infected mother is between 30% and 47% (Galega et al 1984; Fransen et al 1986).

41.2 Testing for gonorrhoea

While testing all women for gonorrhoea during pregnancy is recommended in Canada (PHAC 2008), a number of bodies in the United States recommend testing only women at high risk (AAP 2002; ACOG 2003; AAFP 2004; USPSTF 2005). The Royal Australian College of General Practitioners (RACGP) also supports testing only women considered to be at risk (RACGP 2009). The prevalence of gonorrhoea is regionally variable and, in some areas, high prevalence may occur with that of other sexually transmitted infections, such as chlamydia. It is important for health professionals to be aware of the rates of sexually transmitted infection in their community and develop local protocols accordingly.

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41.2.1 Diagnostic accuracy of tests

In Australia, culture methods for detection of N. gonorrhoeae have been increasingly replaced by nucleic acid detection tests (NAATs), especially in remote areas (Smith et al 2005). These tests can be performed on self-collected vaginal swabs, urine and endocervical specimens. The sensitivity and specificity of vaginal swabs are similar whether collected by the woman (96.1%; 99.3%) or health professional (96.2%; 99.3%), identifying as many infections as endocervical swabs and more than first-catch urine samples (Schachter et al 2005). These tests are evolving and guidelines for laboratories on their use and interpretation have been developed to reduce the high risk of false positives associated with some tests (Smith et al 2005). Where possible, positive results should be confirmed with culture for antibiotic sensitivity testing and to exclude false positives, particularly in low-risk individuals.

In a retrospective study, repeat testing of women at high risk at 34 weeks identified additional women with infection (n=751) (Miller et al 2003). In the United States (USPSTF 2005) and Canada (PHAC 2008), testing is recommended in the first trimester, with testing in subsequent trimesters (Canada) or in the third trimester (United States) for women at continued risk or with a new risk factor.

41.2.2 Harms and benefits of testing

There is some evidence that testing and subsequent treatment of pregnant women at high risk of gonorrhoea may prevent complications associated with gonococcal infection during pregnancy (USPSTF 2005; Darling 2009). Potential harms of testing include false-positive results, anxiety and unnecessary antibiotic use (USPSTF 2005). There is insufficient evidence to quantify the magnitude of these harms but it is likely that they are outweighed by the benefits of testing women at increased risk (USPSTF 2005).

No evidence on the cost-effectiveness of testing for gonorrhoea in pregnancy was identified.

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41.2.3 Effect of treatments on risks associated with gonorrhoea

The aim of treating gonorrhoea during pregnancy is to eradicate the infection and prevent neonatal infection, postpartum sepsis for the mother and transmission to sexual partners (Brocklehurst 2009). In a systematic review (n=346) (Brocklehurst 2009), all tested antibiotic regimens (penicillins, spectinomycin or ceftriaxone) demonstrated a high level of effectiveness as judged by 'microbiological cure', with eradication rates of between 89% and 97%. However, the effects of treatment on substantive outcomes such as ophthalmia neonatorum have not been reported and may vary between different antibiotics.

Consensus-based recommendation	
XLIII	Do not routinely offer gonorrhoea testing to all women as part of antenatal care. Offer gonorrhoea testing to pregnant women who have known risk factors or who live in or come from areas where prevalence is high.
	Approved by NHMRC in June 2014

41.3 Discussing gonorrhoea

Discussion to inform a woman's decision-making should take place before testing takes place and include:

- it is possible to have gonorrhoea without experiencing symptoms
- risk factors for sexually transmitted infection
- the possibility of false positive results
- gonorrhoea causes problems with the pregnancy including spontaneous miscarriage, preterm birth and infection of the newborn
- treatment of gonorrhoea may prevent pregnancy complications associated with infection
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved
- testing for other sexually transmitted infections may be needed
- a second test may be given a week later if symptoms remain
- repeat testing for gonorrhoea may be needed for women at ongoing risk of infection.

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41.4 Practice summary: gonorrhoea

When: A woman has risk factors for gonorrhoea infection, lives in an area of high prevalence or has come from a country with high prevalence

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss the reasons for gonorrhoea testing:** Explain that it is important to find out whether a woman has gonorrhoea because of the effects that the infection can have on the pregnancy and the baby.
- ☐ **Take a holistic approach**: If a woman is found to have gonorrhoea infection, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up.
- ☐ **Document and follow-up:** If a woman is tested for gonorrhoea, tell her the results and note them in her antenatal record. Have a follow-up system in place so that infected women receive timely treatment or referral. Consider repeat testing for women who may be at ongoing risk of infection.

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41.5 Resources

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42 Trichomoniasis

Identifying the cause of vaginitis symptoms enables a woman to make an informed decision about treatment during pregnancy.

42.1 Background

Trichomoniasis is a sexually transmitted vaginitis caused by the single-celled protozoan parasite *Trichomonas vaginalis*. Around 70% of people with trichomoniasis do not experience symptoms (Workowski & Berman 2010). When symptoms are present in women, they include a smelly, yellow-green vaginal discharge with vulval irritation (Workowski & Berman 2010). Trichomoniasis is associated with infertility, pelvic inflammatory disease and enhanced HIV transmission (Sobel 2005; Sutton et al 2007; Johnston & Mabey 2008; Fichorova 2009).

42.1.1 Prevalence of trichomoniasis in pregnancy

Trichomoniasis is the most common curable sexually transmitted infection globally, with a prevalence among women of 8.1% (WHO 2011). Prevalence varies with age as well as geographical region.

- *Population-level data*: There are no accurate data available regarding the national prevalence of trichomoniasis in Australia and the infection is not notifiable.
- *Geographical location:* The reported prevalence of trichomoniasis in different regions of Australia is extremely variable, ranging from virtually zero in the largest cities (Marrone et al 2008; Lusk et al 2010; Uddin et al 2011) to 25% in remote northern Aboriginal communities (Guy et al 2011). A study of prevalence in rural and remote New South Wales found that prevalence increased with remoteness in both Aboriginal and non-Indigenous women (Ryder et al 2012).
- *Aboriginal and Torres Strait Islander women:* Small studies of discrete populations have found an prevalence among pregnant women of 15.5-17.6% (Josif et al 2012) in remote areas and 7.2% in an urban area (Panaretto et al 2006).
- *Country of origin*: Prevalence has been estimated as 3-3.7% among women in the United States (French et al 2006; Sutton et al 2007; Mann et al 2009), 0.3-6% among South American women (Lobo et al 2003; Gondo et al 2010), 5.5-8.5% among Asian women (Sami & Baloch 2005; Azargoon & Darvishzadeh 2006; Madhivanan et al 2009), 10-14% among African American women (Caliendo et al 2005; Miller et al 2005; French et al 2006) and 5.4-17.6% among African women (Adu-Sarkodie 2004; Stringer et al 2010).
- *Risk factors*: Risk factors include multiple sexual partners, previous sexually transmitted infections, non-use of barrier contraceptives, work in the sex industry, intravenous drug use, smoking, low socioeconomic status and incarceration (Brown 2004; Say & Jacyntho 2005; Johnston & Mabey 2008; Workowski & Berman 2010).

42.1.2 Risks associated with trichomoniasis in pregnancy

- *Pregnancy risks:* Trichomoniasis in pregnancy may be associated with increased risk of preterm birth and low birth weight (Buchmayer et al 2003; Mann et al 2009; Gülmezoglu & Azhar 2011).
- *Risks to the baby:* Maternal trichomoniasis has been associated with genital and respiratory infections of the newborn (Carter & Whithaus 2008; Trintis et al 2010).

42.2 Testing for trichomoniasis

In the United States (Workowski & Berman 2010), testing for trichomoniasis during pregnancy is only recommended for women with symptoms. Recommendations on testing during pregnancy have not previously been developed in the United Kingdom or Australia.

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42.2.1 Specimen collection

Small low-level studies in non-pregnant populations have concluded that:

- self-collected vaginal swabs correlate with specimens collected by health professionals (Smith et al 2005; Kashyap et al 2008; Huppert et al 2010) and are easy to perform (Kashyap et al 2008)
- self-collection by tampon sampling is acceptable to women (van de Wijgert et al 2006), is easily incorporated into practice and may be suitable in remote settings refrigeration is not required (Garland & Tabrizi 2004).

42.2.2 Diagnostic test accuracy

Testing for trichomoniasis in Australia is mostly carried out using PCR, which is rapidly replacing culture testing as it has higher sensitivity and results are available more quickly.

- *PCR testing* of vaginal swabs has high sensitivity (96-100%) and specificity (97-100%) (Lobo et al 2003; Caliendo et al 2005; Smith et al 2005; Pillay et al 2007). Small studies have found that PCR testing of tampon samples has high sensitivity (94-100%) (Knox et al 2002; Sturm et al 2004). PCR testing of urine samples has lower sensitivity and specificity (76.7% and 97%) (Pillay et al 2007).
- *Culture testing* of vaginal swabs has a sensitivity of 63.0-98.2% and specificity of 99.4-100% (Lobo et al 2003; Adu-Sarkodie 2004; Caliendo et al 2005; Smith et al 2005). It requires an incubator and culture medium and may take up to 7 days for a result.

While trichomoniasis is occasionally diagnosed by Pap smear, its use is not adequate as the sole method of diagnosis because of its low sensitivity (60.7-72.1%) and the delay in obtaining results (Lara-Torre & Pinkerton 2003; Lobo et al 2003; Smith et al 2005).

42.2.3 Benefits and harms of testing

While accurate diagnostic tests are available, the benefits of testing are limited by uncertainties about the effect of treatments during pregnancy. Advantages of identifying and treating trichomoniasis include relief of symptoms, reduced risk of further transmission and possible prevention of genital and respiratory infections in the newborn (Workowski & Berman 2010). Potential harms of testing include false positive diagnosis (Johnson et al 2007) and adverse effects associated with treatment (see below).

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Recommendation	Grade B
48. Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women.	
Approved by NHMRC in June 2014; expires June 2019	

42.2.4 Availability of safe and effective treatments for trichomoniasis

Metronidazole and tinidazole are used to treat trichomoniasis (Owen & Clenney 2004; Fung & Doan 2005; Wendel & Workowski 2007; Workowski & Berman 2010). The Therapeutic Goods Administration classifies metronidazole as pregnancy category B2 and tinidazole as B3.

Based on the limited evidence available, treatment with metronidazole provides parasitological cure in around 90% of women and would likely be more effective if partners were also treated (Workowski & Berman 2010; Gülmezoglu & Azhar 2011). However, it does not reduce risk of preterm birth or low birth weight in asymptomatic women (Gülmezoglu & Azhar 2011) and may increase the risk of preterm birth (Carey & Klebanoff 2003; Hay & Czeizel 2007).

Studies into the effect of treatment in women with symptomatic trichomoniasis are also limited and findings are inconsistent. Some suggest an increased incidence of preterm birth (Riggs & Klebanoff 2004; Okun et al 2005) and others found no association with preterm birth (Mann et al 2009). Findings may be affected by method of assessing gestational age (Stringer et al 2010) and timing of diagnosis.

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Due to the lack of clarity on the risk of preterm birth, treatment of asymptomatic pregnant women is not recommended but may be a consideration after 37 weeks gestation. Treatment for women with symptoms requires consideration of the risks and benefits for the individual woman.

42.2.5 Repeat testing

Due to the high rates of reinfection among women diagnosed with trichomoniasis, retesting 3 months following treatment may be a consideration, although this approach has not been evaluated (Workowski & Berman 2010).

42.3 Discussing trichomoniasis

Discussion to inform a woman's decision-making should take place before testing takes place and include:

- trichomoniasis is a sexually transmitted infection and most people do not experience symptoms
- trichomoniasis is associated with increased risk of preterm birth and low birth weight and may cause some types of infection in the newborn
- treatment of trichomoniasis relieves symptoms, reduces the risk of transmission and may prevent related infections in the newborn but may not reduce the risk of preterm birth
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved
- testing for other sexually transmitted infections may be needed.

42.4 Practice summary: trichomoniasis

When: A woman has signs or symptoms of vaginitis

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss the reasons for testing for trichomoniasis:** Explain that testing is necessary to identify the cause of the symptoms.
- ☐ **Take a holistic approach:** If a woman is found to have trichomoniasis, other considerations include counselling, contact tracing, partner testing and treatment and testing for other sexually transmitted infections.
- ☐ **Document and follow-up:** If a woman is tested for trichomoniasis, tell her the results and note them in her antenatal record. Have a system in place so that women's decisions about treatment are documented and women who test positive for trichomoniasis during pregnancy are given ongoing follow-up and information.

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42.5 Resources

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43 Toxoplasmosis

There is limited evidence to support testing for toxoplasmosis during pregnancy. As infection may be transmitted to the baby during pregnancy, the focus is on providing women with advice about how to avoid sources of toxoplasmosis.

43.1 Background

Toxoplasmosis, which is caused by the parasite *Toxoplasma gondii*, is usually asymptomatic and self-limiting. Symptoms when they occur include swollen lymph nodes, muscle aches and pains and fever.

When women who have not previously been exposed to the parasite (eg are non-immune) become infected during pregnancy, the infection can be transmitted to the baby (Di Mario et al 2009). The likelihood of a woman acquiring a primary infection during pregnancy varies, depending on local prevalence (Pappas et al 2009):

- *low prevalence*: the potential for a woman to become infected is low but if she is infected during pregnancy it will most likely be a primary infection
- *high prevalence*: primary infection during pregnancy is unlikely due to previous exposure.

Toxoplasmosis infection can be acquired by (Di Mario et al 2009):

- eating raw or insufficiently cooked meat
- not washing hands thoroughly after handling raw meat or gardening
- contact with cat faeces (directly or indirectly through the soil or cat litter); or
- contact with contaminated raw vegetables or fruits.

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43.1.1 Prevalence and incidence

In Australia, primary infection with toxoplasmosis during pregnancy is rare (Gilbert 2002) although it is estimated that between 60% and 80% of Australians are non-immune (Pappas et al 2009).

- *Country of origin*: The prevalence of immunity to toxoplasmosis is high in Latin America, parts of Eastern/ Central Europe, the Middle East, parts of South-East Asia and Africa. There is a trend towards lower prevalence of immunity in many European countries and the United States (Pappas et al 2009).
- *Congenital toxoplasmosis*: The incidence of congenital toxoplasmosis has been reported to range from 0.03/1,000 live births in England and Wales (Gilbert et al 2006) to 0.3/1,000 live births in south-eastern Brazil (Carvalheiro et al 2005).

43.1.2 Risks associated with toxoplasmosis during pregnancy

- Mother-to-child transmission rates have been reported to range from 11.3% (Ricci et al 2003) to 18.5% (Varella et al 2009). The risk of transmission increases with gestational age (from 5% at 12 weeks to 80% just before birth) (Dunn et al 1999). However, babies infected early in pregnancy have a greater risk of congenital anomalies (Di Mario et al 2009).
- Congenital toxoplasmosis has been associated with stillbirth, intracranial anomalies and/or developmental delay, ocular inflammation (Gilbert et al 2006) and impaired hearing (Andrade et al 2008; Brown et al 2009). In a prospective cohort study (n=620), babies with congenital toxoplasmosis had lower gestational age but there was no significant association with low birth weight or small for gestational age (Freeman et al 2005).

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43.2 Testing for toxoplasmosis

The evidence on the benefits to women and babies of testing for toxoplasmosis is limited and inconclusive. Routine testing for toxoplasmosis during pregnancy is not recommended in the United Kingdom (NICE 2008).

43.2.1 Diagnostic accuracy of tests

Tests for toxoplasmosis aim to identify whether maternal infection is acute or chronic. Studies have compared a range of tests for IgG and IgM antibodies and IgG avidity (Petersen et al 2005; Thalib et al 2005; Flori et al 2008; Bobic et al 2009; Kasper et al 2009; Lachaud et al 2009; Elyasi et al 2010; Wallon et al 2010; Jost et al 2011; Lesle et al 2011; Robert-Gangneux et al 2011; Yamada et al 2011). There is great heterogeneity between the studies, making it difficult to comment on the predictive and diagnostic accuracy of one test over another. Studies into the timing of testing are limited and inconclusive (Gilbert & Gras 2003). No evidence on cost-effectiveness was identified.

43.2.2 Harms and benefits of testing

No high-level evidence on the harms and benefits of testing for toxoplasmosis was identified. A narrative review found that psychological consequences of testing included parental anxiety due to false positive results and uncertainties related to prognosis of children with a diagnosis of congenital toxoplasmosis (Khoshnood et al 2007).

Recommendation	Grade C
49. Do not routinely offer testing for toxoplasmosis to pregnant women.	
Approved by NHMRC in June 2014; expires June 2019	

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43.2.3 Availability of safe and effective treatments

Spiramycin and sulphonamide medications have been used to treat toxoplasmosis with the aim of reducing mother-to-child transmission and the severity of fetal infection (Peyron et al 2010).

A systematic review (Thiébaut et al 2007) found weak evidence for an association between early maternal treatment and reduced risk of congenital toxoplasmosis. A subsequent review (Peyron et al 2010) concluded that despite the large number of studies performed, it is still not known whether treatment of pregnant women with presumed toxoplasmosis reduces the transmission of *T. gondii*.

While some studies have reported a lack of symptoms among babies whose mothers were treated during pregnancy (Berrébi et al 2007; 2010; Cortina-Borja et al 2010), current research is inadequate to assess whether the possible benefits outweigh the potential harm to the baby from treatment (Peyron et al 2010).

43.3 Discussing toxoplasmosis

There is suggestive evidence that women may have low levels of knowledge about the risks associated with T. gondii (Ferguson et al 2011) and that health education approaches may help reduce risk of congenital toxoplasmosis (Gollub et al 2008).

Recommendation	Grade C
50. Advise pregnant women about measures to avoid toxoplasmosis infection such as:	
• washing hands before handling food • thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating • thoroughly cooking raw meat and ready-prepared chilled meals • wearing gloves and thoroughly washing hands after handling soil and gardening • avoiding cat faeces in cat litter or in soil.	
Approved by NHMRC in June 2014; expires June 2019	

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43.4 Practice summary: toxoplasmosis

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss sources of toxoplasmosis:** Explain that becoming infected with toxoplasmosis during pregnancy can lead to the infection being transmitted to the baby so it is important to take measures to avoid infection.
- ☐ **Take a holistic approach**: Women who are originally from an area of low prevalence are at risk of primary infection if they travel to countries where toxoplasmosis is highly prevalent.
- ☐ **Document and follow-up:** If a woman is tested for toxoplasmosis, tell her the results and note them in her antenatal record. Have a system in place so that women who become infected with toxoplasmosis during pregnancy are given ongoing follow-up and information.

43.5 Resources

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44 Cytomegalovirus

There is limited evidence to support testing for cytomegalovirus during pregnancy. As cytomegalovirus may be transmitted to the baby and can have serious consequences, the focus is on giving women advice about hygiene measures that reduce their risk of infection.

44.1 Background

Cytomegalovirus is a member of the herpes virus family transmitted by contact with saliva, urine or genital secretions (Gilbert 2002). Most people who acquire the virus after birth experience few or no symptoms. Cytomegalovirus remains latent in the host after primary infection and may become active again, particularly during times of compromised immunity including pregnancy.

44.1.1 Incidence

- *Maternal immunity*: European studies (Alanen et al 2005; Gaytant et al 2005; Naessens et al 2005, Picone et al 2009; Enders et al 2012a) estimate an incidence of cytomegalovirus immunity in pregnant women of 41-56%, with incidence as high as 98.3% among Turkish women (Uysal et al 2012) and 100% among Pakistani immigrants in Norway (Bjerke et al 2011). A Japanese study (Tagawa et al 2010) found an incidence of 87.3%.
- *Transmission*: Rates of mother-to-child transmission vary depending on whether the maternal infection was primary or secondary. Low-level evidence suggests a transmission rate of 30-50% after primary infection, and 0.5-3.0% following secondary infection (Burny et al 2004; Coll et al 2009; Kenneson et al 2007; Leung 2003; Ornoy & Diav-Citrin 2006; Yinon et al 2011).
- *Congenital infection*: The overall prevalence of congenital cytomegalovirus infection at birth is estimated to be 0.62-0.70% (Schlesinger et al 2003; Dollard et al 2007; Kenneson et al 2007; Naessens et al 2005). Congenital cytomegalovirus in Australia is diagnosed in 4.02 per 100,000 live births, with confirmed diagnoses in 15 infants in 2007 and 34 infants in 2008 (Ridley et al 2008).
- *Risk factors:* The evidence suggests that cytomegalovirus infection during pregnancy is more common among women of lower socioeconomic status (1.2%) than among women of higher socioeconomic status (0.39%) (Dollard et al 2007). Evidence of primary infection (seroconversion) is also more likely in this group (Gaytant et al 2005). Frequent and prolonged contact with a child less than 3 years of age (eg as parent or child care worker) increases the risk of infection as cytomegalovirus is shed for long periods of time by children in this age group (Alder 2011).

44.1.2 Risks associated with cytomegalovirus during pregnancy

- The most common cause of congenital infection in developed countries, mother-to-child transmission of cytomegalovirus, occurs in around 40% of primary infections during pregnancy (McCarthy et al 2011). Adverse effects on the developing baby include late miscarriage and growth restriction (McCarthy et al 2011). About 10% of infants with congenital cytomegalovirus infection display manifestations at birth (including growth restriction, abnormal brain development, impaired hearing, inflammation of the choroid and retina) and are at risk of neurological consequences, including cognitive and motor deficits, hearing and visual impairments (McCarthy et al 2011).
- While the risk of transmission increases with gestational age, babies infected early in pregnancy have a greater risk of severe symptoms (Feldman et al 2011; Enders et al 2012b).

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44.2 Testing for cytomegalovirus

Conclusions on the value of antenatal testing for cytomegalovirus are limited by a lack of evidence on the appropriate timing of testing, the prognosis for an infected baby and the efficacy of treatments in preventing mother-to-child transmission. Routine maternal testing for cytomegalovirus is not recommended in the United States (CDC 2008), Canada (Yinon et al 2010) or the United Kingdom (NICE 2008).

44.2.1 Diagnostic accuracy of tests

Cytomegalovirus is diagnosed by isolation of the virus from body fluids, molecular testing for cytomegalovirus genome by PCR and detection of cytomegalovirus antibodies (McCarthy et al 2011). To determine whether primary infection occurred before or during pregnancy, antibody detection needs to occur at around 12–16 weeks (Enders et al 2013). The heterogeneity of studies identified (Parmigiani et al 2003; Khare et al 2004; de Paschale et al 2010; Gabbay-Ben Ziv et al 2012; Goncé et al 2012; Peled et al 2012; Sonoyama et al 2012) makes it difficult to comment on the diagnostic accuracy of one approach to testing over another.

44.2.2 Risks and benefits of testing

There is no high-level evidence on the benefits and risks of testing. Narrative reviews suggest that:

- possible benefits include (Burny et al 2004; Demmler 2005; ECCI 2006; Nyholm & Schleiss 2010):
  - identification of women at risk of primary infection enabling provision of prevention advice
  - diagnosis of infection during pregnancy
  - monitoring of the pregnancy and the option of diagnostic testing of the baby for women with known infection
  - the opportunity to terminate the pregnancy if fetal infection is detected early in the pregnancy
  - early commencement of neonatal antiviral treatment
- risks or limitations include (Burny et al 2004; ECCI 2006; Coll et al 2009; Nyholm & Schleiss 2010; Lazzarotto et al 2011; Nigro & Adler 2011):
  - maternal anxiety
  - lack of evidence on the appropriate timing of testing as the virus may be acquired and affect the developing baby throughout pregnancy
  - the potential for false positive results
  - difficulties in determining whether maternal infection is primary or secondary
  - lack of an effective vaccine or treatment
  - potential harm from diagnostic testing of the baby (eg amniocentesis-related miscarriage)
  - lack of predictive certainty that an infected baby will be symptomatic at birth.

Conclusions on the cost-effectiveness of testing for cytomegalovirus are limited by insufficient evidence on the effectiveness of treatments in preventing congenital cytomegalovirus (Cahill et al 2009).

Consensus-based recommendation		
XLIV	Only offer testing for cytomegalovirus to pregnant women if they come into frequent contact with large numbers of very young children (eg child care workers).	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

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44.2.3 Availability of safe and effective treatments

The evidence is insufficient to assess whether any interventions prevent mother-to child transmission or adverse outcomes for the congenitally infected infant (McCarthy et al 2011). Low-level evidence suggests some benefit from maternal intravenous hyperimmunoglobulin in preventing and treating congenital cytomegalovirus infection (Buxman et al 2012; Nigro et al 2012; Polilli et al 2012; Visentin et al 2012; Yamada et al 2012). Two RCTs to test the efficacy of hyperimmunoglobulin as passive immunisation are in progress.

44.3 Discussing cytomegalovirus prevention

Studies have identified low levels of knowledge about cytomegalovirus and its prevention among women (Ross et al 2007; Cannon et al 2012; Cordier et al 2012) and that health professionals may not give advice about prevention (CDC 2008).

A systematic review (Harvey & Dennis 2008) found that infection rates consistently decreased as cytomegalovirus education and support increased. These findings are supported by other lower level studies (Adler et al 2004; Picone et al 2009; Vauloup-Fellous et al 2009; Cordier et al 2012).

Providing advice to pregnant women about preventing cytomegalovirus acquisition through hygiene measures is recommended in the United States (CDC 2008). The NHMRC recommends that women of childbearing age working with children pay particular attention to good hand hygiene after contact with urine or saliva, especially after changing nappies or assisting in toilet care (NHMRC 2013).

Consensus-based recommendation		
XLV	Advise pregnant women about hygiene measures to prevent cytomegalovirus infection such as frequent hand washing, particularly after exposure to a child's saliva or urine.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

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44.4 Practice summary: cytomegalovirus

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; infectious disease specialist

- ☐ **Discuss transmission of cytomegalovirus:** Explain that becoming infected with cytomegalovirus during pregnancy can lead to the infection being transmitted to the baby.
- ☐ **Take a holistic approach:** Explain that frequent hand washing is the most important measure in controlling the spread of cytomegalovirus and is especially important after contact with articles contaminated with urine or saliva.
- ☐ **Document and follow-up:** If a woman is tested for cytomegalovirus, tell her the results and note them in her antenatal record. If a woman has a positive result, seek advice or referral to a health professional with appropriate expertise.

44.5 Resources

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45 Asymptomatic bacterial vaginosis

As identifying and treating asymptomatic bacterial vaginosis does not appear to change the risk of preterm birth or other pregnancy complications, routine testing in pregnancy is not appropriate.

45.1 Background

Bacterial vaginosis results from the relative deficiency of normal *Lactobacillus* species in the vagina and relative overgrowth of anaerobic bacteria. This reduces the normal acidity of the vagina. Bacterial vaginosis is asymptomatic for 50% of women in pregnancy (Joesoef & Schmid 2002) but may result in a vaginal discharge that can be grey in colour with a characteristic 'fishy' odour (McDonald et al 2007).

45.1.1 Asymptomatic bacterial vaginosis in pregnancy

- Several large prospective, longitudinal studies have found the prevalence of bacterial vaginosis to be in the range 9-23% (Hillier et al 1992; 1995; Meis et al 1995; Goldenberg et al 1996; 1998; Pastore et al 1999). A study in remote central Australia (n=205) (Smith et al 2005) found a prevalence of 26-36% among women attending clinics for a women's health assessment (for either a symptomatic episode or routine check but not for antenatal care).
- *Risk factors*: Bacterial vaginosis in pregnancy is more common among women of low socioeconomic status and women who had low birth weight babies in previous pregnancies (Hillier et al 1995; French et al 2006).

45.1.2 Risks associated with asymptomatic bacterial vaginosis in pregnancy

Bacterial vaginosis has been associated with an increased risk of preterm birth (McGregor et al 1990; Kurki et al 1992; Hay et al 1994; Hillier et al 1995), with a review of case-control and cohort studies finding that women with bacterial vaginosis were 1.85 times more likely (95% CI 1.62-2.11) to give birth preterm than women without (Flynn et al 1999). The higher risk of preterm birth remains in women diagnosed with bacterial vaginosis early in pregnancy, even if the bacterial vaginosis spontaneously resolves later in pregnancy (Gratacos et al 1998).

45.2 Testing for asymptomatic bacterial vaginosis

Routine testing for asymptomatic bacterial vaginosis in pregnancy is not recommended in the United Kingdom (NICE 2008), the United States (USPSTF 2008) or Canada (SOGC 2008). The systematic review supporting the United States statement (Nygren et al 2008) found that:

- no studies directly addressed the adverse effects of testing pregnant women who are asymptomatic for bacterial vaginosis
- there is no clear benefit for the general population from testing and treating asymptomatic bacterial vaginosis during pregnancy
- although a subgroup of high-risk women may benefit from testing and treatment for bacterial vaginosis in pregnancy, a sizeable group would receive either no benefit or may experience harm.

45.2.1 Diagnosis of bacterial vaginosis

Bacterial vaginosis is generally diagnosed by either:

- Amsel's criteria (thin white-grey homogenous discharge, pH greater than 4.5, release of 'fishy odour' on adding alkali, clue cells present on direct microscopy) (Amsel et al 1983); or

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- Nugent's criteria (Gram-stained vaginal smear to identify proportions of bacterial morphotypes with a score of greater than six indicating bacterial vaginosis) (Nugent et al 1991), which has both high sensitivity and specificity (Nelson et al 2003; Taylor-Robinson et al 2003; Hogan et al 2007; Nelson et al 2007), does not seem to vary with the vaginal site of collection (Culhane et al 2005) and has greater sensitivity than standard antenatal clinical diagnosis or a commercial test (Hogan et al 2007).

Other forms of testing, including the pH/whiff test or QuickVue Advanced pH and Amines test, have not been found to be reliable in detecting asymptomatic bacterial vaginosis in pregnancy (Charonis & Larsson 2006; Nelson et al 2007).

45.2.2 Effect of treatments on risks associated with bacterial vaginosis

While antibiotics are effective in eradicating bacterial vaginosis (McDonald et al 2007), treatment does not change the risk of preterm birth, low birth weight or premature rupture of the membranes in women at low risk of preterm birth. The Cochrane review (McDonald et al 2007) found:

- no statistically significant decrease in the risk of preterm birth at less than 37 weeks gestation for any treatment versus no treatment or placebo (n=5,888; OR 0.91; 95% CI 0.78-1.06)
- no evidence of an effect on birth before 34 weeks (n=851; OR 1.22; 95% CI 0.67-2.19) or birth before 32 weeks (n=3,565; OR 1.14; 95% CI 0.76-1.70)
- no difference in the incidence of low birth weight (n=4,107; OR 0.95; 95% CI 0.77-1.17)
- no decrease in the risk of preterm rupture of membranes (n=2,579; OR 0.88; 95% CI 0.61-1.28)
- a possible reduction in risk of preterm birth if treatment is given before 20 weeks pregnancy (n=2,387; OR 0.72; 95% CI 0.55-0.95).

In women with a previous preterm birth, treatment did not affect the risk of subsequent preterm birth (n=622; OR 0.83; 95% CI 0.59-1.17). However, two small studies showed a decrease in the risk of preterm rupture of the membranes (OR 0.14; 95% CI 0.05-0.38) and low birth weight (OR 0.31; 95% CI 0.13-0.75; n=114).

Although there is no evidence that testing and treating all women with bacterial vaginosis in the antenatal period will have a major impact on the rate of preterm birth, there is emerging evidence that early treatment may be more effective (McDonald et al 2007).

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Recommendation	Grade B
51. Do not routinely offer pregnant women testing for bacterial vaginosis.	
Approved by NHMRC in December 2011; expires December 2016	

Practice point	
CCC Early treatment (before 20 weeks pregnancy) of proven bacterial vaginosis may be beneficial for women with a previous preterm birth.	
Approved by NHMRC in December 2011; expires December 2016	

45.3 Practice summary: testing for bacterial vaginosis

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

☐ **Document and follow-up:** If a woman is tested for bacterial vaginosis, note the results in her record. Have a system in place so that women who test positive are given information about treatments.

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45.4 Resources

BASHH (2006) *National Guideline for the Management of Bacterial Vaginosis*. Clinical Effectiveness Group, British Association for Sexual Health and HIV.

SOGC (2008) *Screening and Management of Bacterial Vaginosis in Pregnancy*. SOGC Clinical Guideline No 211. Infectious Diseases Committee and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada.

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46 Thyroid dysfunction

There is currently insufficient evidence to support routine testing for thyroid dysfunction. As there is an association between thyroid dysfunction and adverse pregnancy and fetal outcomes, the focus is on identifying and treating women at high risk of the condition.

46.1 Background

Thyroid dysfunction in pregnancy often results from a pre-existing condition but may arise during pregnancy. Thyroid dysfunction involves either over or under activity of the thyroid gland.

- Hyperthyroidism, in which thyroid hormone levels are raised, is most commonly caused by Graves' disease, an autoimmune disorder (Marx et al 2008) but may also be induced by excessive exposure to iodine (de Benoist et al 2008). Symptoms include weight loss, heat intolerance and hypertension. It is generally diagnosed and treated before conception (Mestman 2004; Marx et al 2008).
- Hypothyroidism is a thyroid hormone deficiency, which may be overt (with symptoms including cold sensitivity, fatigue and dry skin) (Le Groot et al 2012), or subclinical with few or no symptoms but abnormal levels of thyroid hormones (Reid et al 2013). It is most commonly caused by endemic iodine deficiency (Lazarus et al 2011). Autoimmune thyroid disease (eg Hashimoto's disease) is the most common cause when iodine intake is adequate (Reid et al 2013). Detection of thyroid autoantibodies (to thyroid peroxidase or thyroglobulin) confirms the autoimmune origin of hypothyroidism, or in euthyroid women may indicate increased risk of thyroid dysfunction (Reid et al 2013).

46.1.1 Incidence

- Thyroid dysfunction is the second most common endocrine condition (after diabetes mellitus) affecting women of reproductive age (Reid et al 2013).
- The incidence of hyperthyroidism in pregnancy is in the range of 0.1-0.4% (Le Groot et al 2012).
- Studies in relatively iodine-sufficient populations estimate an incidence of 0.3-0.5% for overt hypothyroidism and 3-5% for subclinical hypothyroidism (Le Groot et al 2012). It is likely that incidence would be higher in areas of iodine insufficiency.
- The Australian National Health Survey (ABS 2014) found that, in 2011-2012, iodine levels were relatively low among women of childbearing age. Although women aged 16-44 years had sufficient iodine levels overall, around 18% had iodine levels considered moderately deficient (compared to the national average of 13%) and nearly two thirds (62%) had an iodine level below that recommended by WHO for pregnant and breastfeeding women.
- The WHO Global Database on Iodine Deficiency identifies moderate iodine deficiency in some African countries (Algeria, Chad, Senegal), Afghanistan, Belarus and Vietnam (de Benoist et al 2008). Urinary iodine levels associated with a high risk of iodine-induced hyperthyroidism or autoimmune thyroid disease were identified in Brazil, Chile, Ecuador, Liberia and Uganda.
- Thyroid autoantibodies are present in 5-15% of women of childbearing age (Le Groot et al 2012).

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46.1.2 Risks associated with thyroid dysfunction in pregnancy

- Overt hypothyroidism and hyperthyroidism are associated with a range of adverse obstetric outcomes (miscarriage, pre-eclampsia, placental abruption, preterm birth and post-partum haemorrhage) and risks to the baby (low birth weight, increased neonatal respiratory distress and decreased cognitive function) (Lazarus 2011; Lazarus et al 2012).
- Studies are now focusing on the potential effect of subclinical thyroid dysfunction and autoimmune disease. A systematic review found that subclinical hypothyroidism in pregnancy is associated with pre-eclampsia (OR 1.7; 95%CI 1.1 to 2.6) and perinatal mortality (OR 2.7; 95%CI 1.6 to 4.7) and the presence of maternal thyroid autoantibodies is associated with miscarriage (OR 3.73; 95%CI 1.8 to 7.6) and preterm birth (OR 1.9; 95%CI 1.1 to 3.5) (van den Boogaard et al 2011). A meta-analysis of cohort studies had similar findings for miscarriage (OR 3.90; 95%CI 2.48 to 6.12) (Thangaratinam et al 2011) and another for preterm birth (RR 1.41; 95%CI 1.08 to 1.84) (He et al 2012).

46.2 Testing for thyroid dysfunction

Routine testing for thyroid dysfunction is not recommended by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG 2015) or in the United States (ACOG 2015) and is not addressed in the United Kingdom antenatal guidelines (NICE 2015).

46.2.1 Benefits and harms of testing for thyroid dysfunction

More evidence is needed to assess the benefits or harms of different approaches to testing for thyroid dysfunction in pregnancy on maternal, infant and child health outcomes. A recent Cochrane review (Spencer et al 2015) found that:

- compared to case finding, universal testing increased diagnosis and subsequent treatment of thyroid dysfunction (moderate to high quality) but there were no clear differences in outcomes reported (pre-eclampsia, preterm birth, miscarriage, fetal or neonatal death) (moderate to high quality)
- compared to no testing, universal testing similarly increased diagnosis and subsequent treatment but there was no clear difference in neurosensory disability for the infant as a child (IQ<85 at 3 years) and other outcomes were not reported.

A subsequent RCT reported that the risk of miscarriage (3.1 vs 8.5%, RR 0.36, 95%CI 0.23 to 0.58, p< 0.001) was lower and the risk of caesarean section higher (41.0 vs 33.5%, RR 1.22, 95%CI 1.08 to 1.39, p<0.001) in the testing group than in the control group (low quality evidence) (Ma et al 2016). The difference in risk of preterm birth did not reach significance (p=0.772) (very low quality).

Recommendation	
52.	Do not routinely test pregnant women for thyroid dysfunction.
	Approved by NHMRC in October 2017; expires October 2022

46.2.2 Identifying women at high risk of thyroid dysfunction

While this is an evolving area of practice, the American Thyroid Association considers women with the following to be at high risk of thyroid disease (Alexander et al 2017):

- history of thyroid dysfunction
- symptoms or signs of thyroid dysfunction,
- presence of a goitre
- known thyroid antibody positivity.

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Other risk factors for thyroid disease include (Alexander et al 2017):

- age >30 years
- history of type 1 diabetes or other autoimmune disorders
- history of pregnancy loss, preterm birth or infertility
- history of head or neck radiation or prior thyroid surgery
- family history of autoimmune thyroid disease or thyroid dysfunction
- BMI ≥40 kg/m2
- use of amiodarone, lithium, or recent administration of iodinated radiologic contrast
- two or more prior pregnancies
- residing in area of moderate to severe iodine deficiency.

Assessment of risk factors at the first antenatal visit is recommended (Le Groot et al 2012). However, onset of thyroid dysfunction can occur later in pregnancy (Moleti et al 2009).

Consensus-based recommendation	
XLVI	Recommend thyroid testing to pregnant women who are at increased risk of thyroid dysfunction.
	Approved by NHMRC in October 2017; expires October 2022

46.2.3 Timing of testing

Low-level evidence was inconsistent regarding the timing of testing for thyroid dysfunction. One study found that first trimester testing identifies mainly minor elevations in thyroid-stimulating hormone (TSH), which do not predict adverse pregnancy outcomes (Ong et al 2014), while another found that testing in the second and third trimesters was of limited value (Ekinci et al 2015).

However, where thyroid function testing is indicated, ideally testing should take place as early as possible after 6 weeks gestation as women with overt hypothyroidism with a TSH >10 need urgent treatment to avoid effects on the fetus.

46.2.4 Interpreting thyroid function test results

Thyroid function is initially assessed through testing of TSH, with measurement of serum thyroxine if maternal TSH is either elevated or reduced.

Diagnosis of thyroid dysfunction in pregnancy is complicated by the fact that normal TSH levels differ from the non-pregnant state (Stagnaro-Green 2011). Applying the general laboratory reference range for TSH to pregnant women can result in misclassification of thyroid status (Dashe et al 2005; Stricker et al 2007; Gilbert et al 2008; Lee et al 2009). TSH levels vary with gestational age and between single and twin pregnancies (Dashe et al 2005). Pregnancy-specific reference ranges that take into consideration gestational age and fetal number (eg Panesaer et al 2001) should therefore be used. In addition, TSH and free thyroxine values differ according to the laboratory method used to perform testing.

46.2.5 Effectiveness and safety of treatments

For women with pre-existing thyroid disease, hormone levels are monitored throughout pregnancy and medications adjusted to maintain a euthyroid state. Regular monitoring and adjustment of medication dosage is also needed when thyroid dysfunction is detected during pregnancy.

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46.2.6 Economic analysis

A review of the cost implications of routine testing for thyroid dysfunction was undertaken in 2014 (see separate document on economic analyses). The review found insufficient clinical evidence to show that treatment reduces adverse obstetric and neonatal outcomes. Additionally, there were no economic evaluations relevant to Australia to enable an assessment of the impact of a routine testing program for thyroid dysfunction to detect women with hypothyroidism who have not already been diagnosed. Further research is needed before a comprehensive economic analysis can be conducted.

46.3 Discussing thyroid dysfunction

Discussion to inform a woman's decision-making about thyroid function testing should take place before testing and include that:

- thyroid function can be affected by autoimmune disorders or inadequate or excessive exposure to iodine in the diet
- a family history of thyroid dysfunction means that a woman is more likely to be at risk
- an under-active or over-active thyroid can cause complications to the pregnancy and risks to the baby
- as some symptoms of an over-active thyroid may be part of normal pregnancy (eg heat intolerance) and under-active thyroid may not cause symptoms, it is important to test thyroid function in women who have symptoms or are at high risk of thyroid problems (eg if they have recently arrived from a country with a high prevalence of iodine deficiency)
- consultation with a specialist may be necessary if thyroid problems are identified.

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46.4 Practice summary: thyroid dysfunction

When: A woman has symptoms or risk factors for thyroid dysfunction

Who: Midwife; GP; specialist obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; endocrinologist

- ☐ **Discuss the reasons for thyroid function testing:** Explain that it is important to check a woman's thyroid hormone levels because of the effects that thyroid problems can have on the pregnancy and the baby.
- ☐ **Use pregnancy specific ranges**: If interpreting thyroid function test results, use pregnancy-specific reference ranges appropriate to the method used by the laboratory, that take into consideration gestational age and fetal number.
- ☐ **Take a holistic approach**: While iodine fortification of bread in Australia means that women will likely enter pregnancy with adequate iodine intake, supplementation (150 micrograms a day) is still recommended during pregnancy and breastfeeding. Women who have recently arrived in Australia may have previous exposure to inadequate or excessive iodine, depending on their country of origin.
- ☐ **Document and follow-up:** If a woman's thyroid function is tested, tell her the results and note them in her antenatal record. Also, note whether thyroid dysfunction is newly diagnosed or was previously treated. Have a follow-up system in place to facilitate timely referral and treatment.

46.5 Resources

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NICE (2016 update) *Antenatal Care for Uncomplicated Pregnancies CG62*. London: National Institute for Health and Care Excellence.

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47 Vitamin D status

There is limited evidence to support testing of all women for vitamin D status in pregnancy and the benefits and harms of vitamin D supplementation in pregnancy remain unclear.

47.1 Background

Vitamin D is essential for bone development in children and skeletal health in adults. It regulates calcium and phosphate absorption and metabolism. Vitamin D is obtained through the direct action of sunlight on the skin (90%) or through dietary nutrients (10%), in particular, dairy products, eggs and fish.

Definitions of vitamin D sufficiency vary, with Australian organisations generally considering levels lower than 50 nmol/L as suboptimal (Nowson et al 2012; Paxton et al 2013; ABS 2014b; RANZCOG 2015).

47.1.1 Vitamin D status in Australia

The Australian Health Survey 2011-12 (ABS 2014b) found that most Australian adults had Vitamin D levels above 50 nmol/L, with 23% having lower levels. Prevalence of vitamin D levels lower than 50 nmol/L was:

- lower in summer (14%) and higher in winter (36%)
- relatively low across all the States and Territories in summer, ranging from 6% in Queensland to 19% in New South Wales
- particularly high in winter for those living in the south-eastern states of Australia, such as Victoria and the Australian Capital Territory (49% compared with only 16% and 13% respectively in summer) but remained relatively low in winter for those in Queensland and the Northern Territory.

Differences were seen across geographical areas, with vitamin D levels lower than 50 nmol/L more common in major cities (27%) than in inner regional (16%), outer regional (13%) and remote areas (9%). Vitamin D levels lower than 50 nmol/L were much more common among people born in Southern and Central Asia, North-East Asia, South-East Asia, North Africa and the Middle East.

The Australian Aboriginal and Torres Strait Islander Health Survey (ABS 2014a) found that, in 2012-13, 26.5% Aboriginal and Torres Strait Islander adults had a vitamin D level lower than <50 nmol/L. This pattern was similar for both men and women. Vitamin D levels lower than 50 nmol/L were more common in remote areas (38.7%) than in non-remote areas (23.0%) and vitamin D levels varied considerably by season.

Observational studies in Australia have reported vitamin D status in a range of populations:

- at two antenatal clinics in the Australian Capital Territory and New South Wales, the prevalence of levels lower than 50 nmol/L was 35% in Canberra and 25.7% in Campbelltown (Perampalam et al 2011)
- in a largely low-risk antenatal population in rural Victoria, around 5% had levels lower than 25 nmol/L (Teale & Cunningham 2010) and, at a Victorian metropolitan maternity service, 55% of women had vitamin D levels lower than 50 nmol/L (Davies-Tuck et al 2015)
- among women booking for antenatal care in Cairns, there were no significant differences overall in women's vitamin D levels based on Indigenous status and all women had levels higher than 50 nmol/L (Bendall et al 2012)
- among women attending for antenatal care in Kalgoorlie, 56% of Aboriginal women and 20% of non-Aboriginal women had vitamin D levels lower than 50 nmol/L (Willix et al 2015)

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- among Indigenous women receiving antenatal care in the Northern Territory, mean maternal vitamin D level was 104 nmol/L during pregnancy (mean 32 weeks gestation) and 80 nmol/L at birth and mean cord blood level was 54 nmol/L (Binks et al 2016)
- compared to migrant women without a refugee background, vitamin D levels lower than 75 nmol/L were generally more common among refugee women (Gibson-Helm et al 2014; Gibson-Helm et al 2015)
- risk-based testing for vitamin D status in pregnancy (South Australian Perinatal Practice Guidelines, in which 'high-risk' groups are defined as veiled, dark-skinned and house-bound women) failed to detect over half of women with vitamin D levels lower than 60 nmol/L (De Laine et al 2013).

47.1.2 Vitamin D status and maternal and pregnancy outcomes

Recent studies have explored possible associations between vitamin D status in pregnancy and subsequent outcomes. This evidence is generally of low quality and heterogeneous (ie in definition of optimal level, timing of serum testing) and findings are inconsistent.

- *Gestational diabetes and glucose tolerance*: One cohort study (Burris et al 2012) suggested that women with vitamin D levels lower than 25 nmol/L may be more likely to experience gestational diabetes (aOR 2.2; 95%CI 0.8 to 5.5), while another found no clear difference (aOR: 1.08; 95% CI: 0.74 to 1.56) (Schneuer et al 2014). A cross-sectional study suggested that, compared to vitamin D levels higher than 74 nmol/L in early pregnancy, levels lower than 50 nmol/L (p=0.008) or 50–74 nmol/L (p=0.005) increased the risk of gestational diabetes (Davies-Tuck et al 2015). Another cross-sectional study found that increases in maternal vitamin D were associated with decreases in fasting glucose (p=0.012) (McLeod et al 2012).
- *Pre-eclampsia*: The evidence was largely consistent in finding no association between vitamin D level and the risk of pre-eclampsia in cohort studies (Bomba-Opon et al 2014; Schneuer et al 2014; Gidlof et al 2015) and a case series (Davies-Tuck et al 2015).
- *Preterm birth*: No significant association between vitamin D level and preterm birth was found in a cohort study (p=0.09) (Schneuer et al 2014) and a case series (p=0.11) (Davies-Tuck et al 2015).
- *Small for gestational age*: The frequency of small-for-gestational-age newborns in cohort studies was similar in women with vitamin D levels below or above 20 nmol/L (Bomba-Opon et al 2014) or was increased with levels below 29.9 nmol/L (aOR 1.9 95%CI 1.4 to 2.7) (Leffelaar et al 2010) or below 25 nmol/L (aOR 1.58 95%CI 1.06 to 2.35, compared to 50–75 nmol/L) (Schneuer et al 2014).
- *Birth weight*: A cohort study (Bomba-Opon et al 2014) and a case series (Davies-Tuck et al 2015) found no association between maternal first trimester vitamin D levels and neonatal birth weight. Another cohort study (Leffelaar et al 2010) found an association between maternal vitamin D levels below 29.9 nmol/L and lower birth weights (-64.0 g, 95%CI -107.1 to -20.9).
- *Macrosomia and infant growth*: A cohort study (Morales et al 2015) found that maternal vitamin D levels lower than 50 nmol/L were associated with increased risk of fetal macrosomia (abdominal circumference 90th centile; p=0.041) but not with rapid growth (p=0.11). Other cohort studies found an association between maternal vitamin D level below 29.9 nmol/L and accelerated growth (Leffelaar et al 2010) or risk of overweight at age 1 year (p=0.03), but not at 4 years (p=0.721) (Morales et al 2015).

47.2 Vitamin D status in pregnancy

Current guidance in Australia (Paxton et al 2013; RANZCOG 2015), New Zealand (NZ MoH 2013) and the United States (ACOG 2011) suggests that testing be considered for women at high risk of suboptimal vitamin D levels and supplementation advised for pregnant women with levels lower than 50 nmol/L. Guidance in Australia and

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New Zealand also suggests consideration of a daily dose of 400 IU for pregnant women at higher risk (without testing) (NZ MoH 2013; RANZCOG 2015). In the United Kingdom, it is recommended that all women be advised early in pregnancy to take a supplement of 400 IU daily (NICE updated 2016).

47.2.1 Determinants of vitamin D status in pregnancy

The recent evidence on the determinants of vitamin D status in pregnancy is largely observational and of varying quality. While the definitions used varied across studies, the evidence was consistent that lower vitamin D levels in pregnancy are associated with:

- darker skin phototype (Brough et al 2010; Johnson et al 2011; Perampalam et al 2011; Dahlman et al 2013; Lehotay et al 2013; McAree et al 2013; Gibson-Helm et al 2014; Luque-Fernandez et al 2014; Burris et al 2015; Davies-Tuck et al 2015; Gibson-Helm et al 2015)
- increasing body mass index (BMI) (Perampalam et al 2011; Bartoszewicz et al 2013; McAree et al 2013; Davies-Tuck et al 2015; Karlsson et al 2015)
- season (Brough et al 2010; Perampalam et al 2011; Bartoszewicz et al 2013; Luque-Fernandez et al 2014; Ozias et al 2014; Davies-Tuck et al 2015).

47.2.2 Benefits and harms of vitamin D supplementation

The clinical utility of testing vitamin D status is reliant on there being evidence for benefits from supplementation. While numerous studies have investigated vitamin D supplementation with and without calcium compared to placebo or no treatment, the evidence on the harms and benefits of vitamin D supplementation remains unclear (Harvey et al 2014; De-Regil et al 2016).

- *Serum vitamin D levels*: Studies were consistent in finding that vitamin D supplementation increased vitamin D levels in women (low quality) (Perumal et al 2015; Rodda et al 2015; De-Regil et al 2016) and newborns (Perumal et al 2015; Rodda et al 2015). However, a Cochrane review noted that the clinical significance of increased maternal vitamin D concentrations remains unclear (De-Regil et al 2016).
- *Maternal outcomes*: Evidence from the Cochrane review (De-Regil et al 2016) suggests a reduced risk of pre-eclampsia (RR 0.52; 95%CI 0.25 to 1.05; low quality) and gestational diabetes (RR 0.43; 95%CI 0.05 to 3.45; very low quality) among women supplemented with vitamin D compared to those receiving placebo or no treatment, though neither result was statistically significant. Among women supplemented with vitamin D plus calcium, there was a reduced risk of pre-eclampsia (RR 0.51; 95%CI 0.32 to 0.80; moderate quality) and the data suggest a reduced risk of gestational diabetes (data from a single study) (RR 0.33; 95%CI 0.01 to 7.84; low quality).
- *Birth outcomes*: The Cochrane review found a reduced risk of preterm birth compared to no treatment or placebo with vitamin D alone (RR 0.36; 95%CI 0.14 to 0.93; moderate quality) but an increased risk with vitamin D plus calcium (RR 1.57; 95%CI 1.02 to 2.43; moderate quality) (De-Regil et al 2016), while a later RCT found no significant effect on gestational age at birth among women receiving vitamin D plus calcium (p=0.37) (Asemi et al 2016).

The Cochrane review of studies comparing vitamin D supplementation alone with no supplement found a reduced risk of low birth weight (RR 0.4; 95%CI 0.24 to 0.67; moderate quality), a possible increase in infant length (mean difference [MD] 0.70, 95%CI -0.02 to 1.43) and head circumference (MD 0.43, 95%CI 0.03 to 0.83) and no clear difference in rates of caesarean section (RR 0.95; 95%CI 0.69 to 1.31), stillbirths (RR 0.35; 95%CI 0.06 to 1.99) or neonatal deaths (RR 0.27; 95%CI 0.04 to 1.67) (De-Regil et al 2016). Another systematic review found that the evidence to support a relationship between maternal vitamin D status and birth weight is limited by its observational nature (Harvey et al 2014). A later RCT found no clear differences in birth weight (p=0.88), length (p=0.94), head circumference (p=0.13) or mode of birth (p=0.26) among newborns of women receiving vitamin D plus calcium and those receiving no intervention (Asemi et al 2016).

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- *Infant outcomes*: A systematic review (Harvey et al 2014) found that the evidence to support an association between maternal vitamin D status and infant bone mass was limited by its observational nature and that evidence on serum calcium concentrations was limited by risk of bias. RCTs found that, compared to women receiving no supplement, there was no clear difference in bone mineral content in newborns of mothers receiving vitamin D alone (p=0.21) (Cooper et al 2016) or with calcium (p=0.63) (Diogenes et al 2015).
- *Vitamin D dosage*: Studies were consistent in finding that vitamin D level increased with dose (low quality evidence) (Dawodu et al 2013; Wagner et al 2013; Mutlu et al 2014; March et al 2015; Wall et al 2016). Studies comparing doses of 1000–1200 to 2000 IU daily found no difference in birth weight (p=0.8) (Mutlu et al 2014) or adverse effects (p=0.5) (March et al 2015). One study comparing 4,000 IU to 2,000 IU daily (Wagner et al 2013) found no clear difference in risk of hypertensive disorders of pregnancy (RR 2.16; 95%CI 0.68 to 6.90; low quality evidence), gestational diabetes (RR 1.53; 95%CI 0.71 to 3.28; moderate quality evidence) or preterm birth (RR 0.86; 95%CI 0.51 to 1.45; moderate quality evidence) between groups. Adverse effects were not reported.

Recommendation	
53.	Do not routinely recommend testing for vitamin D status to pregnant women in the absence of a specific indication.
	Approved by NHMRC in October 2017; expires October 2022

Consensus-based recommendation	
XLVII	If testing is performed, only recommend vitamin D supplementation for women with vitamin D levels lower than 50 nmol/L.
	Approved by NHMRC in October 2017; expires October 2022

47.3 Practice summary: vitamin D status

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; pharmacist

- ☐ **Take a holistic approach**: Give women advice on the risks and benefits of sun exposure (see Section 47.4) and the dietary sources of vitamin D (dairy products, eggs and fish), taking cultural considerations into account.
- ☐ **Document and follow-up:** If a woman's vitamin D deficiency status is tested, note the results in her record. Have a system in place so that women who are found to be deficient in vitamin D are given ongoing follow-up and information about supplementation.

47.4 Resources

Australian and New Zealand Bone and Mineral Society, the Australasian College of Dermatologists, Cancer Council Australia, Endocrine Society of Australia and Osteoporosis Australia (2016) *Risks and Benefits of Sun Exposure*.

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48 Human papilloma virus

Human papilloma virus testing aims to identify women who may have a cervical abnormality and require further diagnostic testing.

48.1 Background

Cervical cancer is one of the most preventable and curable cancers. Cells in the cervix show changes or 'abnormalities' before any progression to cancer, which takes around 15 years. Most low-grade abnormalities regress without treatment. High-grade abnormalities may occur after persistent infection with human papilloma virus (HPV), which is a sexually transmitted infection that generally has no symptoms and resolves within 2 years. In a small number of women, persistent infection with a high-risk type of HPV may eventually lead to cervical cancer (AIHW 2012). HPV 16 and 18 are high-risk types that are detected in 70-80% of cases of cervical cancer in Australia (AIHW 2012). A program of vaccination against HPV types 16 and 18 (as well as types 6 and 11, which have a lower risk of causing cancer but are associated with 90% of genital warts) was introduced in Australia in 2007 (DoHA 2013).

48.1.1 Cervical cancer and screening in Australia

- *Prevalence of HPV infection:* An Australian study (before the introduction of the vaccination program) found that prevalence of HPV types 16 and 18 was similar for Aboriginal (9.4% and 4.1%) and non-Indigenous women (10.5% and 3.8%) (Garland et al 2011). Prevalence of HPV infection is higher among women from developing countries, with regions of high prevalence including Africa (22.1%) and Central America and Mexico (20.4%) (de Sanjose et al 2007). In all world regions, HPV prevalence is highest among women younger than 35 years (de Sanjose et al 2007).
- *Other risk factors for cervical cancer*: The risk of progression of HPV-related abnormalities to cervical cancer is increased by immunodeficiency (such as that caused by HIV infection), higher number of pregnancies, tobacco smoking, co-infection with other sexually transmitted infections and long-term (>5 years) use of oral contraceptives (WHO 2006).
- *Cervical cancer incidence and mortality*: Incidence of, and mortality from, cervical cancer in Australia have remained at historic lows of 9-10 new cases and 2 deaths per 100,000 women since 2002 (AIHW 2012). Incidence does not vary significantly with geographical region but mortality is higher in remote areas (AIHW 2012). In 2004-08, the incidence of cervical cancer was 2.8 times higher among Aboriginal and Torres Strait Islander women than among non-Indigenous women (AIHW & AACR 2012), with data from 2006-10 showing that mortality was 4.4 times higher (AIHW 2012). Women from developing countries have an increased incidence, with the highest incidence (>45 per 100,000 women) found in Central and South America, eastern Africa, South and South-East Asia, and Melanesia (WHO 2006).
- *Uptake of cervical screening:* In 2009-2010, 57% of women in the Australian screening population had Pap smears, with participation highest among women aged 40-54 years (AIHW 2012). While cervical screening among women aged 20-24 years is low and decreasing, Australia is one of the few countries that screen this age group (AIHW 2012). Participation in screening did not vary significantly by geographical region but was lower in areas of social disadvantage (AIHW 2012). Information on participation for Aboriginal and Torres Strait Islander women is not available, as Indigenous status of participants is not collected, although there is evidence that this population group is under-screened (Coory et al 2002; Binns & Condon 2006).

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48.2 Testing for human papilloma virus

Current recommendations in Australia are that women be tested for HPV every 5 years.

Table G2: National Cervical Screening Program recommendations

Who	All women who have ever been sexually active, including women who have received HPV vaccination
What	Human papilloma virus testing of cervical samples and liquid-based cytology testing on samples testing positive
When	Starting from the age of 25 years, or 1–2 years after first sexual intercourse, whichever is later
How often	Every 5 years if human papilloma is not detected

Consensus-based recommendation	
XLVIII	Offer women cervical screening as specified by the National Cervical Screening Program.
Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

48.2.1 Management of cervical abnormalities

There are few studies detailing the progression of low-grade abnormalities to cancer during pregnancy but this appears to be extremely rare (NHMRC 2005). The NHMRC recommends investigation of abnormalities during pregnancy as follows (NHMRC 2005):

- in general, women with a low-grade abnormality should have a repeat smear in 12 months
- women with high-grade abnormalities should be referred to a colposcopist experienced in assessing the pregnant cervix.

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48.3 Practice summary: cervical abnormalities

When: Early antenatal visit, if the woman has not had a cervical screen in the recommended time period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker; women's health provider

- ☐ **Discuss the reasons for HPV testing:** Explain that 5-yearly tests for HPV are recommended for sexually active women to detect human papilloma virus infection, as persistent infection can cause cervical abnormalities.
- ☐ **Provide advice to women with a positive result:** Explain that the test is not diagnostic.
- ☐ **Take a holistic approach**: Provide advice to assist women in accessing services (eg pathology services that bulk bill). Explain that inclusion on the National Cancer Screening Register is confidential and automatic (unless a woman requests otherwise) and that the registries send reminders to women who are overdue for testing.
- ☐ **Document results and referrals:** If a woman has a cervical screening test, tell her the results and note them in her antenatal record. Also document inclusion on the national registry and any follow-up required.

48.4 Resources

NHMRC (2005) *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen-detected Abnormalities*. Canberra: National Health and Medical Research Council.

WHO (2006) *Comprehensive Cervical Cancer Control: A Guide to Essential Practice*. Geneva: World Health Organization.

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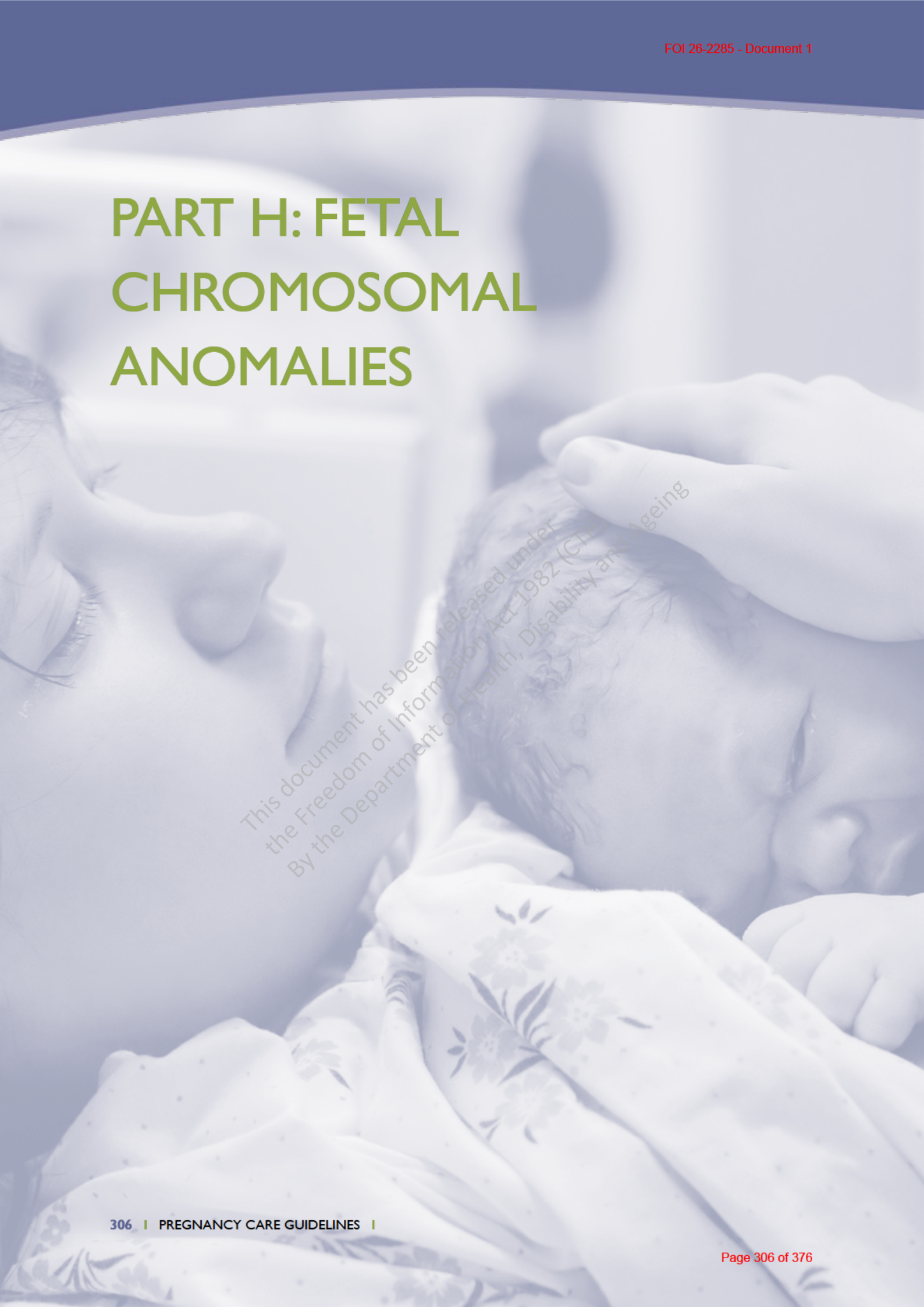
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PART H: FETAL CHROMOSOMAL ANOMALIES



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Tests are available that enable women, who choose to do so, to identify whether there is a high probability of them having a baby with a chromosomal anomaly. This refined probability estimate can inform decisions about whether to have diagnostic testing. The level of decision-making needed at all stages in this process requires sensitive engagement with women, partners and family members.

49 Chromosomal anomalies

Fetal chromosomal anomalies identified through antenatal testing include:

- trisomy 21 (Down syndrome), the most common chromosomal condition, which is characterised by distinctive facial features, some intellectual disability and heart or digestive tract problems
- trisomies 18 (Edwards syndrome) and 13 (Patau syndrome), which are characterised by distinctive facial features, severe intellectual disability and other physical problems.

49.1 Chromosomal anomalies in Australia

The National Perinatal Statistics Unit last reported on congenital anomalies in Australia in 2002-03 (Abeywardana & Sullivan 2008). Trisomy 21 was the most commonly reported chromosomal condition at birth (1.11 per 1,000 births) but there was a high proportion (60%) of fetal deaths and terminations. When terminations were included, the estimated rate was 2.63 per 1,000 pregnancies. Trisomies 18 and 13 were associated with a large number of fetal deaths or terminations. All conditions were more common among women aged 40 years or older.

More recent Victorian data on antenatal diagnoses of chromosome anomalies based on amniocentesis and chorionic villus sampling results from 2013-15 gives an estimated detection rate of trisomy 21 of 2.61 per 1,000 births (1 in 380) (Hui et al 2016). Antenatal diagnoses of trisomies 18 and 13 were 0.5 (1 in 2,000) and 0.3 per 1,000 births (1 in 3,333) respectively (Hui et al 2016). Rates of trisomies 21, 18 and 13 were reported as 1.4, 0.5 and 0.1 in Queensland in 2010 (Howell et al 2011). Data from New South Wales in 2010 gives rates per 1,000 births (ie without terminations included) of 0.5 for trisomy 21 and 0.1 for trisomies 18 and 13 (CEE 2012). In New South Wales, the number of reported terminations of pregnancy associated with chromosomal anomalies rose from 246 in 2004 to 323 in 2009 (CEE 2012).

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50 Tests for probability of chromosomal anomalies

50.1 Approaches to testing for high probability of chromosomal anomalies

A range of biochemical tests and ultrasound techniques has been developed that can significantly increase the identification of pregnancies with a high probability of chromosomal anomalies such as trisomy 21 (Down syndrome), trisomy 18 (Edwards syndrome) and trisomy 13 (Patau syndrome) (see Glossary). A high probability test result leads to the offer of a diagnostic test (chorionic villus sampling or amniocentesis) (see Chapter 51).

The suitability of any test depends on the gestational stage. Extensive pre- and post-test information and counselling are required, with consideration also being given to the woman's preferences, availability of testing facilities, costs to the woman and, for ultrasound, operator expertise.

Current practice in Australia is that testing for chromosomal anomalies is done in the first trimester. The combined first trimester test comprises:

- ultrasound measurement of fetal nuchal translucency thickness between 11 weeks and 13 weeks 6 days gestation (when the fetus has a crown-rump length of 45-84 mm) combined with
- maternal plasma testing of pregnancy-associated placental protein-A (PAPP-A) and free beta-human chorionic gonadotrophin (β-hCG) between 9 weeks and 13 weeks, 6 days gestation.

An emerging practice is the use of cell-free deoxyribonucleic acid (cfDNA) testing (also referred to as non-invasive prenatal testing [NIPT]). cfDNA testing can be performed for detection of fetal anomaly from 10 weeks gestation. The test involves sequencing DNA fragments in maternal serum, mapping each DNA sequence to a reference genome to determine its chromosome of origin, and counting the number of fragments arising from each chromosome. If the fetus is affected by trisomy, a greater than expected number of the relevant chromosome fragments will be present in maternal serum.

Cell-free DNA testing has been used as a first-tier test, as a second-tier test (with women with increased probability on combined first trimester screening offered cfDNA or diagnostic testing) or in a contingent model (where women with an intermediate probability on combined first trimester screening are offered cfDNA testing and those with a very high probability are offered diagnostic testing). Evaluations of the implementation of contingent cfDNA testing in national screening programs have found improved performance of the program (Chitty et al 2016; Gil et al 2016; Oepkes et al 2016). Use of cfDNA as a first-tier test may be appropriate for women with infections where an invasive procedure carries an increased risk of mother-to-child transmission.

Later in pregnancy (14 to 20 weeks), the triple test (maternal serum testing of α-fetoprotein [AFP], free β-hCG [or total hCG] and unconjugated estriol) or the quadruple test (which also includes inhibin A) is used to assess the risk of fetal chromosomal anomaly. While this is an important publicly funded option for women who present later in pregnancy or for whom specialist ultrasound is not available (eg in rural and remote areas) or who cannot afford cfDNA testing (until this becomes publicly funded), the evidence for these tests has not been reviewed as part of the development of these Guidelines. As cfDNA testing can be performed at any gestation from 10 weeks, it should be discussed along with second trimester serum screening for women who have missed the gestational age window for combined first trimester screening.

Consensus-based recommendation	
XLIX	In the first trimester, give all women/couples information about the purpose and implications of testing for probability of chromosomal anomalies to enable them to make informed choices.
	Approved by NHMRC in December 2011; expires December 2016

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50.2 Effectiveness of tests for probability of chromosomal anomaly

Offering testing for probability of fetal chromosomal anomaly to all women in the first trimester, regardless of maternal age, is recommended in the United Kingdom (NICE 2008), the United States (ACOG 2007) and Australia (RANZCOG 2015).

50.2.1 Combined first trimester tests

The combined first trimester test identifies factors that are known to be associated with fetal chromosomal anomalies and that are independent of each other.

The probability of chromosomal and other anomalies and fetal and postnatal death increases with nuchal translucency thickness. Favourable outcomes have been observed in 92% of babies with nuchal translucency of 3.4 mm (95th centile) compared to 18% of those with nuchal translucency of ≥6.5 mm (Ayras et al 2013). In some situations, the ultrasound component of first-trimester testing may be difficult or impossible (eg due to high BMI, fetal positioning).

Combining nuchal translucency assessment with testing of maternal serum increases the predictive value (Alexioy et al 2009). Recent evidence on the sensitivity of the combined test had the following findings.

- A systematic review (65 studies) found detection rates of 91.9% for trisomy 18 (false positive rate 3.5%), 83.1% for trisomy 13 (false positive rate 4.4%) and 70.1% for monosomy X (false positive rate 5.4%) (Metcalfe et al 2014).
- Cohort studies found detection rates of:
  - 92.2% for trisomy 21 (false positive rate 8.0%) (n=675,332) (Kagan et al 2015b).
  - 91.3% for trisomy 21, 97.1% for trisomy 18, 92.3% for trisomy 13, 80% for sex chromosome aneuploidies and 87% for atypical aneuploidies (n=21,052) (Kagan et al 2015a)
  - 87% for trisomy 21, 91.8% for trisomies 13 and 18, 86.0% for monosomy X, 8.1% for other sex chromosome aneuploidies, 89.3% for triploidy and 13.0% for other high-risk outcome (n=14,684) (Syngelaki et al 2014)

The pooled rate of invasive procedures was 59 per 1,000 pregnancies tested (Susman et al 2010; Syngelaki et al 2014; Kagan et al 2015a).

As fetal nuchal translucency thickness increases with crown-rump length (Pandya et al 1995; Edwards et al 2003) and the detection rate in serum is influenced by maternal age (Grati et al 2010), these factors are included in assessment algorithms. The inclusion of age in the calculation, either alone or in combination with serum test results, increases identification of the probability of chromosomal anomalies (Wapner et al 2003; Scott et al 2004; Centini et al 2005; Soergel et al 2006; Gebb & Dar 2009; Hagen et a 2010; Schmidt et al 2010). The maternal serum variables are also influenced by gestational age, maternal weight, ethnicity, smoking, in vitro fertilisation, parity and diabetes, the background risk for each being calculated and then included in the algorithm with nuchal transluceny and maternal age. A history of a previous trisomy 21 pregnancy increases the chance of an abnormal test result for trisomy 21.

Consensus-based recommendation	
L	If a woman chooses to have the combined test (nuchal translucency thickness, free beta-human chorionic gonadotrophin, pregnancy-associated plasma protein-A), make arrangements so that blood for biochemical analysis is collected between 9 weeks and 13 weeks 6 days gestation and ultrasound assessment takes place between 11 weeks and 13 weeks 6 days gestation.
	Approved by NHMRC in December 2011; expires December 2016

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50.2.2 Cell-free DNA testing

cfDNA testing has a higher detection rate for the more common trisomies than the combined first-trimester test: relative risk of detection 1.13 (1.08 to 1.18) for trisomy 21 and 1.22 (1.18 to 1.26) for trisomies 18 and 13 (Petersen et al 2014; Syngelaki et al 2014; Gyselaers et al 2015; Kagan et al 2015a; Kagan et al 2015b; McLennan et al 2016). Fewer invasive procedures are required (10 per 1,000 women tested) (Susman et al 2010; Syngelaki et al 2014; Kagan et al 2015a) and rates of procedure-related miscarriage are lower (Morris et al 2014; Gyselaers et al 2015; Mersy et al 2015).

However, cfDNA testing may not detect less common chromosomal anomalies identified through ultrasound assessment: relative risk of detection 0.23 (0.16 to 0.33) for sex chromosome aneuploidies (Syngelaki et al 2014; Kagan et al 2015a; McLennan et al 2016) and 0.01 (0.00 to 0.04) for atypical aneuploidies (Petersen et al 2014; Syngelaki et al 2014; Kagan et al 2015a) if these are not included in the cfDNA test panel. As well, the economic costs of incorporating cfDNA testing for trisomy 21 as a first-tier test into Australian practice are currently higher than those for combined first trimester testing (costs associated with cfDNA testing for other chromosomal anomalies have not been investigated in Australia) (O'Leary et al 2013; Ayres et al 2014). However, its use as a contingent screen for trisomy 21 at specific thresholds may be more cost-effective than combined first trimester testing (Maxwell et al 2017).

As cfDNA testing is available in Australia, health professionals need to have an understanding of the test, including that:

- the test may be conducted from 10 weeks onwards (Gil et al 2015)
- the test is not diagnostic; a positive result requires confirmation by invasive procedures (Gil et al 2015; Meck et al 2015; Neufeld-Kaiser et al 2015; McLennan et al 2016)
- diagnosis of fetal structural or genetic anomalies may be delayed or missed if the 11–13 week ultrasound is not performed in conjunction with cell-free DNA testing (RANZCOG 2015)
- although the false positive rate is lower than for combined first trimester testing, both false positives and false negatives occur (Gil et al 2015b; Mackie et al 2016; Taylor-Phillips et al 2016)
- low fetal fraction of DNA in the maternal circulation (Benachi et al 2015, Gil et al 2015b, Neufeld-Kaiser et al 2015, McLennan et al 2016), which is common among women with a BMI >30 kg/m2 (Benachi et al 2015, Gil et al 2015b, Neufeld-Kaiser et al 2015, McLennan et al 2016), may yield an unreportable result; depending on the timing of the test, this may mean that women with a test failure miss the window for the combined first trimester test
- in rare circumstances, the test may raise suspicions of maternal or fetal conditions other than the fetal anomalies for which the test is being performed (Sachs et al 2015)
- the test is not currently covered by Medicare or private health insurance; costs to women are $400–$500, depending on location.

50.3 Discussing tests with women

At the first antenatal visit or as early as possible in pregnancy, the availability of testing for probability of chromosomal anomalies should be discussed and women given relevant written information or other appropriate materials (eg video, DVD) (see Section 53.1). Providing information is particularly important, due to the complexity of the process and the level of decision-making that may be required. A systematic review found levels of knowledge adequate for decision-making were at times not being achieved despite information leaflets and video having some effect (Green et al 2004). Studies in which knowledge about genetic testing is increased have not observed any corresponding increase in anxiety (Green et al 2004).

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In discussing the tests so that women can give informed consent, it is important to talk in terms of 'probability' or 'chance' rather than 'risk' and to explain:

- it is the woman's/couple's decision whether any testing takes place
- the chromosomal anomalies for which testing is available and the differences between these conditions
- the different pathways for testing (ie combined first trimester test alone, cfDNA testing as first-tier or second-tier test or in a contingent model; see Section 50.1) and the risks and benefits of each approach
- the testing pathway, the decisions that need to be made at each point and their consequences
- the need for accurate assessment of gestational age so that tests are conducted at the appropriate time
- that results of these tests alone indicate a probability of fetal chromosomal anomaly but do not give a definitive diagnosis of any anomalies
- the sensitivity, specificity and positive predictive value for the woman's age of the test and a full explanation of the reporting format of the test (eg high probability/low probability, 1 in 10, 1 in 300, 1 in 1,000)
- the options for women who receive a high-probability result, including information about chorionic villus sampling and amniocentesis (see Section 51.2)
- a large nuchal translucency associated with normal chromosomes may indicate other anomalies which may be structural (eg diaphragmatic hernia, cardiac anomaly) or genetic (eg Smith-Lemli-Opitz syndrome, Noonan syndrome)
- factors that increase the probability of fetal chromosomal anomalies (advanced maternal age, family history of chromosomal anomalies)
- where and how tests can be accessed if the woman chooses to have them
- the availability of evaluated decision aids (eg the Ottawa Decision Framework) (Arimori 2006; Nagle et al 2006; 2008) (see Section 53.1)
- the costs involved for the woman and the timeframe for receiving results.

Women may choose not to have a test or may choose to proceed directly to a diagnostic procedure instead (eg due to a preference to receive definitive information and/or concerns about the sensitivity of available tests). The choice a woman and her partner make about testing should not influence the subsequent care she receives.

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Practice point	
DDD	Provide information about chromosomal anomalies and the tests used to identify their probability in a way that is appropriate and accessible to the individual woman.
	Approved by NHMRC in December 2011; expires December 2016

50.4 Care for women with a high probability of fetal chromosomal anomaly

Following a result that suggests a higher probability of having a baby with a chromosomal anomaly, the offer of referral to a health professional (eg a genetic counsellor) is an important consideration.

Antenatal care for women with a high probability of having a baby with a chromosomal anomaly should be supportive and respectful of women's choices about continuation of pregnancy.

51 Diagnostic testing

The suitability of diagnostic tests is determined by gestational stage. The tests are invasive and have previously been associated with a 1% increased risk of miscarriage. However, recent studies suggest the additional risk is not significant (Akolekar et al 2015; Wulff et al 2016) and is related to the skill and experience of the person carrying out the test (Bakker et al 2016).

Diagnostic tests are based on chromosomal analysis of cells collected using:

- chorionic villus sampling (tissue from the villi of the chorion [part of the placenta]): testing takes place any time after 11 weeks pregnancy or
- amniocentesis (to sample fetal skin cells in the amniotic fluid): testing takes place after 15 weeks pregnancy.

51.1 Timing of diagnostic tests

There is high quality evidence from a Cochrane review (Alfirevic et al 2003) and a subsequent randomised trial (n=3,775) (Philip et al 2004) that amniocentesis before 15 weeks pregnancy increases the risk of miscarriage and procedure-related indicated terminations and the incidence of talipes equinovarus compared to chorionic villus sampling at that time. Transabdominal chorionic villus sampling is the method of choice for diagnosis of fetal chromosomal anomalies before 14 weeks pregnancy (Philip et al 2004).

Some women may not have the option of chorionic villus sampling (eg if it is not feasible for the test to be conducted before 14 weeks pregnancy or due to placental positioning) and others may choose to wait for amniocentesis after 15 weeks gestation.

Recommendation	Grade B
54. If a woman chooses to have a diagnostic test for chromosomal anomaly, base the choice of test on gestational age (chorionic villus sampling before 14 weeks pregnancy and amniocentesis after 15 weeks) and the woman's/couple's preferences.	
Approved by NHMRC in December 2011; expires December 2016	

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51.2 Discussing diagnostic tests

So that women can give informed consent to diagnostic testing, it is important to explain:

- the chromosomal anomalies that may be diagnosed
- the available tests, the gestational stage at which they should be undertaken, the process of the procedure and the risks involved
- the possibility that the procedure may not be successful or the result may not accurately reflect the fetal status
- the possibility of other fetal anomalies that are not identified by the test
- the timeframe for receiving results and making further decisions if necessary
- options to consider if a chromosomal anomaly is identified (eg continuation of the pregnancy or termination where this is permitted under jurisdictional legislation), the need for additional care if the pregnancy continues (eg specialist management of the pregnancy and the baby) and options for adoption or alternative care arrangements

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- the health and developmental outcomes for children diagnosed with this condition and the potential long-term considerations for the woman and her family
- the impact on a woman and her family of a false negative or false positive result (eg anxiety among women receiving false positives may remain [Green et al 2004])
- costs involved and how they are to be met.

51.3 Discussing diagnostic test results

When a woman has a diagnostic test and fetal chromosomal anomaly is detected, follow-up with an appropriate health professional should occur at the earliest opportunity. Appropriate health professionals include obstetricians, midwives experienced in genetic counselling, genetic counsellors and clinical geneticists.

Careful consideration should be given to the way diagnostic test results are conveyed and experienced interpreters should be used when this is necessary to enable effective communication. It is very important that there is no negative commentary on the condition diagnosed and that women do not feel pressured into any course of action. Accurate information about the chromosomal condition should be given and women offered information about relevant support organisations (see Section 53.1).

Women receiving a diagnosis of fetal chromosomal anomaly may be unable to absorb information for some time and follow-up support may require several consultations. Counselling should be sensitive to the nature of decisions to be taken, should respect individual decisions and allow time to reach decisions (NSW Health 2007). Appropriate follow-up when an anomaly is detected may require referral to genetic counselling services, other professional services or support networks.

If a woman has a normal diagnostic test result, she should be advised of the residual probability of having a baby with a chromosomal anomaly as the diagnostic tests have a sensitivity of less than 100%.

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Consensus-based recommendation	
LI	Offer rapid access to appropriate counselling and ongoing support by trained health professionals to women who receive a diagnosis of fetal chromosomal anomaly.
	Approved by NHMRC in December 2011; expires December 2016

Practice point	
EEE	Refer women with a high-probability screening test result but negative diagnostic test for further specialist assessment because of the increased likelihood of other fetal anomalies.
	Approved by NHMRC in December 2011; expires December 2016

52 Other considerations in testing for fetal chromosomal anomalies

52.1 Availability and uptake of testing

The range of tests available, policies for testing and uptake by women vary regionally (O'Leary et al 2006). Overall, approximately 50% of pregnant women participated in nuchal translucency ultrasound in 2007-08 (Nisbet et al 2010). A Victorian study found the uptake of combined first trimester screening to be 70-80% in recent years (Hui et al 2016).

Studies in Victoria and Queensland have shown higher uptake of testing in metropolitan areas and in private health care and lower rates of diagnosis of Down syndrome in urban areas and public health care (Muggli et al 2006; Coory et al 2007). Lower rates of access to testing in rural areas may reflect lack of transport, low levels of support and income in these areas and women's attitudes. However, it has been suggested that low uptake of testing among women from low socioeconomic groups reflects lower rates of informed choice rather than women's attitudes (Dormandy et al 2005).

A West Australian study found the lowest uptake of testing was among women who were Aboriginal (14.9%), living in remote areas (38.0%), under the age of 25 (40.2%), in the lowest socioeconomic group (41.6%) and with three or more children (48.4%). Logistic regression analysis showed all socio-demographic factors to be strongly associated with screening behaviour, with adjustment for ethnicity, socio-economic status, age, parity and area of residence (Maxwell et al 2011).

A study into testing for chromosomal anomalies among Aboriginal and Torres Strait Islander women (MSHR 2010) has highlighted the importance of providing information about testing and identified challenges involved in offering testing, particularly in remote areas. These included late presentation in pregnancy, difficulties establishing accurate gestational age, limited consultation time to discuss the testing process, competing priorities in antenatal care, confusion about what needs to be done and when, and organisational logistics (eg women's travel, where to send blood, referral procedures).

Practice point	
FFF	Support all women to access testing for chromosomal anomalies in a timely manner.
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52.2 Health professional education

Health professionals caring for pregnant women should undertake continuing education regarding testing for probability of chromosomal anomalies and be aware of current tests available and the settings in which they can be implemented (RANZCOG 2015). This includes education about:

- the conditions being tested for, life outcomes, lived experiences of families and individuals with the condition and supports available for families and individuals with the condition
- delivery of 'challenging news' rather than 'bad news' with respect to chromosomal conditions.

52.3 Accreditation and quality assurance

The ability to achieve a reliable measurement of nuchal translucency depends on appropriate training and adherence to a standard technique to achieve uniformity of results among different operators (Nicolaides 2004). Accreditation of ultrasound operators to conduct nuchal translucency measurement should be through the Nuchal Translucency - Ultrasound, Education and Monitoring Program administered through RANZCOG.

All laboratories used for testing must be accredited by the National Association of Testing Authorities (NATA). External and internal quality control measures should be in place.

53 Practice summary: testing for chromosomal anomalies

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; genetic counsellor

- ☐ **Discuss the process of testing for chromosomal anomalies:** Explain the purpose, the process involved, the conditions for which testing is available and that it is the woman's choice whether any tests are carried out.
- ☐ **Consider timing:** For women who choose to have combined first trimester testing, make arrangements for the tests to be carried out before 13 weeks and 6 days pregnancy. If a woman elects to have cfDNA testing, this may be conducted from 10 weeks. For women who miss the window for combined first trimester testing and do not have access to cfDNA testing, consider advising maternal serum testing.
- ☐ **Offer women with a high-probability result referral to an appropriately trained health professional:** This may assist women in considering options and making decisions about diagnostic testing. If a diagnostic test is carried out and chromosomal anomaly diagnosed, referral for counselling should occur at the earliest opportunity.
- ☐ **Learn about locally available resources:** Available testing services and support organisations will vary by location. Be aware of local support groups and counselling services.

53.1 Resources

Health professional resources

Resources available to health professionals include websites and professional organisations, seminars, courses and printed materials, which are regularly revised and updated so that they reflect current practice. Pamphlets and other information are available from local genetic services and obstetric ultrasound/radiology practices.

RANZCOG (2015) *Prenatal Screening and Diagnosis of Chromosomal and Genetic Abnormalities in the Fetus in Pregnancy C-Obs 59*. Melbourne: Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Nuchal Translucency Online Learning Program

Resources for women and their families

Down syndrome Australia

Centre for Genetics Education: *Screening tests for your baby*

Centre for Genetics Education: Fact sheet 27 *Non-invasive prenatal testing*

Centre for Genetics Education: Fact sheet 36 *Trisomy 21: Down syndrome*

Centre for Genetics Education: Fact sheet 37 *Trisomy 13: Patau syndrome*

Centre for Genetics Education: Fact sheet 38 *Trisomy 18: Edwards syndrome*

Centre for Genetics Education: Fact sheet 39 *Klinefelter syndrome*

Centre for Genetics Education: Fact sheet 40 *Turner syndrome*

Decision Aid for Prenatal Testing for Fetal Abnormalities —*Your Choice: Screening & Diagnostic tests in Pregnancy* Murdoch Children's Institute

Genetic Alliance

Ottawa Personal Decision Aid

Support After Fetal Diagnosis of an Abnormality (SAFDA): *When your unborn baby has a problem: how to manage the weeks ahead*

Support After Fetal Diagnosis of an Abnormality (SAFDA): *The impact, options and afterwards*

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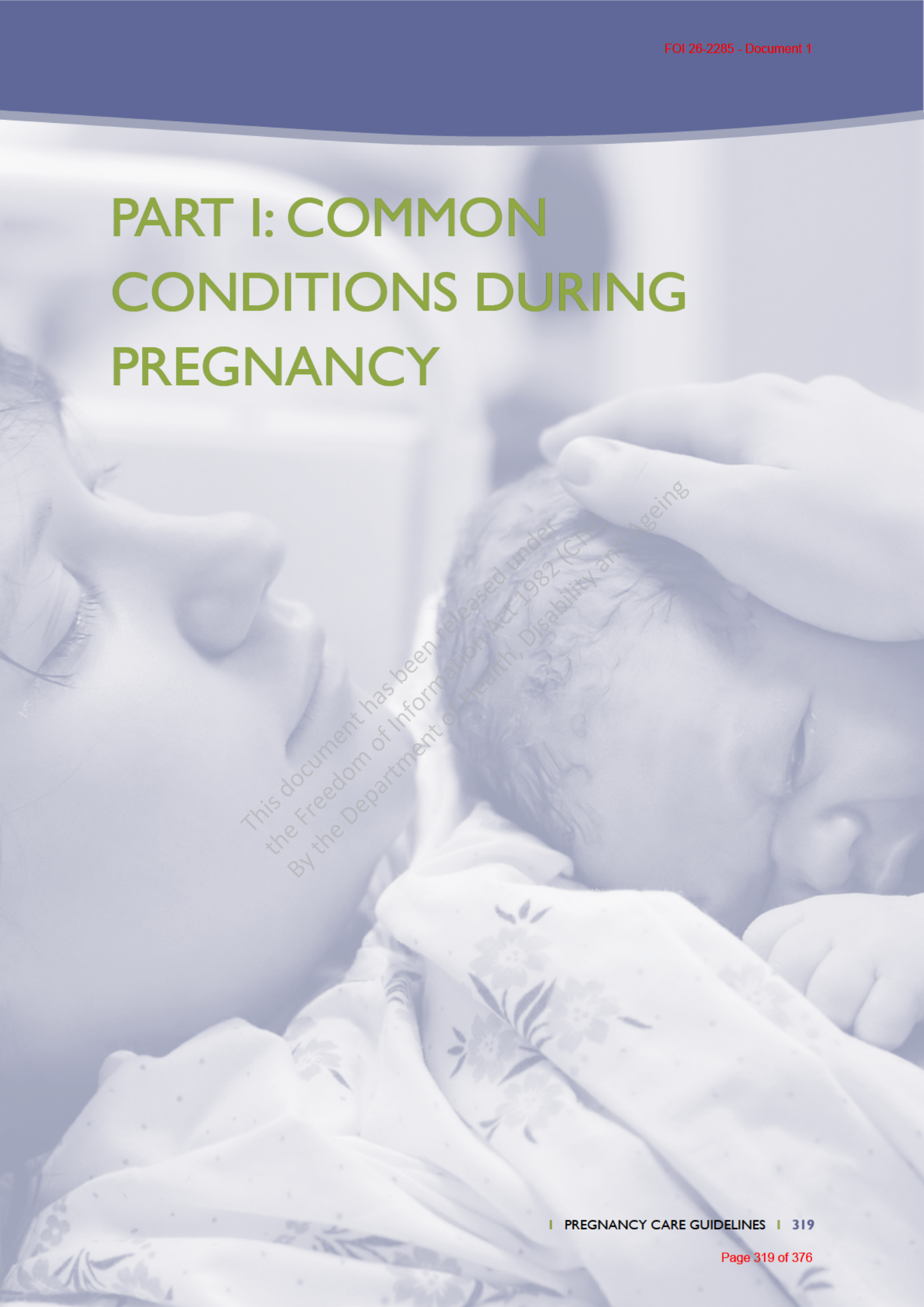
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PART I: COMMON CONDITIONS DURING PREGNANCY



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A number of conditions are common during pregnancy. While these conditions are not harmful to the pregnancy, they can be distressing or debilitating and women may seek advice about managing symptoms. Recommendations are based on evidence about the effectiveness of interventions in reducing symptoms.

Table H1 presents a summary of advice on common conditions during pregnancy considered a priority for inclusion in these Guidelines. Advice on other conditions, such as vaginal discharge and backache is included in the NICE Guidelines (NICE 2008).

Table H1: Summary of advice for women about common conditions during pregnancy

Common condition	Advice	Section
Nausea and vomiting	Although distressing and debilitating for some women, nausea and vomiting usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with pregnancy complications	54
	Discontinuing iron-containing multivitamins may be advisable while symptoms are present	
Constipation	Increasing dietary fibre intake and taking bran or wheat fibre supplements may relieve constipation	55
	Stimulating laxatives are more effective than preparations that add bulk but are more likely to cause diarrhoea or abdominal pain	
Reflux (heartburn)	Heartburn may be improved by having small frequent meals, and reducing foods that cause symptoms on repeated occasions	56
	Medications may also be considered for relieving heartburn	
Haemorrhoids	Haemorrhoids may be improved by increasing fibre in the diet and drinking plenty of water. Standard haemorrhoid creams can be considered if symptoms continue	57
Varicose veins	Varicose veins will not generally cause harm to the woman or baby and usually improve after the birth	58
Pelvic girdle pain	Pregnancy-specific exercises, physiotherapy, acupuncture or use of a support garment may provide some relief from pelvic girdle pain	59
Carpal tunnel syndrome	There is little evidence on the effectiveness of treatments for carpal tunnel syndrome	60

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54 Nausea and vomiting

Nausea and vomiting are common in pregnancy, particularly in the first trimester, with the severity varying greatly among pregnant women. A range of non-pharmacological and pharmacological interventions can be used to assist in managing nausea and vomiting in pregnancy. Women may find these interventions useful, although the evidence for their effectiveness remains inconclusive.

54.1 Background

Nausea and vomiting in pregnancy ranges from mild discomfort to significant morbidity (King & Murphy 2009). Symptoms generally start around 4-9 weeks of pregnancy (Gadsby et al 1993). Nausea and vomiting due to other conditions (eg gastrointestinal, metabolic, neurologic or genitourinary) should always be excluded, particularly in women who report nausea or vomiting for the first time after 10 weeks (Koch & Frissora 2003).

The most severe form of nausea and vomiting in pregnancy is *Hyperemesis gravidarum*, which is intractable vomiting in early pregnancy, leading to dehydration and ketonuria severe enough to justify hospital admission and intravenous fluid therapy (Bottomley & Bourne 2009).

The cause of nausea and vomiting in pregnancy is not known but is probably multifactorial (Ebrahimi et al 2010). The rise in human chorionic gonadotrophin during pregnancy has been implicated; however, data about its association with nausea and vomiting are conflicting (Weigel & Weigel 1989).

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54.1.1 Nausea and vomiting in pregnancy

- *Prevalence*: Nausea is the most common gastrointestinal symptom of pregnancy, occurring in 80-85% of all pregnancies during the first trimester, with vomiting an associated complaint in approximately 52% of women (Whitehead et al 1992; Gadsby et al 1993). Retching (or dry heaving, without expulsion of the stomach's contents) has been described as a distinct symptom that is increasingly measured separately to vomiting and nausea (Matthews et al 2010).
- *Timing*: Most women report nausea and vomiting within 8 weeks of their LMP (94%), with over one-third (34%) reporting symptoms within 4 weeks of their LMP (Whitehead et al 1992; Gadsby et al 1993). Most women (87-91%) report cessation of symptoms by 16-20 weeks of pregnancy. Although nausea and vomiting is commonly referred to as 'morning sickness', only 11-18% of women report having nausea and vomiting confined to the mornings (Whitehead et al 1992; Gadsby et al 1993).
- *Hyperemesis gravidarum*: This condition is much less common, affecting 0.3-1.5% of women (Bottomley & Bourne 2009). Symptoms typically start between 5 and 10 weeks pregnancy and resolve by 20 weeks. However, up to 10% of women will continue to vomit throughout the pregnancy. The hospital admission rate for the condition falls from 8 weeks onwards (Bottomley & Bourne 2009).

54.1.2 Impact of nausea and vomiting in pregnancy

Although distressing and debilitating for some women, nausea and vomiting do not appear to have a negative impact on pregnancy outcomes. A systematic review of observational studies found a reduced risk of miscarriage associated with nausea and vomiting (OR 0.36; 95%CI 0.32 to 0.42) and conflicting data regarding reduced risk for perinatal mortality (Weigel & Weigel 1989). No studies have reported an association between nausea and vomiting in pregnancy and teratogenicity (Klebanoff & Mills 1986).

However, despite reassurance that nausea and vomiting do not have harmful effects on pregnancy outcomes, these symptoms can have a severe impact on a pregnant woman's quality of life. Two observational studies

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have reported on the detrimental impact that nausea and vomiting may have on women's day-to-day activities, relationships, use of healthcare resources and need for time off work (Smith et al 2000; Attard et al 2002).

54.2 Managing nausea and vomiting in pregnancy

The systematic review conducted to inform these Guidelines identified additional evidence that was consistent with the NICE guidelines. The highest quality study, a Cochrane review (Matthews et al 2010) examined 27 trials of interventions including acustimulation, acupuncture, ginger, vitamin B6 and several antiemetic medicines. Systematic review of studies in this area is complicated by the heterogeneity of studies and limited information on outcomes (Matthews et al 2010).

The available evidence suggests the following.

- *Ginger*: While small RCTs have found reduced severity of nausea and vomiting with ginger products (syrup or capsules) (Murphy 1998; Vutyavanich et al 2001; Keating & Chez 2002), there is limited and inconsistent evidence of their effectiveness, although there is evidence that their use may be helpful to women (Matthews et al 2010). Dosages of up to 250 mg four times a day appear to be safe (Vutyavanich et al 2001).
- *Acupressure, acustimulation and acupuncture*: While some evidence from systematic reviews of RCTs (Murphy 1998; Vickers 1996) supports the use of P6 acupressure and it appears to be safe in pregnancy (Smith et al 2000), the evidence on the effectiveness of P6 acupressure, auricular acupressure and acustimulation of the P6 point is inconsistent and limited and there appears to be no significant benefit of acupuncture (P6 or traditional) (Matthews et al 2010).
- *Pyridoxine (vitamin B6)*: There is limited evidence to support the use of pyridoxine (Matthews et al 2010) and concerns about possible toxicity at high doses.
- *Antihistamines*: A meta-analysis of 12 RCTs that compared antihistamines ± pyridoxine with placebo or no treatment found a significant reduction in nausea in the treated group (OR 0.17; 95%CI 0.13 to 0.21) (Jewell & Young 2001). A systematic review of three RCTs (n=389) found that phenothiazines reduced nausea or vomiting when compared with placebo (RR 0.31; 95%CI 0.24 to 0.42) (Mazzotta & Magee 2000), although different phenothiazines were grouped and one of the trials recruited women after the first trimester. The bulk of the evidence demonstrates no association between birth defects and phenothiazine use during pregnancy (n=2,948; RR 1.03; 95%CI 0.88 to 1.22) (Mazzotta & Magee 2000; Attard et al 2002).
- *Other pharmacological treatments:* Antiemetic medicines are more likely to have a place in treatment of severe symptoms and the intractable nausea and vomiting of Hyperemesis gravidarum than in the relief of mild or moderate nausea and vomiting (Matthews et al 2010).

It is currently not possible to identify with certainty interventions for nausea and vomiting in early pregnancy that are both safe and effective (Matthews et al 2010). As nausea and vomiting mostly resolves within 16 to 20 weeks with no harm to the pregnancy, prescribed treatment in the first trimester is usually not indicated unless the symptoms are severe and debilitating (BMA 2003).

Practice point	
GGG	Women who experience nausea and vomiting in pregnancy can be advised that, while it may be distressing, it usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with a poor pregnancy outcome.
	Approved by NHMRC in December 2011; expires December 2016

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54.2.1 Discontinuing iron

Iron supplementation may be an aggravating factor in nausea and vomiting. The systematic review conducted for these Guidelines identified a prospective cohort study (Gill et al 2009) in which 63 of 97 (p=0.001) women with severe nausea qualitatively reported an improvement in symptoms after discontinuing iron-containing antenatal multivitamins. If multivitamins are discontinued, consideration should be given to ensuring folate and iodine intake remain sufficient.

Practice point	
HHH	Discontinuing iron-containing multivitamins for the period that women have symptoms of nausea and vomiting may improve symptoms.
	Approved by NHMRC in December 2011; expires December 2016

54.2.2 Oral health

Nausea and vomiting have the potential to affect oral health and women should be given advice on how to minimise these effects (see Chapter 15).

54.3 Practice summary: managing nausea and vomiting

When: At the first contact with all women and at subsequent contacts for women who report nausea and vomiting

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; dietitian; pharmacist

- ☐ **Inform women that nausea and vomiting is not associated with medium or long-term adverse effects:** Explain that nausea and vomiting is common in pregnancy, is not necessarily confined to the morning and is likely to lessen by week 16.
- ☐ **Provide lifestyle/diet advice :** Acknowledge that nausea and vomiting affects quality of life, and suggest tips on managing nausea and vomiting, including drinking plenty of fluids, eating little and often during the day, getting plenty of rest and avoiding fatty or spicy food. Avoiding iron-containing multivitamins while nausea and vomiting are present may also help.
- ☐ **Discuss non-pharmacological and pharmacological treatments:** If the woman asks about treatments for nausea and vomiting, suggest interventions that may help and are thought to be safe, beginning with non-pharmacological approaches. The safety and effectiveness of antiemetics should be discussed with women with more severe symptoms who choose to consider medication.

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54.4 Resources

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55 Constipation

Constipation is a common gastrointestinal symptom in pregnancy, particularly in the first trimester. Guidance about increasing dietary fibre and appropriate use of laxatives may assist women to treat constipation and reduce the risk of further episodes.

55.1 Background

Constipation is the delay in the passage of food residue, associated with painful defecation and abdominal discomfort. Rising levels of progesterone in pregnancy can cause a reduction in gastric motility and increased gastric transit time. Poor dietary fibre intake can contribute to women experiencing constipation during pregnancy, as at any time of life. Iron supplementation, common during pregnancy, is also associated with constipation (Bradley et al 2007). In Aboriginal and Torres Strait Islander communities with a high prevalence of anaemia, iron supplementation is common.

Constipation is generally defined by Rome II criteria: the presence of at least two of the following symptoms for at least one in four defecations: straining, lumpy or hard stools, sensation of incomplete evacuation, sensation of anorectal obstruction, manual manoeuvres to facilitate defecation, and fewer than three defecations per week.

55.1.1 Prevalence of constipation in pregnancy

Constipation is a commonly reported condition during pregnancy that appears to decrease as the pregnancy progresses.

- A case series study (Meyer et al 1994) found that 39% of pregnant women reported symptoms of constipation at 14 weeks, 30% at 28 weeks and 20% at 36 weeks; this study may have resulted in overestimates, as routine iron supplementation was recommended for all pregnant women in the United Kingdom at the time the study was conducted.
- Later studies have found that constipation affects up to 25% of women during pregnancy:
  - a prospective case series study (Bradley et al 2007) found prevalence rates of 24% (95% CI 16-33%), 26% (95% CI 17-38%), 16% (95% CI 8-26%) in the first, second, and third trimesters, respectively. In multivariable longitudinal analysis, iron supplements (OR 3.5; 95% CI 1.04-12.10) and past constipation treatment (OR 3.58; 95% CI 1.50-8.57) were associated with constipation during pregnancy
  - a correlational study (Ponce et al 2008) found prevalence rates of 29.6%, 19% and 21.8% in the first, second and third trimesters respectively. This study also reported laxative use among pregnant women as 11% (95% CI 7-16), 15% (95% CI 10-21) and 13.5% (95% CI 8-19) in the first, second and third trimesters.

55.2 Guidance on managing constipation

The first-line treatment for constipation is increasing dietary fibre and fluid intake. Dietary fibre intake can be improved by eating more wholegrain foods, fruit and vegetables, or through wheat or bran fibre supplementation. Where fibre supplementation does not alleviate symptoms, laxatives (stimulant, bulk-forming or osmotic) may be helpful in the short-term, although they can cause adverse side effects such as abdominal pain and diarrhoea.

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55.2.1 Effectiveness of treatments

Findings are consistent across the NICE guidelines and the systematic review conducted to inform these Guidelines.

- *Increasing fluid intake*: while there are no RCTs or cohort studies in this area, there is some evidence to suggest that dietary factors such as water intake may play a role in preventing, or alleviating, bowel habit perturbations during and after pregnancy (Derbyshire et al 2006). In spite of the lack of high-level evidence, increased fluid intake should be recommended as one of the first measures to relieve constipation in pregnancy. Increasing fluid intake is not expensive, is readily available and has several other beneficial effects during pregnancy (Vasquez 2008).
- *Dietary fibre supplementation:* Evidence from a Cochrane review (Jewell & Young 2009) based on two RCTs (n = 215) supports the effectiveness of fibre supplementation in safely treating constipation in pregnancy. Fibre supplements were found to increase the frequency of defecation (OR: 0.18; 95% CI 0.05–0.67), lead to softer stools and appear to have no adverse effects.
- *Laxatives:* The same Cochrane review (Jewell & Young 2009) found that when discomfort was not alleviated by fibre supplementation, stimulant laxatives were more effective than bulk-forming laxatives (Peto OR 0.30; 95% CI 0.14–0.61), although stimulants were associated with significantly more abdominal pain and diarrhoea. Preliminary evidence indicates that osmotic laxatives (eg polyethylene glycol or PEG) are effective and well tolerated during pregnancy (Neri et al 2004) but currently there is insufficient evidence about potential effects on the fetus (Vasquez 2008).

Recommendations	Grade C
55.	Offer women who are experiencing constipation information about increasing dietary fibre intake and taking bran or wheat fibre supplementation.
56.	Advise women who choose to take laxatives that preparations that stimulate the bowel are more effective than those that add bulk but may cause more adverse effects such as diarrhoea and abdominal pain.
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55.3 Practice summary: constipation

When: At the first contact with all women and at subsequent contacts for women who report symptoms of constipation

Who: Midwife; maternal and child health nurse; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; practice nurse; allied health professional; pharmacist

- ☐ **Advise about fluid intake**: Drinking more fluids has a range of benefits and may assist in easing constipation. Water is a good source of fluids as it hydrates without adding additional energy to the diet. Other drinks such as milks and fruit juices add variety and nutrients. Intake of fluids containing added sugars should be moderated.
- ☐ **Talk about dietary fibre**: Advise all women to eat a wide variety of nutritious foods, including plenty of vegetables, fruit, wholegrain cereals and breads, nuts, seeds and legumes. Bran or wheat fibre supplementation is safe and effective during pregnancy and may relieve symptoms. Fibre supplements should be introduced slowly and plenty of water consumed while they are being taken.
- ☐ **Discuss laxative use:** Laxatives can be used to relieve symptoms but should not be used long-term. Bulk-forming laxatives may cause fewer side effects than stimulant laxatives.

55.4 Resources

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: Commonwealth of Australia.

55.5 References

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56 Reflux (heartburn)

Reflux (heartburn) is a common symptom in pregnancy. Most women can relieve mild symptoms by modifying their diet and lifestyle. Women with persistent or more severe symptoms may also require advice about specific treatments.

56.1 Background

Reflux (heartburn) is very common antenatally. While it is considered a normal part of a healthy pregnancy, symptoms may be frequent and distressing to women.

Reflux is generally a symptom of gastro-oesophageal reflux disorder (GORD), where some gastric contents are regurgitated into the oesophagus, causing discomfort and a burning sensation behind the sternum and/or throat. Acid regurgitation may also reach the pharynx, resulting in a bitter or sour taste in the mouth. While the exact causes of the increase in reflux during pregnancy are not clear, it is thought that hormonal effects on antireflux barriers in the lower oesophagus and on gastric function may play a part (Ali & Egan 2007; Majithia & Johnson 2012). When symptoms persist, further investigation may identify other causes (eg bariatric surgery, stomach cancer and *Helicobacter pylori* infection (Tiong et al 2006; Cherian et al 2008)) and treatment after the birth may be needed.

56.1.1 Incidence during pregnancy

- Reflux is estimated to occur in 30-50% of pregnancies, with the incidence up to 80% in some groups (Richter 2003; Ali & Egan 2007). Symptoms tend to become both more severe and frequent as pregnancy progresses.
- Older women and those having second or subsequent pregnancies are more likely to experience heartburn (Dowswell & Neilson 2008). There is also evidence suggesting that pre-pregnancy heartburn and weight gain during pregnancy increase the risk of heartburn during pregnancy (Rey et al 2007).

56.2 Discussing reflux

Reflux is not associated with adverse pregnancy outcomes and therefore treatment aims to relieve symptoms for women. There is limited evidence on the effectiveness and safety of current interventions. Generally, the first approach is advice on diet and lifestyle, either to reduce acid production or avoid reflux associated with postural change (Richter 2005).

56.2.1 Lifestyle approaches

Narrative reviews recommend lifestyle modifications for mild symptoms (Tytgat et al 2003; Ali & Egan 2007):

- abstaining from alcohol, tobacco and medications that may increase symptoms (eg anticholinergics, calcium channel antagonists)
- having smaller more frequent meals
- avoiding lying down within 2-3 hours of eating
- elevating the head of bed by 10-15 cm.

Consensus-based recommendation	
LII	Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.
	Approved by NHMRC in June 2014; expires June 2019

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56.2.2 Treatments

A range of medications affecting different physiological processes (eg antacids, histamine-2 [H2] receptor antagonists, proton pump inhibitors) may be used to relieve persistent or severe symptoms (Dowswell & Neilson 2008).

RCT evidence on the safety of reflux medications during pregnancy is limited (Richter 2005). Available evidence from lower level studies suggests that the use of antacids, proton pump inhibitors and H2 blockers for reflux during pregnancy presents no known significant safety concern for either the mother or baby:

- antacids are considered safe in pregnancy and may be preferred by women as they give immediate relief; calcium-based formulations are preferable to those that contain aluminium (Tytgat et al 2003)
- the use of proton pump inhibitors during pregnancy is not associated with an increased risk for major congenital birth defects, spontaneous miscarriage, preterm birth, perinatal mortality or morbidity (Diav-Citrin et al 2005; Gill et al 2009a; Gill et al 2009b; Pasternak & Hviid 2010; Majithia & Johnson 2012; Matok et al 2012)
- the use of H2 blockers in pregnancy is not associated with any increase in risk of spontaneous miscarriage, preterm birth or small-for-gestational-age baby (Gill et al 2009b).

One small RCT (n=36) (da Silva et al 2009) found that the use of acupuncture in pregnancy may reduce reflux symptoms.

Recommendation	Grade C
57. Give women who have persistent reflux information about treatments.	
Approved by NHMRC in June 2014; expires June 2019	

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56.3 Practice summary: reflux

When: A woman is experiencing reflux

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian

- ☐ **Provide advice:** Advise women that the causes of reflux vary between individuals and avoiding the food and drinks that cause them reflux may reduce symptoms. Sleeping on the left side, raising the head of the bed, and not lying down after eating may also help. Reassure women that symptoms usually subside after pregnancy, but may recur in a subsequent pregnancy.
- ☐ **Discuss treatments:** Discuss any remedies the woman may be using to treat reflux. Advise women that if symptoms persist or become more severe, medication can be considered.
- ☐ **Take a holistic approach:** Assist women to identify food and drinks that may cause reflux and to find culturally appropriate alternatives. Consider costs if prescribing medication to treat reflux.

56.4 Resources

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56.5 References

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57 Haemorrhoids

Haemorrhoid symptoms are common in pregnancy, particularly in the second and third trimesters. Advice on avoiding constipation may assist women to prevent or lessen the effects of haemorrhoids. Topical products can be used to ease continuing symptoms.

57.1 Background

Haemorrhoids are enlarged, swollen veins around the anus that are characterised by anorectal bleeding, painful bowel movements, anal pain and anal itching. While the mechanism is not clear, this is thought to be a result of prolapse of the anal canal cushions, which play a role in maintaining continence. Constipation (see Chapter 55) is the major precipitating factor for haemorrhoids. Pregnancy also facilitates development or exacerbation of haemorrhoids, due to increased pressure in rectal veins caused by restriction of venous return by a woman's enlarged uterus (Avsar & Keskin 2010).

57.1.1 Incidence during pregnancy

- Haemorrhoids that were present previously may become symptomatic for the first time in pregnancy. Haemorrhoidal symptoms are most common in the second and third trimesters of pregnancy and after birth (Avsar & Keskin 2010).
- While estimates vary, it is thought that 25-35% of pregnant women are affected by haemorrhoids (Staroselsky et al 2008; Abramowitz & Batallan 2003). One observational study found that 8% of pregnant women (n=165) experienced thrombosed external haemorrhoids in the last 3 months of pregnancy (Abramowitz et al 2002).

57.1.2 Diagnosis

Pain with bowel movements, bleeding and itching are often the first signs and symptoms of haemorrhoids. Diagnosis is made by examining the anus and anal canal, usually by inspection. Digital rectal examination and endoscopy (sigmoidoscopy and colonoscopy) may also be used. It is important to rule out more serious causes of bleeding (Avsar & Keskin 2010).

57.2 Discussing haemorrhoids

57.2.1 Effectiveness of treatments

Treatment during pregnancy aims mainly to relieve symptoms and control pain (Avsar & Keskin 2010).

Most evidence for the effectiveness of haemorrhoid treatments comes from studies of non-pregnant patients. Given the overall lack of evidence, there is consensus in clinical reviews for conservative management in pregnancy including avoiding constipation, dietary modification, dietary fibre supplementation and stool softeners (Avsar & Keskin 2010; Dietrich et al 2008; Wald 2003).

Topical products with analgesics and anti-inflammatory effects provide short-term local relief of symptoms. There is no evidence on the effectiveness or safety of creams used in pregnancy; however, the small doses and limited systemic absorption mean that they are unlikely to harm the baby when used in the third trimester (Staroselsky et al 2008).

While surgical removal of haemorrhoids may be a consideration in extreme circumstances, surgery is rarely an appropriate intervention for pregnant women as haemorrhoidal symptoms often resolve spontaneously after the birth (Staroselsky et al 2008).

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Consensus-based recommendation	
LIII	Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.
	Approved by NHMRC in June 2014; expires June 2019

57.3 Practice summary: haemorrhoids

When: A woman had haemorrhoids before pregnancy or has symptoms of haemorrhoids

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian

- ☐ **Provide advice:** Advise women that avoiding constipation (see Chapter 55) is the best way to prevent and manage haemorrhoids during pregnancy and they should also try to avoid straining with bowel motions.
- ☐ **Discuss treatments:** Advise women that haemorrhoid creams can be used to further ease their symptoms.
- ☐ **Take a holistic approach:** Explore culturally appropriate, low cost ways for women to increase their fibre intake. Advise women who are increasing their fibre intake to make sure they drink adequate fluids.

57.4 Resources

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: Commonwealth of Australia.

57.5 References

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58 Varicose veins

Varicose veins occur often within the general population and are a common symptom during pregnancy. While there is little evidence to support any specific treatment, use of compression stockings may help to relieve symptoms.

58.1 Background

Varicose veins are caused by the pooling of blood in the surface veins as a result of inefficient valves that would normally prevent blood draining back down the leg. They can occur as blue swollen veins on the calves, the inside of the legs and the vulva, and may cause itching and aching. Feet and ankles can also become swollen.

In 70-80% of women who develop problems with varicose veins during pregnancy, the symptoms appear during the first trimester, often within 2 to 3 weeks of gestation (Carr 2006).

A family history of varicose veins, increasing number of full-term pregnancies and increasing age are risk factors for the development of varicose veins (Dindelli et al 1993; Jawien 2003; Beebe-Dimmer et al 2004).

58.1.1 Factors influencing varicose veins in pregnancy

- *Elevated pressure*: Increased blood volume early in pregnancy, followed by fetal growth and weight gain, increase women's intra-abdominal pressure and central venous return, with the potential for the elevated pressure to lead to valve failure and development of varices (Beebe-Dimmer et al 2005).
- *Hormones*: Hormonal fluctuations in early pregnancy strongly influence the development of varicose veins (Carr 2006; Lenkovic et al 2009).

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58.2 Discussing varicose veins

There is a lack of evidence about treatments for varicose veins that are effective and safe in pregnancy. Existing systematic reviews are based on small RCTs with a high risk of bias (Bamigboye & Hofmeyr 2006; Bamigboye & Smyth 2007). The evidence on vulval varices is too limited for conclusions to be drawn.

There is consensus in clinical reviews that advice to women should be based on reassurance, conservative management and symptom relief. Avoiding long periods of standing, use of compression stockings and elevating the feet have been found to improve symptoms in the general population (Carr 2006).

58.2.1 Treatments for varicose veins

- *Compression stockings*: A small RCT on preventing varicose veins in pregnancy with compression stockings (n=42) (Thaler et al 2001) found that compression stockings do not prevent or improve varicose veins, but do improve leg symptoms (pain, discomfort, cramps) (RR 0.74, 95% CI 0.59-0.93).
- *Surgery*: Surgical techniques including stripping and ligation, ablation or scleropathy, may be used to remove varicose veins when people remain symptomatic (Carr 2006). As symptoms of varicose veins often improve after the birth (Bamigboye & Smyth 2007), surgery is rarely considered an appropriate intervention for pregnant women.

Consensus-based recommendation	
LIV	Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.
	Approved by NHMRC in June 2014; expires June 2019

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58.3 Practice summary: varicose veins

When: A woman had varicose veins before pregnancy or has symptoms of varicose veins

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Provide advice:** Explain that varicose veins are common in pregnancy, especially in second and subsequent pregnancies and multiple pregnancies.
- ☐ **Discuss treatments:** Advise women that symptoms can be relieved by elevating the feet while resting and avoiding long periods of standing.
- ☐ **Take a holistic approach:** Women may not mention that they have varicose veins and they may not be visible to the health professional. Asking about itching or discomfort in the legs can assist in identifying varicose veins.

58.4 Resources

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

58.5 References

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Carr S (2006) Current management of varicose veins. *Clin Obstet Gynecol* 49(2): 414-26.

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59 Pelvic girdle pain

The severity of pelvic girdle pain (symphysis pubis dysfunction) during pregnancy varies widely. Advice should be aimed towards minimising pain.

59.1 Background

Pelvic girdle pain has been described as a collection of signs and symptoms of discomfort and pain in the pelvis and lower back (lumbopelvic) area, including musculoskeletal pain radiating to the upper thighs and perineum. Symptoms occur due to relaxation of the pelvic ligament and increased joint mobility in pregnancy. Symptoms vary from mild discomfort to severe and debilitating pain that can hinder mobility. Other causes of pain in the pelvic area (eg urinary tract infection, preterm labour) should be excluded (Kanakaris et al 2011). Pelvic girdle pain usually resolves spontaneously after the birth (Elden et al 2008), although symptoms may recur during subsequent pregnancies (Leadbetter et al 2004).

59.1.1 Incidence in pregnancy

- The true incidence of pelvic girdle pain in pregnancy is unknown and estimates from low-level evidence are contradictory, ranging from approximately 4% to 84% (Bastiaanssen et al 2005; Morgren & Pohjanen 2005; Robinson et al 2006; 2010). The wide variation can be attributed to various factors including the absence of a precise definition and diagnostic criteria, differences in study design and selection of the study population.
- The incidence of pelvic girdle pain has been found to be higher in late pregnancy (Gutke et al 2006; Leadbetter 2006; Van de Pol et al 2007; Robinson et al 2010; Kovacs et al 2012) and among women with a higher BMI (Kovacs et al 2012).
- There is currently no evidence regarding the incidence of pelvic pain in specific population groups.

59.1.2 Factors influencing pelvic girdle pain

Low-level evidence indicates that (Morgren 2005; Albert et al 2006; Eberhard-Gran & Eskild 2008; Biering 2010):

- pelvic pain is more common in women with a previous history of low back pain (Albert 2006; Bjelland et al 2010) or trauma of the back or pelvis (Albert 2006)
- risk factors for developing pelvic pain include: increased number of previous pregnancies (Albert 2006; Bjelland et al 2010; Robinson et al 2010); physically demanding work (Morgren 2005; Bjelland et al 2010); high BMI (Albert 2006; Eberhard-Gran & Eskild 2008; Bjelland et al 2010); emotional distress (Bjelland et al 2010) smoking (Albert 2006; Biering et al 2010).

The evidence on age as a risk factor for pelvic pain in pregnancy is inconsistent (Eberhard-Gran & Eskild 2008; Bjelland et al 2010).

59.2 Discussing pelvic girdle pain

NICE (2008) found little evidence on which to base clinical practice. Subsequent evidence is limited by the heterogeneity and low quality of studies and the inconsistency of findings.

59.2.1 Treatments for pelvic pain

Systematic reviews into interventions for women with pelvic girdle pain have found low-level evidence:

- exercise, pelvic support garments and acupuncture improved functional outcomes (Richards et al 2012)
- exercise during pregnancy may decrease pelvic girdle pain (Schiff Boissonnault et al 2012)

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- women receiving acupuncture or physiotherapy reported less intense pain in the morning or evening than women receiving usual antenatal care and acupuncture was more effective in reducing evening pain than physiotherapy (Pennick & Young 2007)
- acupuncture was more effective than standard treatment, physiotherapy, or stabilising exercises (Ee et al 2008)

RCTs have found benefits from a multimodal approach (manual therapy, stabilisation exercises, patient education) (George et al 2012) and no reduction of pain with exercise (Eggen et al 2012; Stafne et al 2012).

Lower level evidence supports acupuncture as an effective intervention (Ekdahl & Petersson 2010). No serious adverse effects were reported (minor side effects included bruising, pain on needle insertion, bleeding, haematoma and fainting).

Recommendation	Grade C
58. Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.	
Approved by NHMRC in June 2014; expires June 2019	

59.2.2 Advice on managing pelvic girdle pain

There is consensus from low-level evidence and clinical reviews about providing advice on minimising pain, including (Vleeming et al 2008; Leadbetter et al 2004; Aslan & Fynes 2007):

- wearing low-heeled shoes
- seeking advice from a physiotherapist regarding exercise and posture
- reducing non-essential weight-bearing activities (eg climbing stairs, standing/walking for long periods of time)
- avoiding standing on one leg (eg by sitting down to get dressed)
- avoiding movements involving hip abduction (eg taking care getting in/out of cars, baths or squatting)
- applying heat to painful areas.

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59.3 Practice summary: pelvic girdle pain

When: A woman has pelvic girdle pain

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist

- ☐ **Provide advice**: Reassure the woman that pelvic girdle pain will not harm her or her unborn child, and is likely to resolve after the birth. Advise the woman about steps she can take to minimise pain.
- ☐ **Take a holistic approach**: Consider possible barriers to women being able to make changes to minimise their pain (eg work requirements, cultural attitudes to exercise, costs of allied health services).

59.4 Resources

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

59.5 References

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Ee C, Manheimer E, Pirotta M et al (2008) Acupuncture for pelvic and back pain in pregnancy: a systematic review. *Am J Obstet Gynaecol* 198(3): 254–59.

Eggen MH, Stuge B, Mowinckel P et al (2012) Can supervised group exercises including ergonomic advice reduce the prevalence and severity of low back pain and pelvic girdle pain in pregnancy? A randomized controlled trial. *Phys Ther* 92(6): 781–90.

Ekdahl L & Petersson K (2010) Acupuncture treatment of pregnant women with low back and pelvic pain — an intervention study. *Scand J Caring Sci* 24: 175–82.

Elden H, Hagberg H, Olsen MF et al (2008) Regression of pelvic girdle pain after delivery: follow-up of a randomised single blind controlled trial with different treatment modalities. *Acta Obstet Gynecol Scand* 87(2): 201–08.

George JW, Skaggs CD, Thompson PA et al (2012) A randomized controlled trial comparing a multi-modal intervention and standard obstetrical care for low back and pelvic pain in pregnancy. *Am J Obstet Gynecol* 1: S360.

Gutke A, Ostgaard H, Oberg B (2006) Pelvic girdle pain and lumbar pain in pregnancy: a cohort study of the consequences in terms of health and functioning. *Spine* 31(5): E149–55.

Haugland KS, Rasmussen S, Daltveit AK (2006) Group intervention for women with pelvic girdle pain in pregnancy. A randomized controlled trial. *Acta Obstet Gynecol Scand* 85(11): 1320–26.

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Leadbetter R, Mawer D, Lindow S (2004) Symphysis pubis dysfunction: a review of the literature. *J Maternal-Fetal Neonatal Med* 16: 349–54.

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Morgren I & Pohjanen A (2005) Low back pain and pelvic pain during pregnancy: prevalence and risk factors. *Spine* 30: 983–91.

Pennick V & Young G (2007) Interventions for preventing and treating pelvic and back pain in pregnancy. *Cochrane Database Sys Rev 2007* Issue 2. Art. No.: CD001139. DOI: 10.1002/14651858.CD001139.pub2.

Richards E, Van Kessel G, Virgara R et al (2012) Does antenatal physical therapy for pregnant women with low back pain or pelvic pain improve functional outcomes? A systematic review. *Acta Obstet Gynecol Scand* 91(9): 1038–45.

Robinson H, Veierod M, Mengshoel A et al (2010) Pelvic girdle pain – associations between risk factors in early pregnancy and disability or pain intensity in late pregnancy: a prospective cohort study. *BMC Musculoskeletal Dis* 11(91): 1–12.

Robinson H, Eskild A, Heiberg E et al (2006) Pelvic girdle pain in pregnancy: the impact on function. *Acta Obstet Gynecol Scand* 85:160–64.

Stafne SN, Salvesen KA, Romundstad PR et al (2012) Does regular exercise during pregnancy influence lumbopelvic pain? A randomized controlled trial. *Acta Obstet Gynecol Scand* 91(5): 552–59.

Stuge B, Hilde G, Vollestad N (2003) Physical therapy for pregnancy-related low back and pelvic pain: a systematic review. *Acta Obstet Gynecol Scand* 82(11): 983–90.

Van de Pol G, Brummen J, Bruinse H et al (2007) Pregnancy related pelvic girdle pain in the Netherlands. *Acta Obstet Gynecol Scand* 86: 416–22.

Vleeming A, Albert H, Ostgaard HC et al (2008) European guidelines for the diagnosis and treatment of pelvic girdle pain. *Eur Spine J* 17: 794–819.

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60 Carpal tunnel syndrome

Carpal tunnel syndrome is common during pregnancy, particularly in the third trimester. There is little evidence to support intervention in pregnancy and symptoms are likely to resolve after the birth.

60.1 Background

Carpal tunnel syndrome results from compression of the median nerve within the carpal tunnel in the hand. It is characterised by tingling, burning pain, numbness and a swelling sensation in the hand that may impair sensory and motor function.

60.1.1 Incidence during pregnancy

- Due to differences in methods of diagnosis between studies (eg neurophysiologically confirmed, clinically diagnosed, patient-reported), there is great variability in estimates of the incidence of pregnancy-related carpal tunnel syndrome; estimates range from approximately 2% to 72% (Eogan et al 2004; Finsen & Zeitlmann 2006; Baumann et al 2007; Mondelli et al 2007; Padua et al 2010).

60.1.2 Factors influencing carpal tunnel syndrome

- In non-pregnant populations, carpal tunnel syndrome has been reported to occur more frequently in occupations that involve repetitive activity, forceful work or vibration (Palmar et al 2007).
- In pregnancy, likely causes of carpal tunnel syndrome are hormonal changes (Ablove & Ablove 2009) and oedema (Pazzaglia et al 2005; Ablove & Ablove 2009).
- Carpal tunnel syndrome is more common in the third trimester (Shaafi et al 2006; Baumann et al 2007).
- Pre-existing or gestational diabetes may also contribute due to generalised slowing of nerve conduction (Ablove & Ablove 2009) but impaired median nerve conduction also occurs in pregnant women without diabetes (Eogan et al 2004; Baumann et al 2007).

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60.2 Discussing carpal tunnel syndrome

60.2.1 Effectiveness of treatments

The recent evidence on interventions to treat carpal tunnel syndrome during pregnancy is limited to small case series studies (n=20–30) that found reduced symptoms associated with night splinting (Finsen & Zeitlmann 2006) or steroid (dexamethasone) injections (Niempoog et al 2007; Moghtaderi et al 2011).

Activity modification, avoiding positions of extreme flexion or extension of the wrists and avoiding exposure to vibration have been suggested as adjuncts to splinting (Mabie 2005; Borg-Stein et al 2006; Ablove & Ablove 2009) but there is no evidence that these are effective for carpal tunnel syndrome.

While carpal tunnel syndrome usually resolves after the birth (Pazzaglia et al 2005), persistence of symptoms has been reported in more than 50% of women after 1 year and in about 30% after 3 years (Padua et al 2010).

Consensus-based recommendation	
LV	Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited and symptoms may resolve after the birth.
	Approved by NHMRC in June 2014; expires June 2019

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60.3 Practice summary: carpal tunnel syndrome

When: A woman has symptoms of carpal tunnel syndrome

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist; occupational therapist

- ☐ **Provide advice**: Explain that carpal tunnel syndrome is common due to increased fluid retention during pregnancy and may resolve after the birth.
- ☐ **Discuss treatments:** Explain that there is a lack of research about treatments for carpal syndrome during pregnancy and give advice on avoiding movements that may exacerbate symptoms (eg using a splint to keep the joint straight overnight).
- ☐ **Consider referral:** Women with persistent and severe symptoms of nerve compression should be referred for specialist evaluation.
- ☐ **Take a holistic approach:** For women whose occupations involve repetitive activity or vibration advise frequent breaks or a temporary change in role where possible.

60.4 Resources

AAOS (2007) *Clinical Practice Guideline on the Diagnosis of Carpal Tunnel Syndrome*. Rosemont IL: American Academy of Orthopaedic Surgeons. http://www.aaos.org/Research/guidelines/CTS_guideline.pdf

AAOS (2007) *Clinical Practice Guideline on the Treatment of Carpal Tunnel Syndrome*. Rosemont IL: American Academy of Orthopaedic Surgeons.

Common discomforts in pregnancy. In: *Minymaku Kutju Tjukurpa Women's Business Manual, 4th edition*. Congress Alukura, Nganampa Health Council Inc and Centre for Remote Health.

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Baumann F, Karlikaya G, Yuksel G et al (2007) The subclinical incidence of CTS in pregnancy: Assessment of median nerve impairment in asymptomatic pregnant women. *Neurol Neurophysiol Neurosci* 3.

Borg-Stein J, McInnis C, Dugan S et al (2006) Evaluation and management of musculoskeletal and pelvic disorders of pregnancy. *Phys Rehab Med* 18(3): 187–204.

Eogan M, O'Brien C, Carolan D et al (2004) Median and ulnar nerve conduction in pregnancy. *Int J Gynecol Obstet* 87: 233–36.

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Mabie WC (2005) Peripheral neuropathies during pregnancy. *Clin Obstet Gynecol* 48(1): 57–66.

Moghtaderi AR, Moghtaderi N, Loghmani A (2011) Evaluating the effectiveness of local dexamethasone injection in pregnant women with carpal tunnel syndrome. *J Res Med Sci* 16(15): 687–90.

Mondelli M, Rossi S, Monti E et al (2007) Prospective study of positive factors for improvement of carpal tunnel syndrome in pregnant women. *Muscle Nerve* 36: 778–83.

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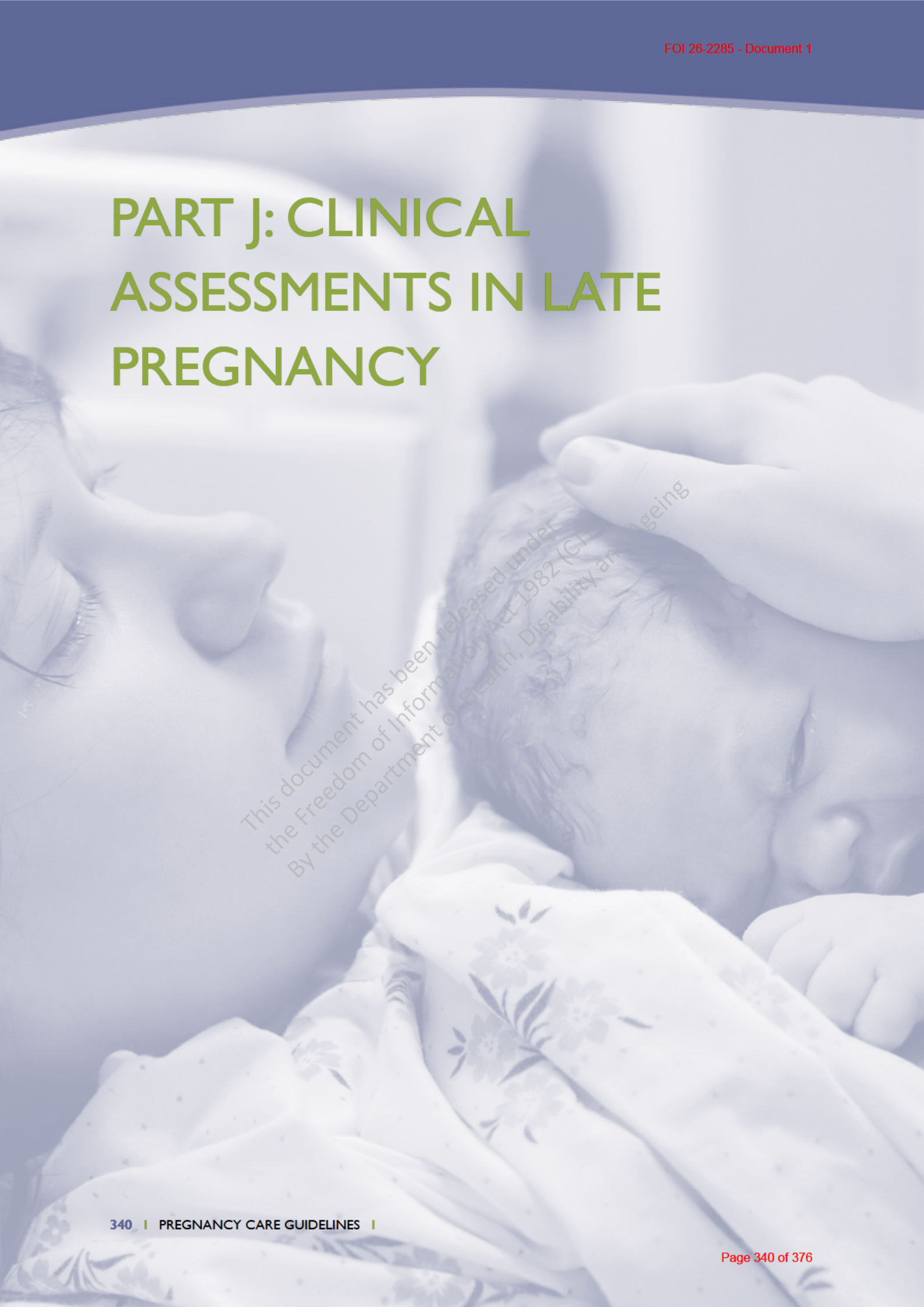
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PART J: CLINICAL ASSESSMENTS IN LATE PREGNANCY



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This section discusses the evidence for aspects of care during late pregnancy. At this stage, antenatal care becomes more frequent and includes planning and preparing for the birth. Some situations will require additional discussion, and women should be given advice and information to help them make informed decisions about options for interventions and birth. For example, identifying the presentation of the baby (eg breech) from 35 weeks allows for timely discussion, planning and referral if necessary. For women who have prolonged pregnancy, the longer the pregnancy the more complex the decisions may become, as the risks to the baby increase.

Recommendations are based on the evidence for interventions that aim to reduce the need for unnecessary induction or unplanned caesarean section. Decisions about women's care are made after considering the benefits and possible risks, always taking the woman's preferences into account. When there is a high risk of adverse outcomes, discussion with specialists (eg obstetrician, neonatologist, paediatrician) is advisable.

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61 Fetal presentation

Identifying fetal presentation and discussing management options with women who have a malpresentation late in pregnancy enables informed planning for the birth.

61.1 Background

Fetal presentation refers to the part of the baby that is overlying the maternal pelvis. Fetal lie refers to the relationship between the longitudinal axis of the baby with respect to the longitudinal axis of the mother (longitudinal lie, transverse lie, oblique lie).

Most babies present with the crown of the head at the cervix (vertex presentation). Less optimal situations are when the presenting part is the face or brow; the buttocks (breech presentation); or foot or feet (footling presentation). Babies that are in a transverse lie may present the fetal back or shoulders, arms or legs, or the umbilical cord (funic presentation). In an oblique lie, generally no palpable fetal part is presenting. This lie is usually transitory and occurs as the baby is moving.

Fetal presentation can be identified by palpation of the maternal abdomen, and confirmed by ultrasound if there is any doubt.

61.1.1 Fetal presentation at birth

Among women who gave birth in Australia in 2010, most fetal presentations were vertex (94.4%). Malpresentations included breech (3.9%), face or brow presentation (0.2%) and shoulder/transverse and compound presentations (0.7%) (Li et al 2012).

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61.2 Abdominal palpation

Abdominal palpation is accurate in identifying presentation, especially if carried out by an experienced health professional (Webb et al 2011). In Australia, it is recommended that all health professionals providing antenatal care be experienced in palpation of the pregnant abdomen including identification of the presenting part (RANZCOG 2009). While the positive effects of abdominal palpation are difficult to quantify, no risks have been identified and it provides a point of engagement with the mother and baby. Assessment of presentation by abdominal palpation before 36 weeks is not always accurate.

Recommendation	Grade C
59.	Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.
	Approved by NHMRC in June 2014; expires June 2019

Where there is any doubt as to the presenting part, obstetric ultrasound should be used to confirm the palpation findings. Ultrasound can also exclude fetal anomaly, low-lying placenta, hyperextension of the baby's head and the presence of umbilical cord around the fetal neck (RANZCOG 2009).

Practice point	
III	Suspected non-cephalic presentation after 36 weeks should be confirmed by an ultrasound assessment.
	Approved by NHMRC in June 2014; expires June 2019

61.3 Breech presentation

Breech presentation is common in mid pregnancy, with incidence decreasing as the pregnancy approaches term. Turning the baby (eg using external cephalic version [ECV]) reduces the number of babies who are breech at term, thereby improving the chance of a vaginal birth.

The optimal mode of birth for women who have a baby in the breech position is the subject of much controversy. Following the initial findings of the Term Breech Trial of fewer adverse outcomes among babies following planned caesarean section than planned vaginal birth (Hannah et al 2000), breech birth is now more likely to occur by caesarean section. Rates of singleton vaginal breech births in Australia fell from 23.1% in 1991 (Sullivan et al 2009) to 4.0% in 2010 (Li et al 2012).

However, several studies have shown that with careful selection criteria and involvement of experienced health professionals in centres that are supportive, vaginal breech birth can be successful in 49-83% of women, with rates of morbidity equal to that of birth by caesarean section and higher success rates among multiparous women (Sibony et al 2003; Alarab et al 2004; Kumari & Grundsell 2004; Oboro et al 2004; Ulander et al 2004; Krupitz et al 2005; Uotila et al 2005; Goffinet et al 2006; Daskalakis et al 2007; Hopkins et al 2007; Jadoon et al 2008).

Evidence into neonatal or maternal outcomes associated with mode of breech birth is inconsistent:

- *Risks to the infant*: Some cohort studies (Kumari & Grundsell 2004; Doyle et al 2005; Molkenboer et al 2007) found no differences in mortality and morbidity between vaginal births and caesarean sections, while others found higher rates of morbidity following vaginal birth (Gilbert et al 2003; Herbst 2005; Rietberg et al 2005; Daskalakis et al 2007; Hopkins et al 2007; Toivonen et al 2012) and one found a higher risk of neonatal mortality among babies of 1,000-1,500 g following vaginal birth but no significant difference in neonatal mortality above these weights (Demirci et al 2012). An observational study found that the risk of adverse perinatal outcomes following vaginal birth was increased among babies with a birthweight below the 10th percentile and a gestational age of less than 39 weeks (Azria et al 2012). A systematic review of cohort studies found a lower risk of developmental dysplasia of the hip following caesarean section compared with vaginal birth (Panagiotopoulou et al 2012). Importantly, the follow-up study from the babies born in the Term Breech Trial showed that risk of death or developmental delay at 2 years of age did not differ with mode of birth (Whyte et al 2004).
- *Risks to the mother*: Some studies have found lower rates of maternal morbidity following vaginal birth (Kumari & Grundsell 2004; Oboro et al 2004; Hopkins et al 2007; Toivonen et al 2012), while another found a lower risk of maternal complications following caesarean section (Krebs & Langhoff-Roos 2003).

Identifying breech presentation at around 36 weeks gestation enables timely discussion of ECV and referral as required (eg to a health professional with expertise in ECV) or referral to a health professional and centre with expertise in vaginal breech birth.

61.4 External cephalic version

Offering ECV when clinically appropriate is recommended in the United Kingdom (RCOG 2010), the United States (ACOG 2006) and Australia (RANZCOG 2009).

61.4.1 Effectiveness

The reported success rate of ECV is in the range of 36.7-72.3% (Hutton et al 2003; Fok et al 2005; Nor Azlin et al 2005; Nassar et al 2006; El-Toukhy et al 2007; Weiniger et al 2007; Grootscholten et al 2008; Kok et al 2008c; Rijnders et al 2010; Buhimschi et al 2011; Burgos et al 2011; Gottvall & Ginstman 2011; Obeidat et al 2011; Bogner et al 2012; Cho et al 2012; Cluver et al 2012).

A spontaneous reversion rate of 3-14% has been reported after 36 weeks (Nassar et al 2006; El-Toukhy et al 2007; Buhimschi et al 2011; Cho et al 2012).

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61.4.2 Benefits and risks

Successful ECV reduces the rate of caesarean sections, with vaginal birth following ECV being successful in 71–84% of women (El-Toukhy et al 2007; Buhimschi et al 2011; Gottvall & Ginstman 2011; Bogner et al 2012; Reinhard et al 2013).

ECV is a safe procedure when performed in a setting where an urgent caesarean section can be performed (Nassar et al 2006; Grootscholten et al 2008; Gottvall & Ginstman 2011; Bogner et al 2012; Cho et al 2012). In a systematic review, the most frequently reported complications of ECV were transient abnormal cardiotocography patterns (5.7%), persisting pathological cardiotocography (0.37%), vaginal bleeding (0.47%) and placental abruption (0.12%) (Collaris & Oei 2004). Caesarean section was performed in 0.43% of all procedures and perinatal mortality was 0.16%.

Small studies have shown that the moderate degree of pain associated with ECV is well tolerated by the majority of women because of its short duration (Fok et al 2005) and that most women rate ECV as a good experience, whether it is successful (94%) or unsuccessful (71%) (Rijnders et al 2010).

61.4.3 Factors influencing success of ECV

Factors predicting successful ECV include posterior placental location, complete breech position, amniotic fluid index >10, unengaged presenting part, maternal weight <65 kg and thicker fundal myometrium on ultrasound (Hutton et al 2008; Kok et al 2008b; Kok et al 2009; Buhimschi et al 2011; Burgos et al 2011; Obeidat et al 2011; Bogner et al 2012; Burgos et al 2012; Cho et al 2012). ECV is also more successful in multiparous (57–78% than primiparous (27–53%) women (Nassar et al 2006; El-Toukhy et al 2007; Kok et al 2008c; Rijnders et al 2010; Burgos et al 2011; Cho et al 2012), and if the health professional performing the ECV is experienced. ECV at 34–35 weeks versus ≥37 weeks increased the likelihood of cephalic version but did not decrease the rate of caesarean section (Hutton et al 2011).

The use of tocolytics (uterine relaxants) to facilitate ECV has been shown to increase cephalic presentations (RR: 1.38; 95% CI: 1.03–1.85) and reduce the rate of caesarean sections (RR: 0.82; 95% CI: 0.71–0.94) in both nulliparous and multiparous women (Cluver et al 2012). The available evidence supports the use of beta mimetics for tocolysis (Kok et al 2008a; Wilcox et al 2011; Cluver et al 2012).

A small non-randomised study suggested that clinical hypnosis combined with tocolysis before ECV may increase success rates (Reinhard et al 2012).

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Recommendation	Grade B
60.	Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.
	Approved by NHMRC in June 2014; expires June 2019

Consensus-based recommendation	
LVI	Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.
	Approved by NHMRC in June 2014; expires June 2019

Practice point	
JJJ	External cephalic version should be performed by a health professional with appropriate expertise.
	Approved by NHMRC in June 2014; expires June 2019

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61.4.4 Other interventions

- *Acupoint stimulation*: The evidence for the effectiveness and safety of moxibustion (a Chinese medicine treatment that involves burning of *Artemisia argyi* close to the skin at an acupuncture point) is inconsistent and largely based on small studies, many of which are of poor quality with high heterogeneity. Some systematic reviews (van den Berg et al 2008; Li et al 2009; Vas et al 2009), RCTs (Habek et al 2003; Neri et al 2004) and a cohort study (Grabowska & Manyande 2009) have reported a higher rate of cephalic version with moxibustion and other acupuncture point stimulation methods, while others have found no beneficial effect (Cardini et al 2005; Guittier et al 2009). Although small studies have not observed significant maternal or fetal side effects associated with moxibustion (Neri et al 2007; Guittier et al 2008), a recent Cochrane review identified a need for further evidence on its safety and effectiveness (Coyle et al 2012).
- *Posture*: A Cochrane review (n=417) found insufficient evidence to support the use of posture management to turn a breech baby (Hofmeyr & Kulier 2011). Combined with moxibustion, postural techniques may reduce the number of non-cephalic presentations at birth (RR: 0.73; 95% CI: 0.57–0.94) (Coyle et al 2012).

61.5 Discussing fetal presentation

If a woman has a baby that is in the breech position, she should be given information in a calm, reassuring manner using appropriate terminology so that she can decide which options are most suitable to her situation. Points for discussion include that:

- for babies in the breech position, ECV may be offered (this involves a health professional using his or her hands on the woman's abdomen to gently turn the breech baby and is successful in approximately half of women, with success more likely if medications to relax the uterus are used)
- ECV is not appropriate in some situations (eg when there is vaginal bleeding, a low level of amniotic fluid or fetal or uterine anomalies)
- ECV has low complication rates but should be carried out where there are facilities for emergency caesarean section
- other interventions to turn a breech baby (posture and acustimulation) are less effective than ECV and the evidence on their safety is limited
- if a woman chooses not to have ECV, the procedure is unsuccessful or the baby returns to breech position, vaginal birth may still be possible depending on the individual situation.

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61.6 Practice summary: fetal presentation

When: At around 36 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the risks associated with malpresentation**: Explain that, while most babies turn to present with the crown of the head before labour, the birth process can be complicated if this does not occur.
- ☐ **Discuss ECV with women with a breech baby:** Explain that turning the baby before the birth reduces the need for caesarean section. Discuss the benefits and risks of the procedure and where it would take place.
- ☐ **Discuss plans for the birth:** Explain the risks and benefits associated with planned vaginal birth and caesarean section.
- ☐ **Take a holistic approach**: Encourage women to attend with family members to discuss plans for ECV and birthing options.

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61.7 Resources

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62 Prolonged pregnancy

Identification of prolonged pregnancy relies on accurate dating. True cases of prolonged pregnancy require careful monitoring and management, to reduce the risk of adverse consequences for mother and baby.

62.1 Background

The standard definition of a prolonged pregnancy (also called post-term or post-dates) is gestation that has lasted 42 weeks (294 days) or longer from the first day of the last normal menstrual period, or 14 days beyond the best estimate of the birth date (ACOG 2004; Briscoe et al 2005; Siozos & Stanley 2005; Caughey et al 2008b; Mandruzzato et al 2010).

62.1.1 Incidence of prolonged pregnancy

- The reported frequency of prolonged pregnancy is approximately 5-10%, with the most common reason being inaccurate dating (ACOG 2004; Caughey et al 2008a; Caughey et al 2008b; Delaney et al 2008; Doherty & Norwitz 2008). Routine ultrasound dating before 20 weeks gestation (see Chapter 20) significantly reduces the rate of prolonged pregnancy (Bennett KA 2004; Mandruzzato et al 2010) and the rate of induced labour (NICE 2008). Primiparity and previous prolonged pregnancy are the most common identifiable causes of true prolonged pregnancy (ACOG 2004).
- In Australia in 2010, 91.7% of women who gave birth did so at 37-41 completed weeks of gestation (term) and 0.8% gave birth at 42 or more weeks gestation (this includes spontaneous or induced labour and births by caesarean section) (Li et al 2012).

62.1.2 Risks associated with prolonged pregnancy

- *Perinatal:* The perinatal mortality rate (stillbirths plus early neonatal deaths) of 2-3/1,000 births at 40 weeks of gestation approximately doubles by 42 weeks to 4-7 deaths per 1,000 births and increases by 6-fold and higher at 43 weeks and beyond (Briscoe et al 2005). A higher risk of complications has also been reported, including (Olesen et al 2003; Clark & Fleischman 2011; Yurdakok 2011):
  - meconium aspiration syndrome
  - oligohydramnios (deficiency in amniotic fluid)
  - central nervous system damage
  - macrosomia and its associated complications (cephalopelvic disproportion, shoulder dystocia and birth injury).
- *Maternal*: reported maternal complications include:
  - increased risk of prolonged labour, trauma to the pelvic floor, vagina and perineum due to fetal macrosomia, caesarean section and postpartum haemorrhage (Olesen et al 2003; ACOG 2004; Briscoe et al 2005; Siozos & Stanley 2005; Caughey et al 2008b)
  - anxiety, particularly if the woman perceives her prolonged pregnancy as high risk (ACOG 2004; Heimstad et al 2007)
  - potential harms from unnecessary interventions resulting from false-positive test results associated with increased fetal surveillance (Divon & Feldman-Leidner 2008).

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62.2 Options in prolonged pregnancy

Policies vary on intervening in low-risk prolonged pregnancies. Offering labour induction after 41 weeks is recommended in the United Kingdom (NICE 2008) and the United States (ACOG 2004). Factors to be considered include the results of fetal assessment, favourability of the cervix (as assessed by Bishop's score), gestational age and the woman's preferences, after discussion of available alternatives and their risks and benefits (ACOG 2004; Norwitz et al 2007).

62.2.1 Sweeping the membranes

Procedures for cervical ripening, such as membrane sweeping, may be of benefit in preventing prolonged pregnancy, particularly in first pregnancies (Mandruzzato et al 2010). Membrane sweeping involves the health professional introducing a finger into the cervical os and 'sweeping' it around the circumference of the cervix during an vaginal examination, with the aim of separating the fetal membranes from the cervix and triggering the release of prostaglandins (NICE 2008).

A systematic review (n=2,797) (Boulvain et al 2005) found an association between membrane sweeping, and reduced frequency of pregnancy continuing beyond 41 weeks (RR: 0.59; 95%CI: 0.46 to 0.74) and 42 weeks (RR: 0.28; 95%CI: 0.15 to 0.50). The strength of the review was limited by small sample sizes and heterogeneity of the studies and possible publication bias for some outcomes. Subsequent RCTs have had inconsistent findings, with some confirming reduced prolonged pregnancy in low-risk women (de Miranda et al 2006; Yildirim et al 2010) and others finding no significant effect on pregnancy duration, particularly if performed before 41 weeks (Kashanian et al 2006; Hill et al 2008; Putnam et al 2011).

Membrane sweeping does not appear to increase the risk of maternal or fetal complications (eg infection) (Boulvain et al 2005; de Miranda et al 2006; Yildirim et al 2010) but is associated with discomfort during the procedure and other adverse effects (eg bleeding, irregular contractions) (Boulvain et al 2005).

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Recommendation		Grade C
61.	Consider offering membrane sweeping to women scheduled for formal induction of labour for prolonged pregnancy.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Practice point	
KKK	It may be advisable to avoid membrane sweeping before 40 weeks or in women at greater risk of Group B streptococcus.
	Approved by NHMRC in June 2014; expires June 2019 UNDER REVIEW

62.2.2 Acupuncture

A systematic review (n=212) (Smith & Crowther 2004) of studies with poor methodological quality, found limited evidence regarding the clinical effectiveness of acupuncture for induction of labour. Four additional small RCTS found that acupuncture was well tolerated but did not have significant clinical effects (Harper et al 2006; Smith et al 2008; Asher et al 2009; Modlock et al 2010).

62.3 Surveillance in prolonged pregnancy

Increased fetal and maternal surveillance aims to identify risk of adverse outcomes and ensure timely induction of labour if indicated (eg fetal compromise or oligohydramnios). There is no consensus about optimal fetal surveillance (ACOG 2004) and specialist referral or consultation is likely to be required.

There is a lack of high-level evidence on surveillance between 41 and 42 weeks. Assessments may include cardiotocography, ultrasound scan to assess amniotic fluid volume, Doppler and/or biophysical profile (Morris

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et al 2003; Lam et al 2006; Singh et al 2008; Khooshideh et al 2009; Grivell et al 2010). Compared to using amniotic pool depth, using the amniotic fluid index increases the rate of diagnosis of oligohydramnios and the rate of induction of labour, without improvement in peripartum outcomes (Nabhan & Abdelmoula 2009).

Practice points	
LLL	Women should be advised to be vigilant of a change (reduction) in fetal movements between 41 and 42 weeks.
MMM	From 41 weeks, it may be reasonable to offer twice weekly cardiotocography and ultrasound to assess amniotic fluid index for surveillance of fetal well-being.
	Approved by NHMRC in June 2014; expires June 2019 UNDER REVIEW

Increased antenatal surveillance from 42 weeks gestation is recommended in the United Kingdom (NICE 2008) and the United States (ACOG 2004). For example, ultrasound assessment of amniotic fluid volume and cardiotocography are used to evaluate fetal wellbeing. However, adverse fetal outcome in late pregnancy is not always predicted by these investigations and the relative risks and benefits of further prolonging the pregnancy should be evaluated in each case. Again, it is important that women are advised to report any changes in fetal movements.

62.4 Induction

A recent Cochrane review (Gulmezoglu et al 2012) found that compared with a policy of expectant management, a policy of labour induction was associated with lower rates of (all-cause) perinatal deaths (RR 0.31; 95%CI 0.12 to 0.88), meconium aspiration syndrome (RR 0.50; 95%CI 0.34 to 0.73) and caesarean section (RR: 0.89; 95% CI 0.81-0.97). Most studies adopted a policy of induction at 41 weeks. Another systematic review with considerable overlap in the included studies had similar findings (Hussain et al 2011).

62.5 Discussing prolonged pregnancy

Women should be provided with appropriate information and support to assist them in making an informed choice between scheduled induction for a prolonged pregnancy or monitoring without induction (or delayed induction). This should include that:

- most women go into labour spontaneously by 42 weeks
- the most common reason for a pregnancy becoming 'prolonged' is inaccurate dating
- there are risks associated with pregnancies that last longer than 42 weeks
- women with prolonged low-risk pregnancies may be offered membrane sweeping to 'trigger' labour
- membrane sweeping involves the health professional separating the membranes from the cervix as part of a vaginal examination; it is safe but may cause discomfort and vaginal bleeding
- if pregnancy is prolonged, additional surveillance and management plans will be put into place following specialist consultation, to reduce the risk of adverse outcomes
- the importance of contacting a health professional promptly if they have any concerns about decreased or absent fetal movements (see Section 22.2).

Women should be appropriately counselled in order to make an informed choice between scheduled induction for a prolonged pregnancy or monitoring without induction (or delayed induction) (Gulmezoglu et al 2012).

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62.6 Practice summary: prolonged pregnancy

When: At antenatal visits from 38 weeks onwards

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the likelihood of prolonged pregnancy:** Explain to the woman that pregnancy beyond 42 weeks is unlikely if dating is accurate.
- ☐ **Discuss why interventions may be offered:** Explain that the risk of complications increases from 42 weeks gestation. Decisions about management are made after considering the risks and benefits and taking the woman's preferences into account.
- ☐ **Discuss the need for fetal surveillance:** Explain that increased fetal monitoring is necessary from 41 weeks, to ensure that there are no risks to the baby from the pregnancy continuing.
- ☐ **Take a holistic approach:** As well as the potential for women to experience anxiety if pregnancy is prolonged, consider practical difficulties (eg when the woman has travelled to give birth or arranged additional support around the estimated date of birth) and provide advice on relevant community supports (eg available financial assistance).

62.7 Resources

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APPENDICES

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A Membership of the committees

Module I — 2008–2011

Name	Discipline and affiliations
Expert Advisory Committee (EAC) Executive	
Professor Jeremy Oats Co-Chair	Chair Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity Medical Co-Director, Integrated Maternity Services, Northern Territory Women's Hospitals Australasia
Professor Caroline Homer Co-Chair	Professor of Midwifery Centre for Midwifery, Child and Family Health, Faculty of Nursing, Midwifery and Health University of Technology Sydney
Dr Anne Sved Williams Co-Chair Screening and Monitoring Working Group	Director, Perinatal and Infant Mental Health, Children Youth and Women's Health Service, South Australia Australasian and New Zealand College of Psychiatrists
Professor Sue McDonald Co-Chair Clinical Working Group Chair Implementation Working Group	Professor of Midwifery and Women's Health La Trobe University, Victoria
Mr Bruce Teakle[26] Co-Chair Social and Lifestyle Group (until end December 2009)	Consumer representative National committee member of Maternity Coalition
Ann Catchlove[26] Co-Chair Social and Lifestyle Group Member of Implementation Working Group	Consumer representative President, Victorian Branch of The Maternity Coalition (from January 2010)
Professor Warwick Giles Co-Chair Clinical Working Group	Senior Staff Specialist, Maternal Fetal Medicine; Conjoint Professor Northern Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Dr Henry Murray Co-Chair Screening and Monitoring Group	Fetomaternal Specialist, Acting Director of Obstetrics, John Hunter Hospital, Newcastle, NSW
Associate Professor Ruth Stewart Co-Chair Social and Lifestyle Group Member of Implementation Working Group	Director of Parallel Rural Community Curriculum, Faculty of Health, Medicine, Nursing and Behavioral Science School of Medicine, Deakin University Australasian College of Rural and Remote Medicine

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26 Consumer representatives were identified through advertisements placed in Consumer Health Forum Publications for consumers with an interest in national guidelines.

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Name	Discipline and affiliations
Dr Jenny Hunt Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Public Health Medical Officer Aboriginal Health and Medical Research Council
Dr Marilyn Clarke Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Obstetrician and gynaecologist
Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	
Dr Jenny Hunt Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Public Health Medical Officer Aboriginal Health and Medical Research Council
Dr Marilyn Clarke Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Obstetrician and gynaecologist
Associate Professor Katie Panaretto	Population Health Medical Officer, Centre for Indigenous Health, University of Queensland, Queensland Aboriginal and Islander Health Council
Prof Sue Kildea	Chair of Midwifery, Australian Catholic University and Mater Mother's Hospital Australian College of Midwives
Ms Francine Eades	Senior Research Officer, Kulunga Research Network
Ms Mary Buckskin (until January 2011)	Chief Executive Officer, Aboriginal Health Council of South Australia
Ms Sue Hendy	Director of Women's, Children's & Youth Health, Western Sydney and Nepean Blue Mountains Local Health Networks
Ms Gwen Wallenburg	Community Midwife, Thursday Island
Ms Leshay Maidment	Branch Manager, Congress Alulkura, and Acting Deputy Chief Executive Officer, Central Australian Aboriginal Congress
Ms Stephanie Bell (until April 2011)	Chief Executive Officer, Central Australian Aboriginal Congress
Ms Simone Andy	Koori Maternity Strategy, Victorian Aboriginal Community Health Organisation
Ms Nicole Randriamahefa (until January 2011)	Tasmanian Aboriginal Centre National Aboriginal Community Controllled Health Organisiation
Clinical Working Group	
Prof Warwick Giles Co-Chair Working Group	Senior Staff Specialist, Maternal Fetal Medicine; Conjoint Professor Northern Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Professor Sue McDonald Co-Chair Working Group	Professor of Midwifery and Women's Health La Trobe University, Victoria

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Name	Discipline and affiliations
Dr Andrew Bisits Member of Implementation Working Group	Lead Clinician, Birthing Services, Royal Hospital for Women, Sydney
Dr John Overton	Obstetrician, Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Jenny Gamble	Associate Professor of Midwifery, Deputy Head of School (Logan campus) Griffith University, Qld Australian College of Midwives
Ms Chris Cornwell	Service Manager, Women's and Children's Hospital Adelaide, SA
Dr Elizabeth Boyd	General Practitioner, Royal Australian College of General Practitioners
Ms Nellie Vagana[27]	Consumer representative
Ms Terri Barrett	Midwifery Director, Statewide Obstetric Support Unit, King Edward Memorial Hospital, Department of Health WA
Screening and Monitoring Group	
Dr Anne Sved Williams Co-Chair Working Group	Director, Perinatal and Infant Mental Health, Children Youth and Women's Health Service, South Australia Australasian and New Zealand College of Psychiatrists
Dr Henry Murray Co-Chair Working Group	Fetomaternal Specialist, Nepean Clinical School University of Sydney Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Jenny Fenwick	Associate Professor of Midwifery, University of Technology, Sydney, NSW Australian College of Midwives
Professor Jane Fisher	Key Centre for Women's Health in Society, University of Melbourne
Associate Professor Elizabeth Sullivan	Director, AIHW National Perinatal Statistics Unit
Professor Michael Permezel	Head of Department, University of Melbourne, Mercy Hospital for Women Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Ms Tanya Farrell	Director, Maternity Services, Royal Women's and Children's Hospital, Melbourne, Victoria
Dr Sandra Eades	Senior Research Fellow, Baker IDI Heart and Diabetes Institute, Melbourne
Ms Kay Hyde	Director, Professional Governance Nurses and Midwives Board of WA
Prof Marie-Paule Austin	Consultant Psychiatrist, St John of God Chair of Perinatal and Women's Mental Health School of Psychiatry, University of NSW
Dr Helen Roxborough	General Practitioner

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Name	Discipline and affiliations
Social and Lifestyle Group	
Ann Catchlove[28] Co-Chair Working Group	Consumer representative from January 2010
Mr Bruce Teakle[28] Co-Chair Working Group	Consumer representative from January 2009 to December 2009
Louise Hartley[28]	Consumer representative August 2008 to December 2008
Associate Professor Ruth Stewart Co-Chair Working Group	Director of Clinical Studies, Integrated Model of Medical Education in Rural Settings (formerly Parallel Rural Community Curriculum), Faculty of Health, Medicine, Nursing and Behavioral Science School of Medicine, Deakin University Australasian College of Rural and Remote Medicine
Professor Maralyn Foureur	Professor of Midwifery, University of Technology, Sydney Australian College of Midwives
Mr Scott Wilson	State Director, Aboriginal & Drug Council (SA) Inc National Indigenous Drug and Alcohol Committee
Ms Robyn Collins	Chief Executive Officer, Nurses and Midwives Board of WA
Dr Ted Weaver	Obstetrician and gynaecologist, Past President, Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Professor Anne Buist	National Program Director, beyondblue
Ms Susan Stratigos	Policy Advisor, Rural Doctors Association of Australia, National Rural Women's Coalition
Ms Debra Oag	Policy Officer, Smokefree Pregnancy Project (until July 2010)
Ms Noelle Mason	Group President, Country Women's Association
Project Officers / Systematic Literature Reviewers	
Dr Stuart Barrow	Project Officer until 2010
Ms Glenda McDonald	Project Officer until 2010
Ms Wendy Cutchie	Midwifery Project Officer from 2010
Ms Vanessa Watkins	Midwifery Project Officer from June 2010
Dr Andrea Gordon	Pharmacologist, Research Fellow, Sansom Institute for Medical Research University of South Australia (contracted to project from November 2010)
Dr Antonina Mikocka-Walus	Research Fellow, School of Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Dr Rasika Jayasekara	Registered Nurse, Lecturer, School of Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Dr Lois McKellar	Lecturer, Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Ms Penny Williamson	Research Assistant (contracted to project from November 2010)
Ms Dianne Gall	Research Assistant (contracted to project from November 2010)

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28 Consumer representatives were identified through advertisements placed in Consumer Health Forum Publications for consumers with an interest in national guidelines.

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Name	Discipline and affiliations
Methodological Consultants	
Professor Sally Green	Co-Director of the Australasian Cochrane Centre and Professorial Fellow School of Public Health & Preventative Medicine, Monash University
Dr Tari Turner	Senior Research Fellow Australian Cochrane Centre, Monash University
Technical Writers	
Ms Jenny Ramson	Technical writer, Ampersand Health Science Writing
Ms Elizabeth Hall	Technical writer, Ampersand Health Science Writing

Module II — 2011–14

Name	Discipline and affiliation/s
Expert Advisory Committee (EAC)	
Professor Caroline Homer Co-Chair	Professor of Midwifery Centre for Midwifery, Child and Family Health, Faculty of Health University of Technology, Sydney
Professor Jeremy Oats Co-Chair	Chair Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity Medical Co-Director, Integrated Maternity Services, Northern Territory Professorial Fellow, Melbourne School of Population and Global Health, University of Melbourne
Dr Steve Adair	Director, The Canberra Hospital Obstetric Department
Ms Ann Catchlove	Consumer representative President, Victorian Branch of The Maternity Coalition
Dr Marilyn Clarke	Obstetrician and gynaecologist, New South Wales
Professor Warwick Giles	Honorary Medical Officer in Maternal Fetal Medicine, Royal North Shore Hospital, Sydney Conjoint Professor University of Sydney and University of Newcastle Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Dr Jenny Hunt	Public Health Medical Officer Aboriginal Health and Medical Research Council of New South Wales
Professor Sue McDonald	Professor of Midwifery Women's and Infants Health La Trobe University/Mercy Hospital for Women, Victoria

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Name	Discipline and affiliation/s
Dr Henry Murray	Director of Obstetrics Maternal Fetal Medicine subspecialist John Hunter Hospital, Newcastle, New South Wales Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Ruth Stewart	Associate Professor Rural Medicine Director Rural Clinical Training and Support, James Cook University School of Medicine and Dentistry, Townsville, Queensland Australasian College of Rural and Remote Medicine
Dr Anne Sved Williams	Director, Perinatal and Infant Mental Health, Women's and Children's Health Network, South Australia Australasian and New Zealand College of Psychiatrists
Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	
Dr Jenny Hunt Co-Chair	Public Health Medical Officer, Aboriginal Health and Medical Research Council of New South Wales
Dr Marilyn Clarke Co-Chair	Obstetrician and gynaecologist, New South Wales
Ms Simone Andy	Koori Maternity Strategy Victorian Aboriginal Community Controlled Health Organisation
Dr Lynore Geia	Adjunct Senior Lecturer (Clinical) School of Nursing, Midwifery & Nutrition James Cook University, Townsville, Queensland
Ms Sue Hendy	Director Nursing and Midwifery Health Education and Training Institute, Sydney
Professor Sue Kildea	Chair of Midwifery Australian Catholic University, Mater Health Service and Mater Research Institute, Brisbane
Ms Leshay Maidment	Branch Manager, Congress Alukura, Alice Springs, Northern Territory
Associate Professor Katie Panaretto	Population Health Medical Officer, Centre for Indigenous Health, University of Queensland Queensland Aboriginal and Islander Health Council
Ms Arimaya Yates	Registered Midwife/ Research Officer Victorian Aboriginal Community Controlled Health Organisation

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Name	Discipline and affiliation/s
Working Group for Migrant and Refugee Women's Antenatal Care	
Associate Professor Ruth Stewart Chair	Associate Professor Rural Medicine Director Rural Clinical Training and Support James Cook University School of Medicine and Dentistry, Townsville, Queensland Australasian College of Rural and Remote Medicine
Dr Daniela Costa	General practitioner Member of the Management Committee of the Multicultural Communities Council of South Australia
Ms Andrea Creado	Chief Executive Officer, Ishar Multicultural Women's Health Centre, Perth
Dr Adele Murdolo	Executive Director, Multicultural Centre for Women's Health
Ms Natalija Nesvadba	Manager, Multicultural Services, Mercy Hospital for Women, Melbourne
Ms Assina Ntawumenya	Social Worker, Women's & Children's Health Network President of African Women's Federation, South Australia
Ms Jan Williams	Clinical Services Coordinator, Migrant Health Service South Australia
Project Officers	***Systematic literature reviewers***
Ms Jo Foster	Ms Wendy Cutchie
Ms Julie Hunter	Ms Marlene Eggert
Ms Monica Pflaum	Ms Julie Wheeler
Ms Pippa Robinson	Ms Cecilia Xu
Ms Deb Welsh	
Methodological Consultant	
Ms Philippa Middleton	Australian Research Centre for Health of Women and Babies, Robinson Institute, the University of Adelaide
Technical Writers	
Ms Jenny Ramson	Ampersand Health Science Writing
Ms Elizabeth Hall	Ampersand Health Science Writing

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2016–17 review

Expert Advisory Committee Member	Discipline/expertise/special Interest	Position and organisation	Location
Co-chairs			
Professor Jeremy Oats	Obstetrics & Gynaecology	Obstetrician Professorial Fellow Melbourne School of Population & Global Health, University of Melbourne	VIC
Professor Caroline Homer AO	Midwifery	President, Australian College of Midwives Distinguished Professor of Midwifery, University of Technology Sydney	NSW
Members			
Dr Martin Byrne	GP Obstetrics	GP & Chair, GP Obstetric Advisory Committee, RANZCOG	QLD
Ms Ann Catchlove		Consumer representative	VIC
Ms Lisa Clements	Midwifery, Migrant & Refugee Women	Practice Nurse/Midwife & Primary Health Care Manger; Companion House Medical Service	ACT
Dr Anthony Hobbs	GP Obstetrics	Commonwealth Deputy Chief Medical Officer, Department of Health	ACT
Ms Tracy Martin	Midwifery	Chair, Maternity Services Inter-Jurisdictional Committee, Principal Midwifery Advisor, Nursing and Midwifery Office, WA Health	WA
Professor Sue McDonald	Midwifery, Perinatal Health	Professor of Midwifery, La Trobe University	VIC
Dr Sarah Jane McEwan	Obstetrics & Gynaecology, Indigenous Health	District Medical Officer, Hedland Health Campus, South Hedland, WA	WA
Assoc Prof Philippa Middleton	Perinatal Epidemiology	Principal Research Fellow, SA Health and Medical Research Institute/The University of Adelaide	SA
Professor Michael Permezel	Obstetrics & Gynaecology	RANZCOG (former RANZCOG President)	VIC
Professor Steve Robson (from July 2017)	Obstetrics & Gynaecology	President RANZCOG	ACT
Adjunct Professor Debra Thoms	Midwifery	Commonwealth Chief Nursing and Midwifery Officer, Department of Health	ACT

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Australian Government Department of Health (Project management and secretariat)

Name	Position
Ms Marg Sykes	Assistant Secretary, Primary Healthcare Branch, Health Services Division, Department of Health
Mr Louis Young	Director, Chronic Disease Management Section, Health Services Division, Department of Health
Ms Samantha Diplock	Assistant Director, Maternity Policy Team, Chronic Disease Management Section, Health Services Division, Department of Health
Ms Anita Soar	Policy/Project Officer, Maternity Policy Team, Chronic Disease Management Section, Health Services Division, Department of Health

Methodologists and technical writer

Methodologists	Affiliation
Assoc Prof Philippa Middleton	Principal Research Fellow, SA Health and Medical Research Institute/ The University of Adelaide
Ms Jenny Ramson	Ampersand Health Science Writing
Emily Shepherd	University of Adelaide
Technical writer	**Affiliation**
Ms Jenny Ramson	Ampersand Health Science Writing

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The Department of Health and the Expert Advisory Committee would also like to acknowledge the following people who contributed their expertise to the review:

- Professor Greg Dore, Head, Viral Hepatitis Clinical Research Program, Kirby Institute for Infection and Immunity in Society, The University of New South Wales
- Associate Professor Lisa Hui, Department of Obstetrics and Gynaecology, University of Melbourne, Department of Perinatal Medicine, Mercy Hospital for Women, Public Health Genetics group, Murdoch Childrens Research Institute
- Associate Professor Janet Vaughan, Consultant Obstetrician and Obstetrics and Gynaecology Ultrasound Subspecialist, Obstetrics Plus, Sydney.

The EAC is also grateful to the organisations and individuals who commented on the draft Guidelines through the public consultation process.

B Terms of reference

Modules I and II

Expert Advisory Committee

The Expert Advisory Committee will convene to:

- provide advice, expertise and direction on the appropriateness of the guidelines to promote optimal care for pregnant women across Australia.
- supervise the parties that are commissioned to:
  - consult with a number of advisory groups to draft and review evidence-based guidelines as well as national and international literature on antenatal care with specific attention to the health needs of Aboriginal and Torres Strait Islander pregnant women and their families, migrant and refugee women their families and other vulnerable groups
  - consult widely to develop evidenced based guidelines that will function as a useful resource for health professionals and will be of interest and relevance to pregnant women and their families in a variety of Australian health care contexts
  - undertake analysis of harms and benefits in the Australian context and determine the costs/benefits and cost effectiveness of proposed interventions in accordance with available literature
  - produce a dissemination plan for the implementation and determine a process for ongoing monitoring of clinical uptake of the guidelines
- ensure the guidelines are developed in accordance with the National Health and Medical Research Council (NHMRC) protocols and are approved by the NHMRC.

Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care

The Working Group will:

- provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for Aboriginal and Torres Strait Islander pregnant women across Australia
- review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of Aboriginal and Torres Strait Islander pregnant women
- identify additional questions and appropriate sources of evidence
- identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources)
- provide advice and draft practice points, where relevant
- provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document
- in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues relevant to antenatal care for Aboriginal and Torres Strait Islander women
- provide advice regarding the implementation of the Guidelines in settings where Aboriginal and Torres Strait Islander women receive pregnancy care
- identify areas and topics for future guideline documents
- provide ideas for making guidelines as practical as possible.

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Working Group for Migrant and Refugee Women's Antenatal Care

The Working Group will:

- provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for migrant and refugee pregnant women across Australia
- review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of migrant and refugee pregnant women
- identify additional questions and appropriate sources of evidence
- identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources)
- provide advice and draft practice points, where relevant
- provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document
- in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues relevant to antenatal care for migrant and refugee women
- provide advice regarding the implementation of the Guidelines in settings where migrant and refugee women receive pregnancy care
- identify areas and topics for future guideline documents
- provide ideas for making guidelines as practical as possible.

2016–17 review

The Expert Advisory Committee will oversee the review and revision of the National Evidence-based Clinical Practice Guidelines — Antenatal Care (incorporating both Modules I and II of the Guidelines). The role of the Expert Advisory Committee will include:

- providing advice, expertise and direction in relation to the combining of the two modules, and the review of the Guidelines to promote optimal care for pregnant women across Australia;
- reviewing the existing Guidelines to identify topics and guidelines that require updating;
- advising on the review of national and international literature on antenatal care to inform amendments required to the existing Guidelines;
- identifying any new topics and drafting new evidence-based guidelines for inclusion in the Guidelines;
- developing a plan and strategies to promote and disseminate the finalised Guidelines to ensure clinical uptake of the Guidelines;
- advising on the development of a consultation strategy (in the event that the review results in major changes to the existing Guidelines or the inclusion of new guidelines); and
- ensuring the review is conducted in accordance with the National Health and Medical Research Council's (NHMRC) protocols and submitted to the NHMRC for approval.

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C Topics under review

Lifestyle considerations

Nutrition, nutritional supplements and physical activity

Vaccines (including influenza, pertussis, varicella)

Clinical assessments

Weight and body mass index

Cervical length in assessment of risk of preterm birth

Maternal health testing

Diabetes

Anaemia

Syphilis

Chlamydia

Cytomegalovirus

Group B streptococcus

Cervical abnormalities

Fetal chromosomal anomalies

Ultrasound assessment for women who have cell-free DNA testing for chromosomal anomalies

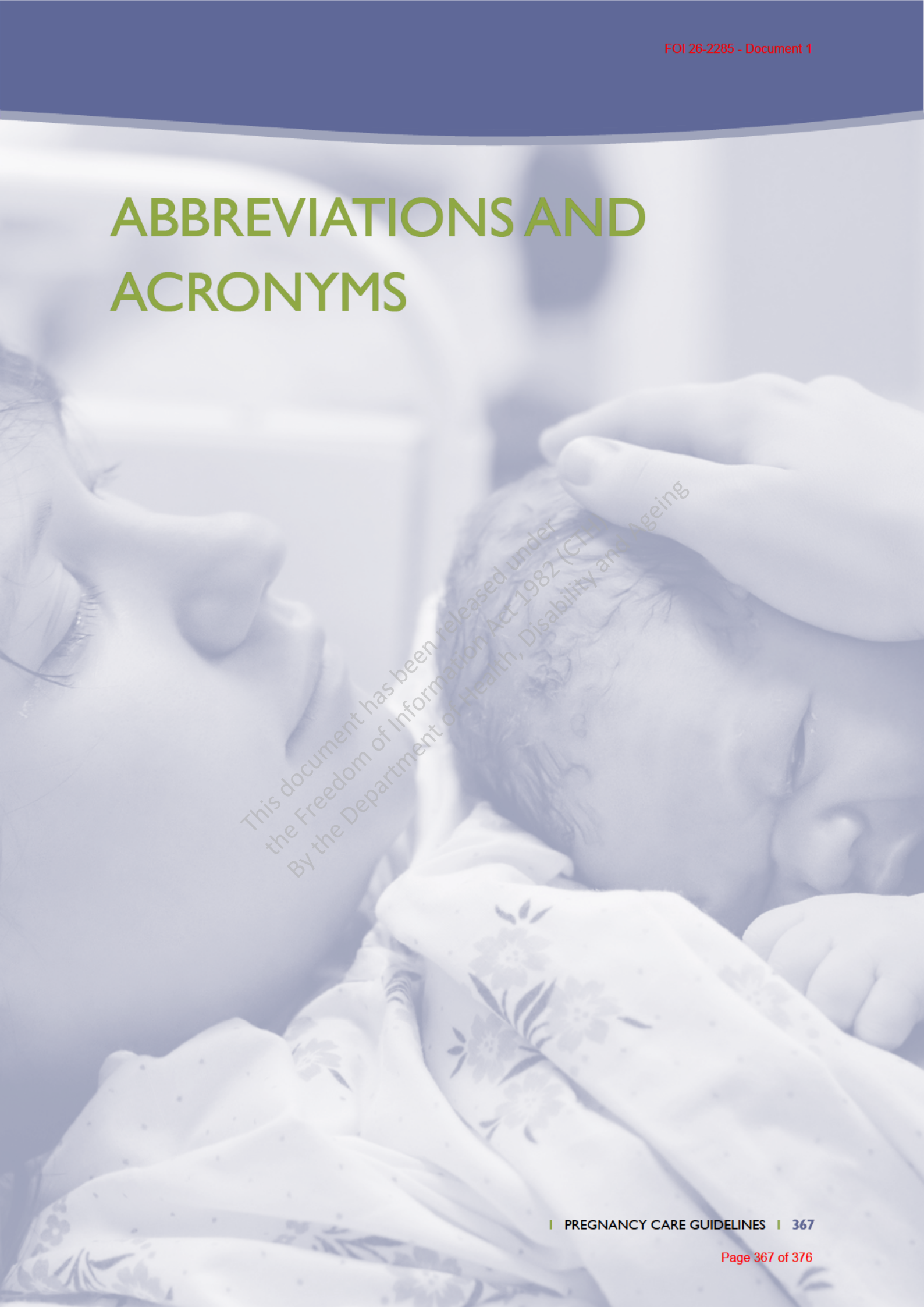
Clinical care in late pregnancy

Prolonged pregnancy

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ABBREVIATIONS AND ACRONYMS



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25-OHD	25-hydroxyvitamin D
AACR	Australasian Association of Cancer Registries
AAFP	American Academy of Family Physicians
AAOS	American Academy of Orthopaedic Surgeons
AAP	American Academy of Pediatrics
AAS	Abuse Assessment Screen
ABS	Australian Bureau of Statistic
ACOG	American College of Obstetricians and Gynecologists
ACSQHC	Australian Commission on Safety and Quality in Health Care
ADA	American Diabetes Association
ADIPS	Australasian Diabetes in Pregnancy Society
AFBP	Aboriginal Family Birthing Program
AFP	a-fetoprotein
AGREE	Appraisal of Guidelines Research and Evaluation
AHMAC	Australian Health Ministers' Advisory Council
AHMC	Australian Health Ministers' Conference
AIDS	acquired immunodeficiency syndrome
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AMGPP	Aboriginal Maternity Group Practice Program
AMIHS	Aboriginal Maternal and Infant Health Service
ANMC	Australian Nursing and Midwifery Council
ANZBMS	Australian and New Zealand Bone and Mineral Society
ANZSA	Australian and New Zealand Stillbirth Association
AOM	Association of Ontario Midwives
aOR	adjusted odds ratio
APA	American Psychiatric Association
APHDPC	Australian Population Health Development Principal Committee
APTT	activated partial thromboplastin time
ARBD	alcohol-related birth defects
ARND	alcohol-related neurodevelopmental disorders
aRR	adjusted relative risk
ASHM	Australasian Society for HIV Medicine
ATAGI	Australian Technical Advisory Group on Immunisation
ATAPS	Access to Allied Psychological Services
AusDiab	Australian Diabetes, Obesity and Lifestyle Study
AWHN	Australian Women's Health Network
AWST	Women Abuse Screen Tool
β-hCG	beta-human chorionic gonadotrophin
BASHH	British Association for Sexual Health and HIV
BMA	British Medical Association
BMI	body mass index
BPD	biparietal diameter
CARPA	Central Australian Rural Practitioners Association
CATSINaM	College of Aboriginal and Torres Strait Islander Nurses and Midwives
CBR	consensus-based recommendation
CBT	cognitive behaviour therapy
CCOPMM	Consultative Council on Obstetric and Paediatric Mortality and Morbidity (Victoria)
CCPHPC	Community Care and Population Health Principal Committee
CDAF	California Dental Association Foundation
CDC	Centers for Disease Control and Prevention (United States)
CDSMC	Community and Disability Services Ministers' Conference
CEE	Centre for epidemiology and Evidence (NSW)
CEH	Centre for Culture Ethnicity and Health
CER	Centre for Epidemiology and Research
cfDNA	cell-free deoxyribonucleic acid
CGE	Centre for Genetics Education (NSW Health)
CHF	Consumers' Health Forum
CHWS	Child Health and Wellbeing Subcommittee
CI	confidence interval
CIE	Centre for International Economics
CMACE	Centre for Maternal and Child Enquiries
COAG	Council of Australian Governments
CPS	Canadian Paediatric Society
CRL	crown-rump length
CTFPHE	Canadian Task Force on the Periodic Health Examination
D&C	dilatation and curettage
DAME	Diabetes and Antenatal Milk Expression (Study)
DFAT	Department of Foreign Affairs and Tourism
DNA	deoxyribonucleic acid
DoHA	Department of Health and Ageing
dTpa	diphtheria-tetanus-acellular pertussis
DTRS	Department of Transport and Regional Services

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EAC	Expert Advisory Committee
EBR	evidence-based recommendation
ECCI	European Congenital Cytomegalovirus Initiative
ECV	external cephalic version
EIA	enzyme immunoassay
EPDS	Edinburgh Postnatal Depression Scale
FAS	fetal alcohol syndrome
FASD	fetal alcohol spectrum disorders
FGM	female genital mutilation
FGM/C	female genital mutilation/cutting
FSANZ	Food Standards Australia and New Zealand
FTA-abs	fluorescent treponemal antibody-absorbed test
GAR	Guidelines Assessment Register
GORD	gastro-oesophageal reflux disorder
GP	general practitioner
GRADE	Grading of Recommendations, Assessment, Development and Evaluation
HAPO	Hyperglycaemia and Adverse Pregnancy Outcome (study)
HARK	Humiliation, Afraid, Rape, Kick
HbA1c	glycated haemoglobin
HbsAg	hepatitis B surface antigen
HC	head circumference
hCG	human chorionic gonadotrophin
HDL	high density lipoprotein
HGSA	Human Genetic Society of Australasia
HITS	Hurt, Insult, Threaten, Scream
HIV	human immunodeficiency virus
HoRSCHA	House of Representatives Standing Committee on Health and Ageing
HPV	human papilloma virus
HT	head and trunk volume
IADPSG	International Association of Diabetes and Pregnancy Study Groups
IARC	International Agency for Research on Cancer
ICER	incremental cost-effectiveness ratio
IDF	International Diabetes Federation
IOM	Institute of Medicine (US)
IU	International unit
IUSTI	International Union against Sexually Transmitted Infections
IVF	in vitro fertilisation
LGR	ligase chain reaction
LIFE	Living Is For Everyone
LLETZ	large loop excision of the transformation zone
LMP	last menstrual period
LSD	lysergic acid diethylamide
MBS	Medicare Benefits Schedule
MCH	mean corpuscular haemoglobin
MCV	mean corpuscular volume
MD	mean difference
MDMA	methylenedioxymethamphetamine
mmHg	millimetres of mercury
mmol/mol	millimoles per mole
MSAC	Medical Services Advisory Committee
MSHR	Menzies School of Health Research
MSIJC	Maternity Services Inter-Jurisdictional Committee
NAAT	nucleic acid amplification test
NAATI	National Association of Accreditation for Translators and Interpreters
NACCHO	National Aboriginal Community Controlled Health Organisation
NACOH	National Advisory Committee on Oral Health
NAHSWP	National Aboriginal Health Strategy Working Party
NATA	National Association of Testing Authorities
NCHECR	National Centre for HIV Epidemiology and Clinical Research
NCSP	National Cervical Screening Program
NHMRC	National Health and Medical Research Council
NICE	National Institute of Health and Clinical Excellence
NIPT	non-invasive prenatal testing
nmol/L	nanomoles per litre
NNDSS	National Notifiable Diseases Surveillance System
NPS	National Prescribing Service (UK)
NRHA	National Rural Health Association
NRT	nicotine replacement therapy
NT DHCS	Northern Territory Department of Health and Community Services
NT-UEMP	Nuchal Translucency - Ultrasound, Education and Monitoring Project
NZ MoH	New Zealand Ministry of Health
NZCM	New Zealand College of Midwives

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OR	odds ratio
PAPP-A	pregnancy-associated placental protein-A
PBS	Pharmaceutical Benefits Scheme
PCR	polymerase chain reaction
PEG	polyethylene glycol
PHAC	Public Health Agency of Canada
PHLS	Public Health Laboratory Service (United Kingdom)
PIGF	placental growth hormone
pmol/L	picomoles per litre
PP	practice point
PT	prothrombin time
QEBR	qualified evidence-based recommendation
RACGP	Royal Australian College of General Practitioners
RADIUS	Routine Antenatal Diagnostic Imaging with Ultrasound
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCOG	Royal College of Obstetricians and Gynaecologist (UK)
RCT	randomised controlled trial
RNA	ribonucleic acid
RPR	rapid plasma reagin
RR	relative risk
sFlt-1	soluble fms-like tyrosine kinase-1
SIDS	sudden infant death syndrome
SIGN	Scottish Intercollegiate Guidelines Network
SMD	standardised mean difference
SOGC	Society of Obstetricians and Gynaecologists of Canada
square	Suicide, Questions, Answers and Resources
SUDI	sudden and unexpected death in infancy
TGA	Therapeutic Goods Administration
TPHA	Treponema pallidum haemagglutination assay
TSH	thyroid-stimulating hormone
US DHHS	United States Department of Health and Human Services
USPSTF	United States Preventive Services Task Force
VCCCVM	Victorian Community Council on Crime and Violence Management
VDRL	Venereal Diseases Research Laboratory
WHA	Women's Hospitals Australasia
WHO	World Health Organization
WSDH	Washington State Department of Health

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GLOSSARY



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Aboriginal and Torres Strait Islander peoples: It is recognised that there is no single Aboriginal or Torres Strait Islander culture or group, but numerous groupings, languages, kinships, and tribes, as well as ways of living. Furthermore, Aboriginal and Torres Strait Islander peoples may currently live in urban, rural or remote settings, in urbanised, traditional or other lifestyles, and frequently move between these ways of living.

Acupressure: Acupressure is a noninvasive variation of acupuncture that involves application of constant pressure to specific points or areas.

Acustimulation: Mild electrical stimulation to specific points or areas.

Amniocentesis: A diagnostic test for chromosomal anomalies, such as trisomy 21 (Down syndrome), where an ultrasound guided needle is used to extract a sample of the amniotic fluid.

Antiretroviral treatment: the use of medicines to reduce growth of retroviruses, primarily HIV.

Auscultation: The detection of the fetal heart using Doppler or a Pinard stethoscope.

Cardiotocography: A technical means of recording the fetal heart rate and uterine contractions.

Chorionic villus sampling (CVS): diagnostic test for chromosomal anomalies such as trisomy 21 (Down syndrome) where an ultrasound guided needle is used to extract a sample of the placenta.

Cleft lip and/or palate: variations of a congenital anomaly caused by non-fusion of embryonic facial lobes.

Cognitive-behavioural therapy: Psychological therapy based on the assumption that faulty thinking patterns, maladaptive behaviours and "negative" emotions are all inter-related. Treatment focuses on changing an individual's thoughts (cognitive patterns) or maladaptive behaviours in order to change emotional states. Cognitive-behavioural therapy integrates the cognitive restructuring approach of cognitive therapy with the behavioural modification techniques of behavioural therapy.

Ectopic pregnancy: a pregnancy in which implantation of the fertilised egg takes place outside the uterus, usually in a fallopian tube. Ectopic pregnancies usually result in miscarriage but can cause rupture of the fallopian tube and severe internal bleeding.

Edinburgh Postnatal Depression Scale (EPDS): The EPDS was developed and validated as a screening tool for depression in the postnatal period. It has subsequently been validated for use in pregnant women and is therefore appropriate for use throughout the perinatal period.

Educational and motivational interviewing strategies: Education strategies given to all members of the intervention group. Counselling delivered by a number of means: through primary carer, medical professional, professional counsellor, targeted printed material etc.

External cephalic version: A procedure in which a health professional uses his or her hands on a woman's abdomen to turn a breech baby.

First antenatal visit: The first visit specifically for antenatal care following confirmation of the pregnancy.

First contact: The visit in which a woman attends to confirm pregnancy, seek antenatal care or make arrangements for the birth.

Herbal medicines: Preparations such as tablets, tinctures and infusions that are made from plant parts. These preparations are usually formulated based on traditional uses of Western or Chinese herbs.

Induction of labour: A procedure to artificially start the process of labour by way of medical, surgical or medical and surgical means.

Interventions based on stages of change (smoking cessation): Similar to cognitive behavioural and education strategies, except that these interventions were grouped separately as they involve assessment of "readiness" to change and exposure to the intervention may be more selective.

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Low birth weight: Birth weight of less than 2,500 g.

Macrosomia: Birth weight higher than 4,000 g.

Maternal serum screening: A blood test performed during pregnancy to detect markers of chromosomal anomaly, such as trisomy 21 (Down syndrome).

Migrant and refugee women: The term 'migrant and refugee' is used in these Guidelines to refer both to women who are voluntary migrants and women who come to Australia as refugees, humanitarian entrants or asylum seekers.

Miscarriage: the spontaneous end of a pregnancy at a stage where the embryo or fetus is incapable of surviving independently, generally defined in humans as before 20 weeks.

Neonatal abstinence syndrome: A withdrawal syndrome occurring among newborns exposed to opiates (and some other substances) in utero.

Nuchal translucency thickness assessment: An ultrasound scan performed between 11 and 13 weeks of pregnancy that measures the thickness of the nuchal fold behind the baby's neck – a marker of chromosomal anomaly, such as trisomy 21 (Down syndrome).

Oligohydramnios: A deficiency of amniotic fluid.

P6 (or Neiguan) point: an acupuncture point located on the anterior aspect of the forearm near the wrist.

Passive smoking: The inhalation of smoke, called second-hand smoke or environmental tobacco smoke, from tobacco products used by others.

Perinatal period: For the purposes of these guidelines, 'perinatal' is defined as the period covering pregnancy and the first year following pregnancy or birth. It is acknowledged that other definitions of this term are used for data collection and analysis. The definition used here broadens the scope of the term perinatal in line with understanding of mental health in pregnancy and following birth.

Pernicious anaemia: An autoimmune condition that results in an inability to absorb vitamin B_{12}.

Pharmacotherapies (smoking cessation): Studies cited in Lumley et al 2009 used nicotine replacement therapy, as patches, gum or lozenge. Other studies considered bupropion or other pharmacological agents.

Placenta praevia: An obstetric complication in which the placenta is attached to the uterine wall close to or covering the cervix.

Placental abruption: A potentially life-threatening obstetric complication in which the placental lining separates from the uterus of the mother.

Polyhydramnios: Accumulation of excess amniotic fluid during pregnancy.

Preterm birth: Birth at less that 37 weeks gestation.

Proteinuria: The presence of an excess of serum proteins in the urine.

Psychological preparation: In the context of these Guidelines, this is defined as using psychological approaches (eg focusing on coping skills, cognitive restructuring, problem-solving and decision-making) to assist women and their partners to be prepared for parenthood.

Psychosocial support (smoking cessation): Includes discussion groups, provision of support materials (unless CBT-based), provision of telephone support etc.

Psychosocial: In the context of these Guidelines, this refers to social factors that have the potential to affect a woman's emotional well-being.

Pyelonephritis: An ascending urinary tract infection that has reached the pyelum (pelvis) of the kidney.

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Rewards and incentives (smoking cessation): Intervention group provided rewards or incentives (payment; one study provided a lottery for participants), usually based on smoking status evaluated by biochemical markers.

Singleton breech: A single baby whose buttocks (rather than head) is overlying the maternal pelvis.

Stillbirth: The birth of a baby that has died in the uterus after 20 weeks of pregnancy or reaching a weight of more than 400 g if gestational age is unknown.

Sudden and unexpected death in infancy: The sudden death of an infant that is unexpected by history and remains unexplained after a thorough forensic autopsy and a detailed death scene investigation.

Trisomy 13: A genetic disorder in which a person has three copies of genetic material from chromosome 13, instead of the usual two copies. Also referred to as Patau syndrome or trisomy D.

Trisomy 18: A genetic disorder caused by the presence of all or part of an extra 18th chromosome. Also referred to as Edwards syndrome or trisomy E.

Trisomy 21: Chromosomal anomaly due to an additional chromosome 21. Also referred to as Down syndrome.

Woman-focused communication skills: These involve techniques and attitudes that indicate respect for the woman, a willingness to listen to her perspectives, values and current life circumstances around antenatal concerns, and not direct the woman into any particular course of action. Woman-centred communication skills can include giving appropriate information, but always includes communication that views the woman as a capable and responsible person, and creates a respectful, supportive and effective alliance between the woman and the health professional.

Methodological terms

ADAPTE framework: A systematic approach to aid in the adaptation of guidelines produced in one setting to be used in a different cultural and/or organisational context.

AGREE: A framework for assessing the quality of clinical practice guidelines, including that the potential biases of guideline development have been addressed adequately and that the recommendations are both internally and externally valid, and are feasible for practice. This process involves taking into account the benefits, harms and costs of the recommendations, as well as the practical issues attached to them. Therefore, the assessment includes judgements about the methods used for developing the guidelines, the content of the final recommendations, and the factors linked to their uptake.

Citation bias: The citation or non-citation of research. Citing of trials in publications is not objective so retrieving studies using this method alone may result in biased results. Unsupported studies tend to be cited often which may also bias results.

Confidence interval: An interval describing the range of values within which there is reasonable certainty that the true effect lies. Uncertainty increases with the width of the interval.

Consensus-based recommendation: Recommendations based on systematic review of the literature where evidence is found to be limited or lacking.

Language bias: The publication of research findings in a particular language. Significant results are more likely to be published in English so a search limited to English-language journals may result in an overestimation of effect.

Mean difference: The absolute difference between the mean value in two groups in a clinical trial, which estimates the amount by which the intervention changes the outcome on average compared with the control.

Multiple publication bias: The multiple or singular publication of research findings. Studies with significant

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results tend to be published multiple times which increases the chance of duplication of the same data and may bias the results of a review.

Odds ratio: the ratio of the likelihood of an event occurring in one group to that of it occurring in another group. An odds ratio of 1 indicates that the condition or event under study is equally likely to occur in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely to occur in the first group and an odds ratio less than 1 indicates that the condition or event is less likely to occur in the first group.

Outcome reporting bias: The selective reporting of some outcomes but not others. Outcomes with favourable findings may be reported more. For example, adverse events have been found to be reported more often in unpublished studies. This may result in more favourable results for published studies.

Practice point: For the purposes of these Guidelines, these cover areas of antenatal care that were beyond the scope of the literature reviews but where the EAC determined there was a need for advice. These points are based on best practice clinical judgement.

Publication bias: The publication or non-publication of research findings. Small, negative trials tend not to be published and this may lead to an overestimate of results of a review if only published studies are included.

Randomised controlled trial: A study in which participants are allocated at random to receive one of several clinical interventions. One of these interventions is the standard of comparison or control. The control may be a standard practice, a placebo or no intervention at all.

Recommendation: Evidence-based action statement developed through systematic review of the literature.

Relative risk: The ratio of the risk (rate) of an outcome in an exposed group (eg to a specific medicine) to the risk (rate) of the outcome in an unexposed group in a specified time period.

Sensitivity: The proportion of people with the condition who have a positive test result.

Specificity: The proportion of people without the condition who have a negative test result.

Systematic literature review: A systematic review of evidence focused on a research question(s) that aims to identify, appraise, select and synthesise all high quality research evidence relevant to that question.

Time-lag bias: The rapid or delayed publication of research findings. Studies with positive results tend to be published sooner than studies with negative findings and hence results may be overestimated until the negative studies 'catch up'.

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Related documents

- *Short-form Guideline*
- *Administrative Report*
- *Linking Evidence to Recommendations*
- *Economic Analyses*

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Australian Pregnancy Care Guidelines

Main editor

Living Evidence for Australian Pregnancy and Postnatal Care (LEAPP)

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Australian Living Evidence Collaboration

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1. Australian Pregnancy Care Guidelines



Info Box

These guidelines are being actively updated.
These guidelines are based on the 2020 Australian *Clinical Practice Guidelines: Pregnancy Care*[3]. Recommendations and other content will be progressively updated and included in the guidelines.

There is currently one updated recommendation on alcohol in pregnancy.

Several good practice statements have been re-approved from the previous guideline, with no change to the recommendations. These include recommendations on:

- Advising women on the number of antenatal appointments
- Antenatal education programs
- Checking which multivitamin supplements women are taking
- Monitoring smoking and substance use
- Changing the agreed due date
- Training for ultrasound assessment of gestational age and diagnosis
- Women who are non-immune to rubella.

These recommendations are formally open for public consultation ahead of NHMRC approval. Comments on these and other recommendations can be submitted at any time using the 'Feedback' link beneath each recommendation.

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Summary of recommendations

New

Download a summary of the recommendations only from these guidelines.

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Updating the Australian *Pregnancy Care Guidelines*

Info Box

In 2023, the Australian Government Department of Health and Aged Care commissioned the Australian Living Evidence Collaboration (ALEC, https://livingevidence.org.au), in partnership with the Australian College of Midwives (ACM) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), to update the Australian *Pregnancy Care Guidelines*.

The Living Evidence in Australian Pregnancy and Postnatal Care (LEAPP) project was established to update and establish the *Pregnancy Care Guidelines* as 'living' guidelines. In living guidelines, key recommendations in areas of uncertainty or rapidly moving research can be continually updated, keeping pace with the best available evidence.

The Australian *Pregnancy Care Guidelines* were last published in 2020, although some recommendations and guidance were developed earlier: Module I was published in 2012, Module II was published in 2014, and some sections were reviewed and updated in 2016–17.

This edition of the *Pregnancy Care Guidelines* currently incorporates content from the 2020 edition, and will be progressively updated. Draft recommendations undergoing public consultation will also be published here. Information on the date and approval status of recommendations is included with each recommendation.

ALEC will seek approval for all new and updated recommendations under Section 14A of the *National Health and Medical Research Council Act 1992*. Draft recommendations yet to receive this approval will be clearly identified.

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1.1 Introduction

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Info Box

Antenatal care is a usual part of pregnancy for most women who give birth in Australia. Women receive antenatal care in community and hospital-based settings and see a range of health professionals. Effective models of antenatal care have a focus on the individual woman's needs and preferences, collaboration and continuity of care.

Within the diversity of women that make up the Australian population, some face greater disadvantage, experience difficulties in accessing health services and may experience poorer outcomes. The broader context of a woman's life should be considered in planning and providing pregnancy care. Taking a woman-centred approach also ensures that a woman's social, emotional, physical, psychological, spiritual and cultural needs and expectations are considered and respected. Throughout the pregnancy, women should be given information in an appropriate form to support them to make choices about their care.

Objective of the Guidelines
The Guidelines aim to improve the health and experiences of pregnant women and their babies by providing evidence-based recommendations to support high quality, safe, consistent care during pregnancy.

Scope
The Guidelines cover the antenatal care of healthy pregnant women (that is, women who do not have identified pre-existing conditions and are not at higher risk of complications such as in multiple pregnancy). They are intended for use in all settings where antenatal care is provided, including primary care, obstetric and midwifery practice and public and private hospitals.

This includes:

- discussing health and wellbeing during pregnancy (eg nutrition, physical activity)
- providing information to support parents to prepare for the rest of pregnancy, childbirth and parenthood
- promoting and supporting breastfeeding
- assessing fetal wellbeing (eg offering an 18–20 week ultrasound scan, discussing fetal movements and assessing fetal growth)
- assessing the health of the woman, in particular factors indicating that additional care may be required (eg for women at increased risk of preterm birth or pre-eclampsia)
- assessing for any condition that may affect the health of the woman or the unborn baby (eg anaemia, diabetes, sexually transmitted infections, mental health disorders)
- providing advice on symptoms that are common during pregnancy (eg reflux and haemorrhoids)
- discussing and offering testing for chromosomal anomalies
- providing opportunities for women to raise any issues they wish to discuss
- providing ongoing support
- enabling consultation and referral when required.

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The Guidelines do *not* include:

- information on preconception, birth or postnatal care
- advice on clinical management of conditions or risks identified through testing or clinical assessment (with some exceptions, such as the treatment of syphilis)

These Guidelines are not intended as a textbook of antenatal care. A process of prioritisation was used to decide which topics were relevant to the Australian context and important to include in these Guidelines. Health professionals are directed to appropriate resources or other relevant guidelines where available.

Intended audience
The primary audience for these Guidelines includes all health professionals who contribute to antenatal care, including midwives, general practitioners (GPs), obstetricians, maternal and child health nurses (also called child and family health nurses), Aboriginal and Torres Strait Islander Health Practitioners; Aboriginal and Torres Strait Islander Health Workers, multicultural health workers, practice nurses, allied health professionals, childbirth and parenting educators and sonographers. The way in which different professionals use these Guidelines will vary depending on their knowledge, skills and role, as well as the setting in which care is provided.

These Guidelines will also be of interest and relevance to pregnant women in Australia. In addition, it is expected that policy makers will be able to draw on the Guidelines in the development of policy and health services.

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2. Reading guide

Pregnancy care is an important care model for pregnant women, and it is associated with better maternal and child health outcomes. Across Australia, pregnant women receive care from a diverse array of healthcare professionals, both within hospital and community settings. To maintain the uniformity and quality of antenatal care, the clinical practice guidelines have been implemented nationwide since 2008. These guidelines are relied on the best available evidence and have undergone multiple updates over the years. The most recent version of this guidelines, Pregnancy Care Guidelines, was developed in 2018, with selected recommendations receiving additional updates in 2020. However, as research in the area of pregnancy and pregnancy care is rapidly expanding and some recommendations from the guideline were outdated, there is a need to update the existing guideline using the living evidence approach by incorporating the most up-to-date evidence. The living evidence approaches will lead to recommendations that will be updated weekly when new evidence is available. This will be reflected in the publication of a new version in which changes made to a specific recommendation or supporting information are highlighted to emphasize the update.

The guideline consists of two layers

1. **The Recommendations**

Recommendation for (Green)

A strong recommendation is given when there is high-certainty evidence showing that the overall benefits of the intervention are clearly greater than the disadvantages. This means that all, or nearly all, women will want the recommended intervention.

Recommendation against (Red)

A strong recommendation against the intervention is given when there is high-certainty evidence showing that the overall disadvantages of the intervention are clearly greater than the benefits. A strong recommendation is also used when the examination of the evidence shows that an intervention is not safe.

Conditional Recommendation for (Yellow)

A conditional recommendation is given when it is considered that the benefits of the intervention are greater than the disadvantages, or the available evidence cannot rule out a significant benefit of the intervention while assessing that the adverse effects are few or absent. This recommendation is also used when women preferences vary.

Conditional Recommendation against (Orange)

A conditional recommendation is given against the intervention when it is judged that the disadvantages of the intervention are greater than the benefits, but where this is not substantiated by strong evidence. This recommendation is also used where there is strong evidence of both beneficial and harmful effects, but where the balance between them is difficult to determine. Likewise, it is also used when women's preferences vary.

Only in research settings (Orange)

An "only in research settings" recommendation is given when there is insufficient evidence to determine if an intervention is either beneficial or harmful. When an "only in research" recommendation is given, the panel recommends that the intervention should only be considered in a randomized clinical trial with appropriate ethical approval. In any other circumstance, intervention is not recommended.

Consensus Recommendation (Bluish-Purple)

A consensus recommendation can be given for or against the intervention. This type of recommendation is used when there is not enough evidence to give an evidence-based recommendation, but the panel still regards it as important to give a recommendation.

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2. Supporting information

Early recommendations are primarily adapted from other guidelines and/or based on the consensus of the guideline panel, and supporting information will be limited. Additional information will be added as recommendations are updated in light of new evidence to provide further information about specific recommendations.

Evidence profile: The overall effect estimates and references to the studies.

Summary: Overview and brief review of the underlying evidence.

Certainty of the evidence:

- **High**: We are very sure that the true effect is close to the estimated effect.
- **Moderate**: We are moderately sure of the estimated effect. The true effect is probably close to this one, but there is a possibility that it is significantly different.
- **Low**: We have limited confidence in the estimated effect. The true effect may be significantly different from the estimated effect.
- **Very low**: We have very little confidence in the estimated effect. The true effect is likely to be significantly different.

Evidence to decision: Brief description of beneficial and harmful effects, certainty of evidence and considerations of patient preferences.

Rationale: Description of how the above elements were weighted in relation to each other and resulted in the current recommendation direction and strength.

Practical information: Practical information regarding the treatment and information on any special patient considerations.

Adaption: If the recommendation is adapted from another guideline you can find more information here.

Feedback: If you are logged in as a user, you can comment on specific recommendations.

References: Reference list for the recommendation.

The gradation of evidence quality and recommendation strength used is based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE). For a quick and informative introduction to GRADE, the article Understanding GRADE: an introduction by Goldet & Howick is recommended (J Evid Based Med 2013;6(1):50-4). See also http://www.gradeworkinggroup.org.

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2.1 Language used in these Guidelines

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Our approach and the language we use aims to be inclusive and accessible to everyone. We're committed to listening to and reflecting the voices of women and transgender, non-binary and gender diverse communities. Many of our member organisations are currently exploring ways we can adopt language that's inclusive, clinically accurate, non-discriminatory and sensitive to all. This is a work in progress that we're following closely.

In the meantime, when working with individuals or telling their stories, we use their preferred pronouns and appropriate gendered language. In all other places, we use current terminology (for example, pregnant women, mothers and the maternal healthcare system) but apply our gender-inclusive principles. At all times, we understand that there are multiple ways people identify themselves and no offence is ever intended by using commonly referenced clinical or cultural linguistic conventions.

2.2 New and updated recommendations

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New and updated guidelines added to the LEAPP Pregnancy Guidelines consist of two layers:

1. The Recommendations

Recommendation for (Green)

A strong recommendation is given when there is high-certainty evidence showing that the overall benefits of the intervention are clearly greater than the disadvantages. This means that all, or nearly all, women will want the recommended intervention.

Recommendation against (Red)

A strong recommendation against the intervention is given when there is high-certainty evidence showing that the overall disadvantages of the intervention are clearly greater than the benefits. A strong recommendation is also used when the examination of the evidence shows that an intervention is not safe.

Conditional/Weak Recommendation for (Yellow)

A conditional recommendation is given when it is considered that the benefits of the intervention are greater than the disadvantages, or the available evidence cannot rule out a significant benefit of the intervention while assessing that the adverse effects are few or absent. This recommendation is also used when women preferences vary.

Conditional/Weak Recommendation against (Orange)

A conditional recommendation is given against the intervention when it is judged that the disadvantages of the intervention are greater than the benefits, but where this is not substantiated by strong evidence. This recommendation is also used where there is strong evidence of both beneficial and harmful effects, but where the balance between them is difficult to determine. Likewise, it is also used when women's preferences vary.

Only in research settings (Orange)

An "only in research settings" recommendation is given when there is insufficient evidence to determine if an intervention is either beneficial or harmful. When an "only in research" recommendation is given, the panel recommends that the intervention should only be considered in a randomised clinical trial with appropriate ethical approval. In any other circumstance, intervention is not recommended.

Consensus Recommendation (Bluish-Purple)

A consensus recommendation can be given for or against the intervention. This type of recommendation is used when there is not enough evidence to give an evidence-based recommendation, but the panel still regards it as important to give a recommendation.

Good practice statement

Good practice statements are recommendations made by the panel where an evidence review has not been conducted. These recommendations are often about how care is provided, or additional information that may be useful to health professionals, rather than which interventions are the most effective.

2. Supporting information

Additional information is presented immediately below each recommendation to provide context for the recommendation. In addition, the following sections may appear below each guideline to provide specific types of information:

Evidence profile: A summary of the research evidence found to support the recommendation, and an assessment of the certainty of the evidence.

Summary: A brief overview of the evidence.

Certainty of the evidence: Assessed using the GRADE approach.

- **High**: We are very sure that the true effect is close to the estimated effect.
- **Moderate**: We are moderately sure of the estimated effect. The true effect is probably close to this one, but there is a possibility that it is significantly different.
- **Low**: We have limited confidence in the estimated effect. The true effect may be significantly different from the estimated effect.
- **Very low**: We have very little confidence in the estimated effect. The true effect is likely to be significantly different.

Evidence to decision: A brief description of additional considerations used to inform the recommendation, including the balance of beneficial and harmful effects, certainty of evidence, patient preferences and values, equity, resources, feasibility and acceptability of the recommendation.

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Rationale: Description of how the above elements were weighted in relation to each other and resulted in the current recommendation direction and strength.

Practical information: Practical information regarding the intervention or recommendation, and information on any specific considerations for different population groups.

Adaption: If the recommendation is adapted from another guideline, you can find more information here.

Feedback: If you are logged in as a user, you can comment here on specific recommendations. See here for guidance on how to log in. You can also provide feedback through admin.alec@monash.edu.

References: Reference list for the recommendation.

The assessment of certainty of the evidence and the evidence-to-decision framework used for these guidelines is based on the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

2.3 Recommendations from the 2020 Australian *Clinical Practice Guidelines: Pregnancy Care*

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The date of evidence review and date of NHMRC approval are stated alongside each recommendation.

For recommendations from the 2020 Guidelines, evidence-based recommendations were graded using different systems depending on the year of update. Recommendations were graded according to the National Health and Medical Research Council (NHMRC) *Levels of Evidence and Grades for Recommendations for Developers of Guidelines* (2009) for the 2010–2011 and 2012–2013 reviews, and using GRADE methods for the 2016–2017, 2018-2019 and 2019-20 reviews. Recommendations were approved by the NHMRC in December 2011, June 2014, October 2017 April 2019 and October 2020, respectively.

Where evidence was limited or lacking, consensus-based recommendations (CBRs) were developed. Some recommendations and CBRs from other national guidelines have also been included, where these were based on systematic review of the evidence.

For areas beyond the scope of the systematic reviews, practice points (PPs) were developed by the EAC/EWG, the Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and/or the Working Group for Migrant and Refugee Women's Antenatal Care (see Appendices A and B).

Definition of grades of recommendations (2010–11 and 2012–13 reviews)

Type	Definition
Grade A:	Body of evidence can be trusted to guide practice
Grade B:	Body of evidence can be trusted to guide practice in most situations
Grade C:	Body of evidence provides some support for recommendation(s) but care should be taken in its application
Grade D:	Body of evidence is weak and recommendation must be applied with caution
CBR	Recommendation formulated in the absence of quality evidence (where a systematic review of the evidence was conducted as part of the search strategy)
PP	Area is beyond the scope of the systematic literature review and advice was developed by the EWG

Source: Adapted from NHMRC (2009) Levels of Evidence and Grades for Recommendations for Developers of Guidelines and NHMRC (2011) Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines.

Definition of grades of recommendations (2016–17 2018-19 and 2019-20 reviews)

Type	Definition
Evidence-based recommendation (EBR)	Body of evidence can be trusted to guide practice
Qualified evidence-based recommendation (QEBR)	Body of evidence can be trusted to guide practice in most situations
CBR	Recommendation formulated in the absence of quality evidence (where a systematic review of the evidence was conducted as part of the search strategy)
PP	Area is beyond the scope of the systematic literature review and advice was developed by the EWG

For more detailed information on the methods used to develop previous versions of the guidelines, see Appendix 1.

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3. Methods and processes

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Information about the methods and processes used to develop new and updated recommendations for these Guidelines is described in the Technical Report.

Information about our governance structure and member organisations is available in our Administrative Report.

Conflicts of interest
Our policy for managing conflicts of interest and the template used for collecting the declarations of interest can be found here.

Public consultation
We welcome feedback and suggestions. Comments can be submitted via the feedback function under each recommendation in MAGIC or by emailing admin.alec@monash.edu.

Previous version of the Guidelines
For the methods and processes used to develop the 2020 guidelines and previous versions, please see Appendix 1.

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4. Optimising pregnancy care

4.1 Principles of care

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In 1998, the World Health Organization (WHO) proposed a set of principles of perinatal care *[5]* that endorse the protection, promotion and support necessary for effective antenatal and postnatal care *[4]*. These principles are embedded in the approach to care outlined in these Guidelines and are included in Table A1.

Table A1: WHO principles of perinatal care

Care for women with a normal pregnancy and birth should promote normal reproductive processes and women's inherent capabilities
Pregnancy and birth should be viewed as a natural process in life and essential care should be provided to women with the minimum set of interventions necessary
Care should be based on the use of appropriate technology
Sophisticated or complex technology should not be applied when simpler procedures may suffice or be superior
Care should be evidence-based
Care should be supported by the best available research, and by randomised controlled trials where possible and appropriate
Care should be local
Care should be available as close to the woman's home as possible and based on an efficient system of referral from primary care to tertiary levels of care
Care should be multidisciplinary
Effective care may involve contributions from a wide range of health professionals, including midwives, general practitioners, obstetricians, neonatologists, nurses, childbirth and parenthood educators
Care should be holistic
Care should include consideration of the intellectual, emotional, social and cultural needs of women, their babies and families, and not only their physical care
Care should be woman-centred
The focus of care should be meeting the needs of the woman and her baby. Each woman should negotiate the way that her partner and significant family or friends are involved. Care should be tailored to any special needs a woman may have
Care should be culturally appropriate and culturally safe
Care should consider and allow for cultural variations in meeting these expectations
Care should provide women with information and support so they can make decisions
Women should be given evidence-based information that enables them to make decisions about care. This should be provided in a format that the woman finds acceptable and can understand
Care should respect the privacy, dignity and confidentiality of women
All women have the right to be treated with respect and dignity, have their privacy respected, and be assured that all their health information is confidential

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4.2 Providing woman-centred care

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Woman-centred care focuses on the woman's unique needs, expectations and aspirations; recognises her right to self-determination in terms of choice, control and continuity of care; and addresses her social, emotional, physical, psychological, spiritual and cultural needs and expectations *[6]*. It also acknowledges that a woman and her unborn baby do not exist independently of the woman's social and emotional environment, and incorporates this understanding in assessment and provision of health care.

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Understanding the woman's context

"An individualised approach to care should be offered at all times rather than routine practice. Care provision needs to be flexible, friendly and non-threatening, making it accessible to all women, including young women."

Every woman has a right to antenatal care that considers her individual social and emotional situation. While many Australian women experience high levels of economic prosperity, educational attainment and good health, many live in poverty, subsist on inadequate pensions, are restricted by under-employment or low-income occupations, experience racism and violence and have poor health outcomes *[7]*. Gender inequalities persist, with women economically less secure, maintaining the primary carer role, and subject to violence (including physical and sexual assault, as well as emotional, psychological and financial abuse) *[7]*.

The experience of pregnancy, especially in the early stages, differs for each woman. The stability of a woman's relationships and social environment will influence her experience. In addition, if the pregnancy is unplanned or results from sexual assault, the woman may experience uncertainty about whether to proceed with the pregnancy.

Although addressing all of these factors is beyond the scope of antenatal care, taking them into account will lead to a fuller understanding of an individual woman's situation and the environment for the developing baby. This provides the opportunity for early intervention to reduce any risk to the woman and her baby. Referral to other services (eg housing, social services) should also be considered, in partnership with the woman.

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Cultural safety in antenatal care

"Cultural safety puts the woman at the centre of care by identifying her needs and establishing a partnership built on trust." (Phiri et al 2010) [17]

Cultural safety is based on the basic human rights of respect, dignity, empowerment, safety and autonomy *[17]*. The concept of 'cultural safety' comes from an approach that incorporates culture within a wider structural framework, focusing on social position to explain health status rather than on the 'values, beliefs and traditions' of a particular group *[22]*. This approach considers the dynamic nature of culture and the diversity within groups, avoids stereotyping and identifies the needs of the individual receiving care.

Cultural safety is defined by the individual attending health care. It builds on the concepts of cultural awareness (appreciating cultural, social and historical differences and reflecting on one's own culture, biases and tendency to stereotype) and cultural sensitivity (acknowledging differences and exploring self attitudes) *[20]*. For example, if a woman prefers to see a female health professional, identifying this need is culturally aware, planning the woman's care around that need is culturally sensitive and ensuring that the woman is not seen by a male health professional is culturally safe *[17]*. Embedding this into routine care may contribute to a culturally responsive service *[19]*.

Strategies to ensure culturally safe care include optimising communication (eg through the use of interpreters), building sound relationships, acknowledging women's cultural preferences *[17]* and reflecting on and analysing how power relationships and history have affected the health of individuals *[12]*. It is also important to acknowledge that the interaction between the 'culture' of the health professional and the culture of the woman (regardless of ethnicity) may result in a power imbalance *[12]*. Women from vulnerable and marginalised groups may feel particularly disempowered in healthcare settings. This can be reduced through *[13]*:

- mindfulness about symbols of power (eg uniform, stethoscope) and the way the room is structured (eg avoiding sitting behind a desk)[HW1]
- positioning: sitting alongside, not opposite, quiet or shy women and families
- showing genuine respect for the woman: the woman will be more likely to feel trust, tell more of her experience and accept advice.

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Providing information and support so that women can make decisions

"Women should be provided with evidence-based information and encouraged to participate in decisions about care." (Chalmers et al 2001) [4]

In any health interaction, a woman has the right to (adapted from Charter of Health Consumer Rights *[8]*):

- determine what treatment she accepts or chooses not to accept
- be given easily understandable explanations in her first language of the details of her specific health concerns, any proposed treatments or procedures and the results of any tests performed
- have access to all health information about herself and her baby
- have her privacy respected, be treated with respect and dignity and know that all her own health information is confidential.

Health professionals and women need to communicate and collaborate in a team approach *[16][14]*. The woman's input (and her family's when she chooses) is an important part of this process *[15]*. Consistency of information, especially if this is provided by different professionals, is very important *[11][18]*.

Making a choice or consenting should be an ongoing process of discussion between a woman and the health professionals involved in her care. Factors that may assist women in decision-making include:

- determining how much prior knowledge the woman has *[13]*
- asking open-ended questions and listening to the answers
- attending to verbal and non-verbal cues
- clarifying the information provided by the woman
- clarifying the woman's understanding of the information provided to her
- providing easy to understand verbal explanation and written or audiovisual information in the woman's preferred language (where available)
- where appropriate, using accredited interpreters to ensure effective communication.

Women have the right to decline care or advice if they choose, or to withdraw consent at any time and have these choices respected *[21]*. It is important that the level of care provided does not alter because of this choice *[10][9][15]* .

Documenting discussions and decisions

Documenting discussions and decisions should include clear and consistent records of *[15]*:

- information provided to the woman and indications that the messages have been understood
- informed consent, responsibility and accountability for decisions
- the woman's understanding of risk and her responsibility for her own choices and decisions about care, especially if these decisions are in conflict with professional advice (in such circumstances it must be clearly documented that the woman is aware of and has accepted a certain level of risk[8]).

Shared and reciprocal documentation, including some form of woman-held record, ensures that all members of the collaboration are aware of essential information throughout maternity care. Several jurisdictions in Australia regularly use woman-held records, which have been found to be an excellent way to improve communication *[15]*. A woman-held record means the woman has a better chance of controlling her health information, encouraging respectful language and, as a result, enabling her to feel more in control during her maternity care *[15]*.

Electronic (eg web-based or e-health) or triplicate records allow sharing of accurate documentation and reduce duplication of effort, enabling more streamlined care for women *[15]*.

[8] Several Australian States and Territories have schedules in their health legislation that outline health professionals' obligations and protections if treatment is refused. These include refusal of treatment certificates, which may help in recording decisions and avoiding confusion if care is transferred.

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Involving the woman's family

"Women and their families should be assisted to prepare for pregnancy, birth and parenthood. Fathers have needs of their own as individuals and not simply as companions or supports for their partner." (Chalmers et al 2001) [4]

Woman-centred care encompasses the needs of the baby, the woman's family, significant others and community, as identified and negotiated by the woman herself *[6]*. Each woman should be asked about whom she would like to be involved in her care; some women may only want their partner involved while others may wish to involve a wider family or social network. A minority of women may have limited control over the family members who are involved in their antenatal care or the social environment in which the baby develops (eg exposure to passive smoking or domestic violence).

Involving fathers/partners enables them to participate in decision-making and be informed about the care pathway and environmental factors that may influence the health of the baby during pregnancy (eg maternal passive smoking) and after the birth (eg infectious diseases such as pertussis). Education and information about pregnancy and childbirth should be provided using the principles outlined in Section 4 for Optimising pregnancy are.. Assessment and intervention for fathers/partners may also be a consideration (eg mental health, smoking cessation, immunisation).

Involvement of fathers/partners in antenatal care may also enable early intervention (eg family support) for families requiring additional assistance *[23]* .

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Resources

COAG (2009) *Protecting Children is Everyone's Business. National Framework for Protecting Australia's Children 2009–2020*. An initiative of the Council of Australian Governments. Commonwealth of Australia.

NHMRC (2004) *General Guidelines for Medical Practitioners on Providing Information to Patients*. Canberra: Commonwealth of Australia.

NHMRC (2004) *Communicating with Patients. Advice for Medical Practitioners*. Canberra: Commonwealth of Australia.

NHMRC (2005) *Cultural Competence in Health: A Guide for Policy, Partnership and Participation, Next Steps. Canberra: Commonwealth of Australia.*

NHMRC (2010) *National Guidance on Collaborative Maternity Care*. Canberra: National Health and Medical Research Council.

4.3 Pregnancy care for Aboriginal and Torres Strait Islander women

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While the diversity of circumstances and experiences is acknowledged, this section highlights general considerations in providing antenatal care for Aboriginal and Torres Strait Islander women.[9]

While many Aboriginal and Torres Strait Islander women experience healthy pregnancies, poor health and social complexity contribute to worse overall perinatal outcomes than those experienced by non-Indigenous women.

[9] These Guidelines use 'Aboriginal and Torres Strait Islander women' as an umbrella term while acknowledging the great diversity within this group and that "Aboriginal' or 'Torres Strait Islander' may be more appropriate in some contexts. Where literature is cited, the term used in the literature is used.

Info Box

Background to culturally safe antenatal care

"Cultural Respect is achieved when the health system is a safe environment for Aboriginal and Torres Strait Islander peoples and where cultural differences are respected." (AHMAC 2004) [24]

History and politics have shaped and continue to shape the lives and health of Aboriginal and Torres Strait Islander peoples. Social complexity and family disruption are continuing effects of government policies that have contributed to Aboriginal and Torres Strait Islander peoples having by far the worst health status of any identifiable group in Australia and the poorest access to services *[35]*. This is reflected in the overall health of Aboriginal and Torres Strait Islander women and their babies.

In 2014, among registered births in Australia, 5.3% of babies had one or two parents who identified as Aboriginal and Torres Strait Islander peoples and 4.2% had mothers who identified as Aboriginal and Torres Strait Islander peoples *[26]*. While this section focuses on the care of Aboriginal and Torres Strait Islander women during pregnancy, it is important to remember that pregnancies in which the father of the baby is of Aboriginal or Torres Strait Islander background may have similar issues in terms of perinatal outcomes *[33]*.

There is a disproportionate burden of adverse perinatal outcomes for Aboriginal and Torres Strait Islander mothers and their babies compared to non-Indigenous mothers and babies, including increased maternal mortality (13.8 vs 6.6 deaths per 1,00,000 women who gave birth in 2008–2012) *[38]*, pre-term birth (140 vs 80 per 1,000 births), low birth weight (118 vs 62 per 1,000 births) and perinatal deaths (14 vs 9 per 1,000 births) *[25]*. Aboriginal and Torres Strait Islander women are also less likely to attend an antenatal visit in the first trimester compared to non-Indigenous women (53 vs 60%) or to attend five or more antenatal visits (86% vs 95%)*[25]*.

All health professionals need to be aware of these disparities and have a role in optimising the care of Aboriginal and Torres Strait Islander pregnant women to aid in 'closing the gap' in health outcomes between Aboriginal and Torres Strait Islander and other peoples *[33]*.

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Providing woman-centred care

"Have a good chat with them, gain their trust, make 'em feel secure ... words, the way you talk to them means a lot ... especially young ones, that's what they're looking for." (Older Aboriginal woman from remote community, Central Australia as quoted in (Wilson 2009)) [50]

This section discusses issues specific to providing appropriate antenatal care for Aboriginal and Torres Strait Islander women. The cultural beliefs, practices and needs of Aboriginal and Torres Strait Islander women vary, both between and within culturally defined groups, and respect for the views and beliefs of individual women and of local communities is needed *[40]*.

Understanding the woman's context

Many Aboriginal and Torres Strait Islander women experience healthy pregnancies. The women having babies are generally younger and, on average, have more children during their reproductive life than non-Indigenous women *[33]*. Aboriginal and Torres Strait Islander culture takes a more holistic view of wellbeing and has many strengths that provide a positive influence on well-being and resilience for Aboriginal and Torres Strait Islander women and their families. These include a supportive extended family network and kinship, connection to country, and active cultural practices in language, art and music.

For women who experience adverse events in their pregnancies, the reasons are diverse and occur throughout the life course *[33]*:

- *socioeconomic factors*: lower income, higher unemployment, lower educational levels, inadequate infrastructure (eg affordable housing, water supply), increased rates of incarceration
- *health factors*: diabetes mellitus, cardiovascular disease (including rheumatic heart disease), respiratory disease, kidney disease, communicable infections, injuries, poor mental health, overweight and underweight
- *lifestyle factors:* lack of physical activity, poor nutrition, harmful levels of alcohol intake, smoking, higher psychosocial stressors (deaths in families, violence, serious illness, financial pressures, contact with the justice system).

In addition, "racism constitutes a 'double burden' for Aboriginal and Torres Strait Islander Australians, encumbering their health as well as access to effective and timely health care services" *[41]*.

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Cultural safety

Although maternity services in Australia are designed to offer women the best care, they largely reflect western medical values and perceptions of health, risk and safety. Achieving culturally safe maternity services is critical to improving health for Aboriginal and Torres Strait Islander mothers and babies *[41]* and this is underpinned by cultural awareness among health professionals.

Cultural safety acknowledges that health consumers feel safest when health professionals have considered power relations, cultural differences and individuals' rights *[46]*. Cultural safety is defined by the individual's experience of health care they receive, ability to access services and to raise concerns. Part of this process requires health professionals to examine their own realities, beliefs and attitudes. Cultural safety incorporates cultural awareness which is defined as 'an understanding of how a person's culture may inform their values, behaviours, beliefs and basic assumptions, recognising that we are all shaped by our cultural background, which influences how we interpret the world around us, perceive ourselves and relate to other people *[47]*.

The provision of culturally safe care requires a willingness to gain the knowledge, understanding and skills to communicate sensitively and effectively with Aboriginal and Torres Strait Islander people and to acknowledge and respect cultural differences. Cultural safety is also relevant to Aboriginal and Torres Strait Islander health professionals.

An emerging area in developing a culturally responsive workforce is trauma-informed care, in which health professionals understand the ongoing impact of intergenerational trauma resulting from historical injustices, colonisation, removal from and dispossession of land, and continuing racism *[41]*. This is particularly important given that Aboriginal and Torres Strait Islander children are over-represented in out-of-home care compared with non-Indigenous children (9.5 times more likely), with some women encountering the child protection system during pregnancy, leading to removal of their babies soon after birth.

While further developments in cultural safety education are required *[41]*, a recent study found that providing cultural safety training as an assessable component of practice and recognising that it is as important as the physical aspects of care for the women would improve the experiences of women and support midwives in practice *[31]*.

Cultural awareness education programs and tools for evaluating individual and organisational cultural responsiveness have been developed (see Section 3.7).

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Info Box

Improving women's experience of antenatal care

Taking an individualised approach
Factors that may improve a woman's experience of antenatal care include *[33]*:

- creating a comfortable and welcoming physical space
- taking time to establish rapport and trust
- providing continuity of carer
- ensuring privacy and confidentiality
- involving her partner/the father of the baby, where this is agreed by the woman
- having some knowledge about the woman's community
- endeavouring to have flexible scheduling of appointments.

Ideally a nominated person within a practice should be able to ensure the woman is receiving appropriate care from other healthcare team members and to assist to coordinate services if required.

Providing information and support so that women can make decisions
There is indirect evidence that, in some settings, Aboriginal and Torres Strait Islander women have fewer opportunities to make decisions about their care than non-Indigenous women, or fewer than is desirable *[39]*. This may be improved through providing information to women and their partners in a culturally appropriate way and providing strategies to help them achieve positive change *[33]* and by working in partnership with Aboriginal health professionals, women and communities.

Aboriginal community worker involvement
Where available, assistance from Aboriginal and/or Torres Strait Islander health workers, community workers or Aboriginal and/or Torres Strait Islander liaison officers should be sought as they can facilitate understanding between the woman and her healthcare provider and provide assistance for attending appointments and coordinating care *[33]*. This may be particularly important when English is not the woman's first language.

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Successful models of antenatal care

"Aboriginal peoples and Torres Strait Islanders should access services and health care not just at a level enjoyed by other Australians (principle of equality) but at one that reflects their much greater level of health care need (principle of equity)." (Couzos & Murray 2008) [35]

A range of programs have been implemented around the country to improve the delivery of antenatal services to Aboriginal and Torres Strait Islander women. Evaluations have shown their success in improving uptake of care earlier in the pregnancies, for the duration of the pregnancy and often postnatally, which allows other opportunistic healthcare interventions, such as family planning, cervical screening and improving breastfeeding rates *[33]*. This shows that if services cater for their needs, women will utilise them.

Evaluated programs include:

- *Midwifery group practice*: A midwifery group practice (staffed by midwives, Aboriginal Health Workers, Aboriginal midwifery students and an Aboriginal 'senior woman') was introduced in a regional centre in the Northern Territory to provide continuity of care for women from remote communities transferred to the centre for antenatal care and birth *[27]*. There were improvements in antenatal care (fewer women had no antenatal care and more had more than five visits), antenatal screening and smoking cessation advice and a reduction in fetal distress in labour. The experiences of women, midwives and others during the establishment and the first year of the midwifery group practice were also reported positively and women's engagement with the health services through their midwives improved. Cost-effective improvements were made to the acceptability, quality and outcomes of maternity care.

- *Midwifery continuity of care*: A meta-synthesis of qualitative studies undertaken in Australia and Canada found that overall the experience of midwifery services was valuable for Indigenous women, with improved cultural safety, experiences and outcomes in relation to pregnancy and birth *[34]*. The most positive experiences for women were with services that provided continuity of care, had strong community links and were controlled by Indigenous communities *[34]*. Continuity of midwifery care can be effectively provided to remote dwelling Aboriginal women and appears to improve outcomes for women and their infants *[42]*. However, there are barriers preventing the provision of intrapartum midwifery care in remote areas *[34]*. A study among midwives in a large tertiary hospital in South Australia found that communication and building support with Aboriginal health workers and families were important to midwives working with Aboriginal women and identified the following barriers to provision of care *[31]*:

  - time constraints in a busy hospital
  - lack of flexibility in the hospital protocols and polices
  - the system whereby women were required to relocate to birth
  - lack of continuity of care
  - lack of support 24 h a day from the Aboriginal workforce
  - the speed at which women transitioned through the service.

  The midwives had some difficulty differentiating the women's physical needs from their cultural needs and the concept of cultural safety was not well understood. The midwives also determined that women who were living in metropolitan areas had lesser cultural needs than the women who were living in rural and remote areas. Stereotyping and racism was also identified within the study.

- *Aboriginal Maternity Group Practice Program (AMGPP)*: The AMGPP employed Aboriginal grandmothers, Aboriginal Health Officers and midwives working in partnership with existing antenatal services to provide care for pregnant Aboriginal women residing in south metropolitan Perth *[28]*. Babies born to women in the program were significantly less likely to be born preterm (9.1% vs 15.9% in historical controls [adjusted odds ratio (aOR) 0.56; 95%CI 0.35 to 0.92]; vs 15.3% in contemporary controls [aOR 0.75; 95%CI 0.58 to 0.95]); to require resuscitation at birth (17.8% vs 24.4% in historical controls [aOR 0.68; 95%CI 0.47 to 0.98]; vs 31.2% in contemporary controls [aOR 0.71; 95%CI 0.60 to 0.85]) or to have a hospital length of stay greater than 5 days (4.0% vs 11.3% in historical controls [aOR 0.34; 95%CI 0.18 to 0.64]; vs 11.6% in contemporary controls [aOR 0.56; 95%CI 0.41 to 0.77]) *[28]*. Analysis of qualitative data from surveys and interviews found that the model had a positive impact on the level of culturally appropriate care provided by other health service staff, particularly in hospitals. Two-way learning was a feature. Providing transport, team home visits and employing Aboriginal

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staff improved access to care. Grandmothers successfully brought young pregnant women into the program through their community networks, and were able to positively influence healthy lifestyle behaviours for women *[29]*.

- *Aboriginal Family Birthing Program (AFBP)*: The AFBP provides culturally competent antenatal, intrapartum and early postnatal care for Aboriginal families in some parts of South Australia, with women cared for by an Aboriginal Maternal and Infant Care worker and a midwife in partnership. The Aboriginal Maternal and Infant Care worker has a clinical role. Compared with women attending mainstream public antenatal care, women attending metropolitan and regional AFBP services were more likely to report positive experiences of pregnancy care (aOR 3.4, 95%CI 1.6 to 7.0 and aOR 2.4, 95%CI 1.4 to 4.3, respectively). Women attending Aboriginal Health Services were also more likely to report positive experiences of care (aOR 3.5, 95%CI 1.3 to 9.4) *[32]*. Even with greater social disadvantage and higher clinical complexity, pregnancy outcomes were similar for AFBP and Aboriginal women attending other services *[44]*.
- *Aboriginal Maternal and Infant Health Service (AMIHS)*: the AMIHS was established in New South Wales to improve the health of Aboriginal women during pregnancy and decrease perinatal morbidity and mortality for Aboriginal babies *[45]*. The AMIHS is delivered through a continuity-of-care model, where midwives and Aboriginal Health Workers collaborate to provide a high-quality maternity service that is culturally sensitive, women-centred, based on primary health-care principles and provided in partnership with Aboriginal people.

An evaluation of the AMIHS found:

— the proportion of women who attended their first antenatal visit before 20 weeks increased (65 vs 78% in 2004, OR 1.2; 95%CI 1.01 to 1.4; p=0.0.03)
— the rate of low birthweight babies decreased (13 vs 12%, not statistically significant)
— the proportion of preterm births decreased (20 vs 11%; OR 0.5 95%CI 0.4–0.8–1.4; p=0.001)
— perinatal mortality decreased (from 20.4 per 1,000 births in 1996–2000 to 14.4 per 1,000 births in 2001–2003; not statistically significant owing to small numbers)
— breastfeeding rates improved (from 67% initiating breastfeeding and 59% still breastfeeding at 6 weeks in 2003, to 70% initiating breastfeeding and 62% still breastfeeding at 6 weeks in 2004).

While these programs have been identified as beneficial, not all Aboriginal and Torres Strait Islander women have access to these types of programs and many still rely on mainstream services such as GPs and public hospital clinics *[33]*. Hence, it is important that mainstream services embed cultural competence into continuous quality improvement. Participation in a continuous quality improvement initiative by primary health care centres in Aboriginal and Torres Strait Islander communities is associated with greater provision of pregnancy care regarding lifestyle-related risk factors *[37]*. For example, screening for cigarette smoking increased from 73% at baseline to 95% (OR 11, 95%CI 4.3 to 29) after four cycles *[37]*.

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Birthing on country

There is a strong relationship between distance to maternity services and poorer clinical and psychosocial outcomes *[41]*. For some Aboriginal and Torres Strait Islander women, the social risks of not birthing on country include cultural risk (eg the belief that birthing away from country may be the cause of ill health as it breaks the link between strong culture, strong health and the land) and emotional risks (having to spend weeks removed from family and other children while awaiting the birth) *[41]*. These factors cause distress to women and families and increase clinical and medical risks (eg women not attending antenatal care, or presenting late in labour, to avoid being flown out of their community for birth).

In a study of birthing services in rural and remote areas, very remote communities were least likely to have a local birthing facility *[49]*. In addition, services were influenced by jurisdictional policy rather than identified need.

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Adolescent mothers

Adolescent motherhood occurs more often within communities where poverty, Aboriginal and Torres Strait Islander status and rural/remote location intersect *[43]*. Adolescent pregnancy has been typically linked to a range of adverse outcomes for mother and child. In Australia, the proportion of births among adolescent women is higher among Aboriginal and Torres Strait Islander women than among non-Indigenous women (17 vs 2%) *[25]* and the risk of poorer psychosocial and clinical outcomes is greater if these women are not well supported during pregnancy and beyond *[48]*. However, a study in the Northern Territory suggests that problems usually associated with Aboriginal adolescent births (such as low birth weight) are not due to maternal age but are related to the underlying poor health, socioeconomic disadvantage and a system that is challenged to support these young women, both culturally and medically *[27]*.

Drawing on existing literature and consultations with young Aboriginal women and health professionals supporting pregnant Aboriginal women, a West Australian study found that engagement with the health system is encouraged and health outcomes for young mothers and their babies improved through destigmatising of young parenthood and providing continuity of caregiver in culturally safe services with culturally responsive health professionals *[48]*. Another study noted the critical role of general practitioners in identifying at-risk adolescent women, preventing unintended adolescent pregnancy, clinical care of pregnant adolescents and promoting the health and wellbeing of adolescent mothers and their children *[43]*.

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Improving outcomes

System-wide strategies to strengthen health centre and health system attributes that support best-practice antenatal health care for Aboriginal and Torres Strait Islander women are needed. Some strategies can be implemented within health centres while others need partnerships with communities, external services and policy makers *[36]*.

Approaches to improving the health outcomes for Aboriginal and Torres Strait Islander women and their babies in pregnancy include the following:

- systems-based approaches to address socioeconomic disadvantage, education and health literacy *[30]*
- health services approaches to provide trusted, welcoming and culturally appropriate health services in both community-controlled and government sectors, facilitate better communication between primary and hospital-based services and utilise initiatives such as continuous quality improvement practices that lead to improved services, particularly where staff turnover is high *[30]*
- families-based approaches, to address social and lifestyle factors (eg smoking prevention and quitting *[30]*, drinking alcohol, social and emotional wellbeing and nutrition) *[36]*
- clinical guidelines to address specific needs of Aboriginal and Torres Strait Islander women in pregnancy (eg screening for infection in young women and women from areas where risk is high) *[30]*
- supports for the particular needs of rural and remote women in accessing care (eg access to ultrasound services) *[30]*
- strengthened systems to ensure workforce support, retention and recruitment; patient-centred care; and community capacity, engagement and mobilisation *[36]*.

Good practice statement

Adopt a respectful, positive and supportive approach in providing antenatal care to Aboriginal and Torres Strait Islander women, working in partnership with women, Aboriginal and Torres Strait Islander health professionals and communities. This should be informed by cultural safety training for health professionals.

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Resources

Couzos S & Murray R (eds) (2008) *Aboriginal Primary Health Care: An Evidence Based Approach (3rd edition)*. Melbourne: Oxford University Press.

Queensland Health Aboriginal and Torres Strait Islander Cultural Capability Framework 2010 to 2033

RACGP (2011) *Cultural Awareness Education and Cultural Safety Training*. The RACGP National Faculty of Aboriginal and Torres Strait Islander Health.

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Walker R (2010) *Improving Communications with Aboriginal Families.* A Resource for Hospital Staff, Women's and Newborns' Health Network, WA Department of Health.

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Wilson G (2009) *What Do Aboriginal Women Think Is Good Antenatal Care? Consultation Report.* Darwin: Cooperative Research Centre for Aboriginal Health.

Websites

HealthInfoNet

Closing the Gap

Maternity care in the bush

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4.4 Pregnancy care for migrant and refugee women

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While many migrant and refugee women experience healthy pregnancies, issues associated with resettlement can contribute to poorer perinatal outcomes than those experienced by women in general. While the diversity of circumstances and experiences is acknowledged, this section highlights general considerations in improving the experience of antenatal care for migrant and refugee women.

The term 'migrant and refugee' is used in these Guidelines to refer both to women who are voluntary migrants and women who come to Australia as refugees, humanitarian entrants or asylum seekers. Migrants and refugees are also often referred to as people of culturally and linguistically diverse background, people from non-English–speaking backgrounds or people who speak a language other than English

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Background to culturally safe antenatal care

"Caring for individuals from diverse backgrounds is a daily reality for nurses and midwives, who are expected to provide care which is both clinically safe and culturally sensitive." *[22]*

Although a third of women who gave birth in Australia in 2014 were not born in Australia *[25]*, there is little specific information on the pregnancy outcomes of migrant and refugee women. National data suggest similar rates of perinatal death among babies of women born in Australia and those born overseas *[61]*. However, retrospective studies suggest that outcomes vary with country of birth *[57]* and use of interpreters, but not refugee status *[66]*.

There is significant heterogeneity among migrant and refugee women and their experience of antenatal care. Women bring with them the knowledge and practices from their home countries. Expectations of early antenatal attendance vary between countries. For example, more than half (57%) of women giving birth in New South Wales in 2004 who were originally from a developing country first attended for antenatal care later than 12 weeks in the pregnancy *[67]*. In New South Wales in 2006, 64.9% of mothers born in Melanesia, Micronesia and Polynesia and 72.8% of mothers born in the Middle East and Africa commenced antenatal care before 20 weeks gestation, compared with 89.6% of mothers born in English-speaking countries *[55]*. Expectations of the birth experience are also strongly influenced by cultural views and practices *[60]*.

An increasing proportion of refugee and humanitarian entrants to Australia come from Africa, the Middle East and Southeast Asia; about 30% are women aged 12–44 years *[56]*. Refugee women are more likely than other women to have complex medical and psychosocial problems and may face additional barriers in accessing antenatal care *[56]*.

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Factors affecting uptake of antenatal care

Migrant and refugee women are diverse, and have differing issues and outcomes. As well as cultural background, women's experiences differ with migration status, educational level and prior experience of pregnancy and birth. However, there are some common issues that can affect uptake of antenatal care by migrant and refugee women. These include *[17][63][62][53][52]*:

- *migration factors*: lack of knowledge of or information about the Western healthcare system (including rights in relation to tests and treatments); arriving in the new country late in pregnancy; history of grief, loss and/or trauma in addition to migration
- *cultural factors*: adherence to cultural and religious practices, poor language proficiency, lack of assertiveness, partner/ family perception of antenatal care, perceiving pregnancy as not requiring health professional involvement, belief that antenatal care is more a burden than a benefit, belief that antenatal classes are not necessary, fear of coming into contact with government agencies
- *position in host country*: financial problems, unemployment, low or intermediate educational level, social inequality (education, economic resources and residence [rural or urban]), lack of time, lack of childcare, no medical leave from work
- *social network*: lack of usual female family and community support systems, isolated community
- *accessibility:* inappropriate timing and incompatible opening hours, transport and mobility problems, indirect discrimination, lack of suitable resources (eg female interpreters)
- *expertise*: health professional lacking knowledge of cultural practices
- *personal treatment and communication*: poor communication, perception of having been badly treated by a health professional.

Health care costs and access to health services can be an issue for some women. Women who are asylum seekers may be ineligible for either Medicare or Centrelink Health Care Cards. Women who are skilled migrants and international students may also have restricted health care access because they don't have Medicare entitlements. While overseas students are required to maintain Overseas Student Health Cover for the duration of their time in Australia, pregnancy-related services may not be covered in the first 12 months of membership.

Even when care can be accessed, women who have no previous experience with a western health care system may have limited understanding of reasons for antenatal visits, medical procedures and use of technology. They may not feel confident to ask questions or participate in discussions about their care plan or birth options. Different cultural beliefs may also influence aspects of antenatal care such as involvement of the father in pregnancy and childbirth, acceptance of tests and interventions, willingness to be cared for by a midwife rather than a doctor or a woman rather than a man, understanding of dates and times of appointments, and knowledge about medical aspects of pregnancy.

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Issues affecting women from specific groups

Different groups of migrant and refugee women face specific issues that may affect their experience of pregnancy and birth. Increased awareness of such issues and the differences between groups will help to promote better antenatal care of women from migrant and refugee backgrounds.

- *Women who arrive in Australia as refugees:* Prior to migration, many refugees experience poor health (including oral health, co-existing health issues and inadequate nutrition) and experience poverty, discrimination, trauma and violence in their countries of origin and in countries of displacement. These experiences cause significant psychological distress, manifesting in symptoms of anxiety, depression, post-traumatic stress, poor sleep and concentration. These symptoms can continue to affect women's lives as they face further emotional challenges in the resettlement period. Early intervention and referral to appropriate counselling services should always be offered and assistance in accessing services provided. Refugee women may fear authority figures, including health professionals, due to past experiences and may also have financial, employment and housing issues. Women in this situation will require reassurance and explanation of the care offered to them, including tests, procedures and pregnancy risks. More time may be needed, and specific strategies used (often in collaboration with other services and migrant agencies) to build necessary confidence and trust.
- *Women affected by Female Genital Mutilation/Cutting (FGM/C)*: FGM/C is the collective term used to describe the cultural practice of cutting or removal of either a part, or the whole external female genitalia. Some of these procedures are minor, while others involve significant change and have an impact during the antenatal period. Depending on the degree of FGM/C, women may require referral to services offering specialised care and support. Some women may need to be deinfibulated to enable ongoing clinical assessment and avoid complications; this is usually performed in the second trimester but the first trimester is the optimum time to discuss the procedure.
- *Women in higher risk groups:* Some migrant and refugee groups have higher rates of risk factors such as gestational diabetes, smoking in pregnancy and vitamin D deficiency. Lifestyle advice should take cultural issues into account (eg giving culturally relevant nutritional advice on managing gestational diabetes and educating both women and men about passive smoking, as it may be men rather than women who smoke). Domestic violence is high among some communities, and may be hidden within the family structure and/or the community. Screening for conditions endemic in the woman's country of origin may also be a consideration.

Health professionals are encouraged to develop an understanding of the issues facing families from the migrant and refugee groups that they regularly work with and to use this information to improve the care they provide.

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Providing woman-centred care

"Establishing effective communication between a woman and her midwife [or other health professional] is essential for determining how culturally safe care can be instituted." (Carolan & Cassar 2010) *[53]*

The fundamentals of providing care discussed in Section 4 apply to all women. This section discusses issues specific to providing appropriate antenatal care for migrant and refugee women.
4.2.1 Improving women's experience of antenatal care

Taking an individualised approach

Factors that may improve the experience of antenatal care for migrant and refugee women include:
• taking the time to establish rapport and trust with each woman
• being conscious of the need to avoid making assumptions based on a woman's culture, ethnic origin or religious beliefs
• explaining the woman's entitlement to antenatal care and options for accessing it (eg community clinic or hospital-based setting)
• considering issues that may influence attendance at appointments, such as transport, cost considerations (access to Medicare rebates, need to attend a service that offers bulk billing, cost of procedures such as ultrasounds)
• considering a woman's support network (eg support from partner, family and friends, and family dynamics)
• consulting the woman about whom she would like to involve in her care and, if necessary, advocating on her behalf so that she receives appropriate care throughout pregnancy
• respectfully exploring cultural and personal understanding and experience of pregnancy and appropriate self-care in pregnancy, and encouraging the woman to discuss anything she is worried or unsure about
• explaining frequently used terms that the woman is likely to hear at antenatal appointments with different health professionals
• explaining confidentiality and that the woman's privacy will be respected
• checking the woman's understanding of what has been discussed.

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Multicultural health workers

In many states and territories, roles such as multicultural health workers have been developed. Multicultural health workers (also known as bicultural health workers) assist people from migrant and refugee communities to access health services. For example, a multicultural health worker might support a woman to attend antenatal appointments by booking or confirming appointments, helping to fill out forms and questionnaires, assisting with transport and finding clinic locations. They may also provide services that are appropriate to women's culture and language, such as referral, group work, health education and community development. While the multicultural health worker may communicate with the woman in her preferred language, the role differs from that of an interpreter in that a wider range of services is provided, and a continuing relationship is generally formed between the health worker and the woman and her family. While there is little evidence specific to antenatal care, a systematic review of the literature on culturally appropriate interventions to manage or prevent chronic disease in migrant and refugee communities found that the use of multicultural health workers can promote greater uptake of disease prevention strategies by migrant and refugee communities and translate into greater knowledge and awareness about services *[59]*.

Providing information and support so that women can make decisions

It may be necessary to use a variety of means to communicate effectively with women from migrant and refugee backgrounds. Information should be explained carefully and clearly, with the assistance of an accredited health interpreter.

Some words cannot be interpreted easily, and the health professional may need to explain the concept or give examples. It is important to agree on a set of terms that are mutually understood and if necessary use pictures. For example, using charts and models to demonstrate particular body parts can reduce misinterpretation. Acronyms and abbreviations should be avoided, as these can be confusing.

Written information should also be provided; this can serve as a prompt or can be shown to other health professionals who can then remind the woman or explain the information again. Literacy levels in the woman's own language should not be assumed. Video or audio resources may also be appropriate.

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Interpreters

It is the responsibility of the health professional to make sure that communication is clear. Accredited health care interpreters assist by translating the discussion between the health professional and the woman, communicating with the woman in her preferred language either in person or through a telephone service. Involving an accredited interpreter, preferably with training in medical terminology, is recommended for all antenatal appointments if the health professional and the woman have difficulty communicating.

Interpreters accredited by NAATI (National Association of Accreditation for Translators and Interpreters) have been assessed as having a high level of technical competence in both English and one or more other languages and are bound by a code of ethics including strict confidentiality. However, there is a shortage of accredited interpreters, particularly for languages of new and emerging communities. While involvement of female interpreters is preferable in antenatal care, their availability may also be limited.

Non-accredited interpreters, including partners, family and friends, should not be used as they are less able to convey complex medical information in an accurate and non-emotive way. Their involvement may also discourage the woman from disclosing information fully, out of embarrassment or fear of breach of confidentiality. In emergency situations where the timing of decision-making is crucial, it may be necessary for non-accredited interpreters to assist with communication but it is not appropriate to involve people younger than 18 years of age in this role. Staff members who speak the relevant language may provide language assistance but should not be asked to act as interpreters. Organisational policy should be followed at all times and an accredited interpreter (in person or through a telephone service) sought as quickly as possible. Any decision to involve a non-accredited interpreter should be documented in the woman's antenatal record.

Women may not request an interpreter as they believe there is a cost involved or be unaware that such a service exists. Women may also be sensitive about their level of English proficiency and may have concerns about confidentiality. However, it is important that the onus for using an interpreter is not on the woman.

The use of interpreters can be promoted by *[54]*:

- having translated information in community languages in the reception area, stating that accredited interpreters are available and free of charge
- advising individual women verbally that interpreters are available and free of charge
- including information about the code of ethics of accredited interpreters regarding confidentiality, accuracy and the procedure for working with interpreters.

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Table A2: Involving an interpreter

Suggest the use of an interpreter and, if the woman wants an interpreter, provide a female interpreter where possible
Do not use the woman's partner, friends or relatives to act as interpreters unless absolutely necessary
Ask the woman simple questions about her personal details to assess her ability to communicate in English
A telephone interpreter could be introduced at this point if communication is difficult
Ask the woman what main language she speaks at home
Check if a dialect is spoken or if the woman is of a particular ethnicity
Explain that the use of an interpreter is just as important for your understanding as for her own
Decide which type of interpreter is going to be most suitable (eg telephone or onsite)
Consider confidentiality (eg in small communities, the woman may know the interpreter)
Consider ethnicity of the interpreter (eg when the woman and interpreter come from countries where there has been political or civil unrest)

Source: Adapted from CEH (2009).

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Service delivery issues for migrant and refugee women

"Pregnant women who are recent migrants, asylum seekers or refugees, or who have difficulty reading or speaking English, may not make full use of antenatal care services. This may be because of unfamiliarity with the health service or because they find it hard to communicate with healthcare staff." (National Collaborating Centre for Women's and Children's Health 2010) [64]

Experiences of antenatal care among migrant and refugee women may be improved through *[65]*:

- social support, for example through ethnic-specific cultural liaison officers and women's groups, to maintain cultural connections with the traditions, birthing ceremonies and rituals of women's countries of origin
- individualised care, informed by cultural awareness and understanding among health professionals, including knowledge of cultural traditions and practices relevant to pregnancy and birth and associated expectations of women, especially of groups in the local community
- a cross-cultural approach to communication based on recognition of the culture of the woman and the health professional
- cultural brokerage, for example through maternity liaison officers/multicultural health workers who can help women understand and navigate the health system, provide education and resources in relation to maternity care, act as a patient advocate and liaise between women and maternity staff, or through partnerships between English-speaking health professionals and multicultural resource centres
- education, including linguistically appropriate information, parenting education workshops, education about accessing the health system, the different models of care available, and education for fathers/partners on antenatal issues
- culturally appropriate resources, including materials available in the woman's own language, resources in spoken format for women who lack literacy in their own languages, visual resources specifically designed to support antenatal care and access to accredited interpreter services during appointments or important events.

At a local level, individual services can assist health professionals by *[64]*:

- monitoring changing local needs and adjusting services accordingly
- maintaining accurate information about each woman's current address and contact details during her pregnancy
- offering flexible services in the number and length of antenatal appointments when interpreting services are used
- assisting women to book in for their first antenatal appointment, particularly in areas where they are required to telephone a central service and be allocated an appointment at a specific hospital
- ensuring continuity of care wherever possible
- disseminating information about pregnancy and antenatal services, including how to find and use services, in a variety of formats, settings and languages.

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Good practice statement

The care needs of migrant and refugee women can be complex. The first point of contact (eg first antenatal visit) is important and care should be undertaken with an accredited health interpreter. Wherever possible, antenatal care should involve a multicultural health worker.

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Good practice statement

Health professionals should take the initiative in organising for an accredited health interpreter wherever necessary, and reassure the woman of the benefits if she is reluctant.

Approved by NHMRC in June 2014; expires June 2019

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Resources

Consumer resources

NSW Multicultural Health Communication Service: *Pregnancy and postnatal topics*

Health professional resources

beyondblue (undated) *Perinatal Mental Health of Women from Culturally and Linguistically Diverse (CALD) Backgrounds. A Guide for Primary Care Health Professionals.* Melbourne: *beyondblue: the national depression initiative.*

Hach M (2012) *Common Threads: The Sexual and Reproductive Health Experiences of Immigrant and Refugee Women in Australia.* MCWH: Melbourne.

Family Planning Victoria *Female Genital Mutilation/Cutting resources*

Mental Health in Multicultural Australia [Access denied]

Victorian Transcultural Mental Health (VTMH)

Interpreters

- *Telephone Interpreting Service*: Free interpreting services for non-English speaking Australian citizens and permanent residents communicating with general practitioners and medical specialists in private practice and their reception staff. 131 450
- *Doctors Priority Line*: A free telephone interpreting service for general practitioners and specialists providing services that are claimable under Medicare, delivered in private practices and provided to non-English speakers who are Australian citizens or permanent residents. The Doctors Priority Line is available 24 hours a day, seven days a week.
- *NSW Health Standards Procedures for Working with Health Care Interpreters PD2006_053.*
- *Overseas Student Health Cover*

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4.5 Pregnancy care for women with severe mental illness[10]

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This section discusses considerations in providing antenatal care for women with low prevalence mental health conditions (bipolar disorder, schizophrenia and borderline personality disorder). Screening for high prevalence conditions (depression and anxiety) is discussed in Section 8. Resources to assist in management of serious mental health disorders in the antenatal period are included in Section 0.

[10] The information in this section is largely based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline.* Melbourne: Centre of Perinatal Excellence, with permission from the Centre for Perinatal Excellence.

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Impact of severe mental illness in pregnancy

"Mental health conditions in their more severe form are often associated with impaired functioning, especially in relation to a woman's ability to care for her infant and the formation of secure infant attachment, which may in turn be associated with poorer social, cognitive, and behavioural outcomes in the child." (1st 1001 Days APPG 2015) [69]

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Bipolar disorder and schizophrenia

Bipolar disorder is characterised by intense and sustained mood shifts usually between episodes of depression and mania. Schizophrenia is a complex condition of brain function with wide variation in symptoms and signs, and in the course of the illness. The experiential 'core' of schizophrenia has been described as a disturbance involving the most basic functions that give the person a feeling of individuality, uniqueness and self-direction *[72]*.
The prevalence of schizophrenia and bipolar disorder in the general population is around 1 in 100 *[72][74]*. People with schizophrenia or bipolar disorder (in the general population) suffer from high rates of other mental health conditions, including depression and anxiety disorders *[73][72]*.
Relapse of these conditions during pregnancy is common, with 22.5% of diagnosed women in one study being admitted to a psychiatric hospital during pregnancy (38.6% of women with schizophrenia and 10.7% of women with bipolar disorder)*[75]*.
Women with bipolar disorder or schizophrenia are more likely than women in the general pregnant population to experience pregnancy complications (pre-eclampsia, gestational diabetes) *[75]* and women with bipolar disorder may also be more likely to experience gestational hypertension, antepartum haemorrhage, severe fetal growth restriction (<2nd–3rd centile) (although this may be related to smoking) and neonatal morbidity *[78]*.

Borderline personality disorder

Borderline personality disorder is characterised by emotional dysregulation (poorly modulated emotional repsonses); efforts to overcome fear of abandonment; intense and unstable relationships; engaging in impulsive activities (eg substance use); talking about or engaging in self-harm and/or suicidal behaviours; inappropriate, intense anger or difficulty controlling anger; and transient, stress-related paranoid ideation or severe dissociative symptoms. Women who have borderline personality disorder have often experienced sexual, physical or emotional abuse or neglect in childhood. Estimated prevalence among women aged [3]25 years is 2.7% (95%CI 1.4 to 4.0) *[77]*.

Women with borderline personality disorder during pregnancy have been found to be at increased risk of gestational diabetes, premature rupture of the membranes, chorioamnionitis, venous thromboembolism, caesarean section and preterm birth *[79]*. They may experience distress when touched, anticipate birth as traumatic and frequently request early delivery, comorbidity with substance abuse is common and rates of referral to child protective services high *[71]*. Continuity of carer (the same person or small group of people) is likely to be helpful for women with this condition.

The label 'borderline personality disorder' should be used with caution as it often has negative connotations (especially for health professionals) and may be associated with substantial stigma. Conversely, it is important to identify women with such a condition, as they, their families and treating health professionals will need additional resources and support over the antenatal period and beyond.

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Info Box

Planning antenatal care for women with severe mental illness

"While women with pre-existing severe mental illness may already be under the care of a GP and/or psychiatrist, specific consideration must be given to planning their antenatal care due to the complexity of these conditions and the substantial challenges for primary care professionals involved in their management." (Austin et al 2017) [70]

When planning antenatal care for women with severe mental illness, priority needs to be given to ensuring that health professionals involved in their care consider the complexity of these conditions and the challenges of living with them. Where available, involvement of specialist perinatal mental health services is advisable.

Key considerations in providing antenatal care to women with severe mental illness include:

- monitoring for early signs of relapse, particularly as medication is often ceased before or during pregnancy
- education about nutrition and ceasing smoking, substance use and alcohol intake in pregnancy
- monitoring for excessive weight gain and gestational diabetes in women taking antipsychotics, with consideration given to referral to an appropriate health professional if excessive weight gain is identified
- referral for multi-dimensional care planning early enough in the pregnancy (particularly if the pregnancy is unplanned) to build trusting relationships and develop a safety net for mother, baby and significant others.

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Good practice statement

For women with borderline personality disorder who have often experienced complex trauma, trauma-informed care and specific support for health professionals in dealing with challenging behaviours is a priority.

Approved by NHMRC in October 2017; expires 2022

Good practice statement

For women with schizophrenia, bipolar disorder or borderline personality disorder, a multidisciplinary team approach to care in the antenatal period is essential, with clear communication, advance care planning, a written plan, and continuity of care across different clinical settings.

Approved by NHMRC in October 2017; expires 2022

Good practice statement

Where possible, health professionals providing care in the antenatal period should access training to improve their understanding of care for women with schizophrenia, bipolar disorder and borderline personality disorder.

Approved by NHMRC in October 2017; expires 2022

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Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

beyondblue (undated) *Perinatal Mental Health of Women from Culturally and Linguistically Diverse (CALD) Backgrounds. A Guide for Primary Care Health Professionals.* Melbourne: *beyondblue: the national depression initiative*.

Consumer websites

Centre of Perinatal Excellence (COPE)

Black Dog institute

Children of Parents with a Mental Illness (COPMI)

Mindhealthconnect

Perinatal Anxiety and Depression Australia (PANDA)

Mental health referral and advice

- The *beyondblue* website includes a directory of health professionals in mental health, including psychologists, social workers and mental health nurses.
- The *headspace Knowledge Centre* provides information about treatment interventions and models of care for young people with mental health and substance use issues
- The *Black Dog Institute* offers education and training programs, resources and online learning for health professionals with a focus on depression and bipolar disorder.
- *square* (Suicide, Questions, Answers and Resources) is an integrated suicide prevention resource that is part of the National Suicide Prevention Strategy.
- The *GP Psych Support service* provides GPs with patient management advice from psychiatrists within 24 hours. Phone: 1800 200 588; Fax: 1800 012 422.
- Government funding to receive treatment from psychiatrists, psychologists and GPs, social workers is available through the *Better Access initiative* (Medicare items).

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4.6 Other population groups with specific care needs

Info Box

Within the diversity of women that make up the Australian population, some face greater disadvantage in terms of access to health services and may experience poorer perinatal outcomes *[7]*. These include adolescent women and women living in rural and remote areas. This section discusses considerations in providing optimal antenatal care for these groups of women.

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Info Box

Adolescent women

While a higher risk of poor birth outcomes such as low birth weight is seen for births to teenage women, this is likely to be related more to the social circumstances of these young women, rather than their age." (Middleton 2009) [82]

The number of births to women aged younger than 20 years in Australia accounted for around 2% of non-Indigenous births and 17% of Aboriginal and Torres Strait Islander births *[25]*. Women younger than 20 years experience higher rates of stillbirth and neonatal deaths than Australian women in general (14.2 vs 9.6 per 1,000 births) *[25]*.

Adolescent women are likely to seek antenatal care later in pregnancy. In 2014, 47% of women aged younger than 20 attended antenatal care before 14 weeks of pregnancy, compared with 66% of women aged between 30 and 34 years *[26]*.

The high levels of social disadvantage, higher incidence of domestic violence, higher rates of smoking in pregnancy, lack of social supports and lower socioeconomic and education status of these women contribute to poorer outcomes. Young women still have their own developmental needs that should be addressed in addition to the needs related to the pregnancy. Whether the pregnancy is planned, unplanned or unwanted, and the need for reporting of sexual activity in a minor at risk, are also considerations.

Improving perinatal outcomes for adolescent women and their babies

In the context of growing recognition of young people's need for services that are sensitive to their unique stage of biological, cognitive and psychosocial transition into adulthood *[85]*, the World Health Organization identified that youth-friendly services need to be equitable, accessible, acceptable, appropriate, comprehensive, effective and efficient *[86]*. Key features of youth-friendly care include *[85][86]*:

- health professionals and support staff who are non-judgmental and considerate, treat each young person with equal care and respect, are competent, motivated and well supported
- health services that have an appealing ambience, convenient working hours, offer privacy and avoid stigma, and aim for short waiting times and (when needed) swift referral.

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Info Box

Women in rural and remote areas

"While it is generally accepted that women should have access to safe maternity care, consistent with their assessed level of risk, as close as possible to where they live, the options available to women differ according to where they live." (DoHA 2008) *[81]*

Women living in outer regional, remote or very remote areas may have difficulties accessing appropriate antenatal health care due to distance and limited availability of services. They may be required to give birth away from their communities, which can lead to extra financial costs, lack of practical and emotional support, isolation, lack of integrated care between systems, inappropriate or culturally unsafe health care, and temporary separation from older children *[83]*.

Rates of neonatal death are significantly higher among women living in rural areas and rates of fetal death are higher among women living in remote areas *[80]*. Rural and remote families also experience higher rates of maternal death. For example, the rate of direct maternal deaths is high in rural and remote areas (8% of direct maternal deaths in locations inhabited by 3% of the population) and proportionately high in outer regional areas *[84]*.

Providing integrated care in rural and remote areas

Care pathways in rural, remote and very remote Australia are different to those in urban settings and options can be limited. This has a particular impact on women and families living in these areas, a significant proportion of whom (23% in 2014) are Aboriginal and Torres Strait Islander women *[25]*.

In rural and remote settings, care is largely provided by the local primary care health professionals: midwives, nurses, Aboriginal and Torres Strait Islander health workers, GPs, or a combination of these. It is important that these health professionals have access to specialist advice and support. Contemporary approaches including telemedicine, support lines and online services are becoming increasingly available and will be extremely valuable in rural and remote areas. Innovative models of care (eg specialist outreach services and caseload midwifery care) may also expand women's possibilities to have care as close to home as possible. It is also important for health professionals in these areas to use family and community networks where possible and explore community initiatives and existing programs to improve pathways to care for women in their region.

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5. Core practices in pregnancy care

New

Info Box

Download Health Professional Summary Sheet for this section *here*

5.1 Providing pregnancy care services

Info Box

Different women have different needs in relation to pregnancy and childbirth and require access to appropriate levels of care *[87]*. The level of care determines whether the woman is at the right place, at the right time, with the right health professional, for her clinical needs. Models of care should, as far as possible, provide a range of options at the same time as closely matching quality services to clinical needs *[87]*.

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Info Box

Approaches to antenatal care

"A highly trained, qualified and effective primary maternity service workforce, working collaboratively, to use increasingly scarce respective skills efficiently, is the key to developing and sustaining quality primary maternity services." (AHMAC 2008) *[87]*

Australian women are likely to receive antenatal care in primary and hospital settings and to see a range of health professionals. Existing models of care include *[89]*:

- *public hospital care*: the woman attends the hospital for all aspects of her antenatal care and receives care from hospital doctors and midwives
- *GP care*: the woman sees her GP throughout her pregnancy
- *private obstetrician or private midwife care*: the woman sees her private obstetrician or midwife throughout her pregnancy
- *private obstetrician and private GP*: the woman sees her GP regularly during the antenatal period with specific visits to an obstetrician
- *shared care*: several health professionals are involved in the care of a woman during pregnancy, often in the context of a formal arrangement; health professionals involved may include GPs, midwives, other primary care health professionals, specialist obstetricians and hospital practitioners
- *midwife care*: midwives are the primary providers of care for the woman; this may be through a team of midwives being responsible for care of a small number of women (team midwifery) or a woman receiving care from one midwife or his/her practice partner (caseload midwifery).

As well as these health professionals, others who may have an integral role in the antenatal care team where available include Aboriginal health workers, maternity liaison officers, bilingual or multicultural health workers and sonographers. Child and family health workers, psychologists, nutritionists and drug and alcohol workers may also play a role in a woman's antenatal care.

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Collaborative practice

Findings from several comprehensive Australian maternity reviews have confirmed the need for maternity services to work within collaborative and consultative frameworks, to more closely match services to women's needs, preferences and expectations *[87]*. Midwives, obstetricians and GPs can all make valuable contributions to collaborative antenatal care *[87]*.

In maternity care, collaboration is a dynamic process of facilitating communication, trust and pathways that enable health professionals to provide safe, woman-centred care. Collaborative maternity care enables women to be active participants in their care *[91]*. It includes clearly defined roles and responsibilities for everyone involved in the woman's care, especially for the person the woman sees as her maternity care coordinator *[91]*.

Collaboration also involves working within established clinical networks and systems to facilitate timely referral and transfer to appropriate services when required *[87]*. Collaborative networks within these systems are critical for enabling access to safe effective quality services *[87]*.

Continuity of care and carer

The benefits of midwifery continuity of care when providing maternity services are well documented *[95][90]*. Continuity of care is a common philosophy and involves shared understanding of care pathways by all professionals involved in a women's care, with the aim of reducing fragmented care and conflicting advice. Continuity of carer is when a health professional who is known by the woman provides all her care, thus enabling the development of a relationship.

Factors that may improve continuity of care include:

- sharing of information (eg through documenting of all assessments): this reduces the need for a woman to repeatedly "tell her story"
- collaborative development of management plans: this ensures that they are matched to locally available resources
- developing linkages and networks
- adapting approaches to care that are locally successful.

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Providing antenatal care for women with complex social needs

For women with complex social needs, maternity care may be provided in partnership with other agencies including children's services, domestic violence teams, illegal substance use services, drug and alcohol teams, youth and adolescent pregnancy support services, learning disability services and mental health services *[93][90]*.

Antenatal groups

A model of antenatal education and support where women set the agenda (as opposed to being told what their health professionals decide they should know) can provide women with the opportunity to learn from each other and build their own support network *[88]*. Women may learn and retain knowledge more readily through hearing other women's stories or experiences.

Antenatal groups may provide a sustainable alternative to the delivery of antenatal care for health services experiencing significant demand and limited resources. Antenatal groups can also be used to meet the needs of specific groups of women, such as adolescent women, Aboriginal and Torres Strait Islander women, women from specific cultural and language backgrounds, refugee women and women experiencing social isolation. However, the WHO guidelines on antenatal care *[94]* found that further research on the benefits of antenatal groups is required.

Info Box

Resources

NHMRC (2010) *National Guidance on Collaborative Maternity Care*. Canberra: National Health and Medical Research Council.

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5.2 Antenatal visits

Info Box

Each antenatal visit should be structured around specific content that is based on the woman's needs. Incorporating assessments and tests into visits minimises inconvenience to the woman.

While antenatal visits are well established as a means of improving perinatal outcomes, the number and timing of visits has been less studied *[103]*. Systematic reviews and observational studies tend to show an association between number of antenatal visits and/or gestational age at first antenatal visit and pregnancy outcomes *[98]*, although there are many differences in sociodemographic and risk profiles of women attending for antenatal care that may contribute to these findings *[101]*.

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Background

Almost all women (99.9%) who gave birth in Australia in 2014 had at least one antenatal visit *[25]*:

- 95% had five or more visits
- 87% had seven or more visits
- 57% had ten or more visits (excludes data from Victoria).

Nationally, in 2014 *[25]*:

- 43% of women attended at least one antenatal visit in the first 10 weeks of pregnancy
- 62% of women attended in the first trimester (less than 14 weeks)
- around one in eight women (12%) did not begin antenatal care until after 20 weeks' gestation.

Women living in the lowest socioeconomic status (SES) areas began antenatal care later in pregnancy; just over half (55%) of women living in the lowest SES areas attended antenatal care in the first trimester compared with 68% in the highest SES areas in 2014 *[25]*.

The proportion of women attending five or more antenatal visits varied slightly by remoteness and socioeconomic disadvantage (data exclude very preterm births and data from Victoria) *[25]*:

- 96% of women living in major cities compared with 90% in very remote areas
- 96% of women living in the highest SES areas compared with 93% in the lowest SES areas.

Indigenous women were less likely to attend either an antenatal visit in the first trimester (53% compared with 60% of non-Indigenous women) or to attend five or more visits (86% compared with 95% of non-Indigenous women) (age-standardised)*[25]*.

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Number and timing of antenatal visits

A Cochrane review *[98]*, which included studies in high-, middle- and low-income countries, found no strong evidence of differences in the number of preterm births or low birth weight babies between groups receiving a reduced number of antenatal visits (eight visits in high-income countries and fewer than five visits in low-income countries) compared with standard care. However, there was some evidence that in low- and middle-income countries perinatal mortality may be increased with reduced visits. The number of inductions of labour and caesarean sections were similar in women receiving reduced visits compared with standard care.

Evidence concerning women's preferences about the number of antenatal visits suggests that:

- for some women, the gap between visits was perceived as too long when the number of visits was lower than that traditionally offered *[98]*
- women who were satisfied with a reduced number of antenatal visits were more likely to have a caregiver who both listened and encouraged them to ask questions than women who were not satisfied with reduced schedules *[97]*
- women who were over 35 years of age, had previous pregnancies, were less educated or had more than two children preferred fewer appointments, whereas women who were less than 25 years of age, single or had a prior adverse pregnancy history indicated a preference for more appointments than the standard schedule *[100]*.

Timing of initiation of antenatal care

The NICE guidelines suggest that the first antenatal visit occur before 10 weeks pregnancy due to the high information needs in early pregnancy. This also allows arrangements to be made for tests that are most effective early in the pregnancy (eg gestational age assessment, testing for chromosomal anomalies).

Economic considerations

The NICE guidelines found inconclusive evidence regarding the cost-effectiveness of a reduced number of antenatal visits. Most of the existing research in developed countries is based on women assessed as at low risk of poor perinatal outcomes at first contact. The available evidence found that:

- providing routine antenatal care through five compared with eight visits did not affect maternal and perinatal outcomes and therefore was more cost effective *[105]*
- reduced costs associated with six or seven versus thirteen visits were offset by the greater number of babies requiring special or intensive care, although maternal satisfaction and psychological outcomes were poorer in women attending fewer visits *[99]*
- although the average number of antenatal visits was lower in France than in England and Wales in 1970–80, there was no difference in pregnancy outcomes, suggesting that fewer visits would be more cost effective if only these outcomes are considered *[102]*
- there was no significant difference in the monetary value women placed on different providers of antenatal care *[104]*.

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Info Box

Discussing the schedule of antenatal visits with women

The first or another early contact with a woman provides an opportunity to assess the appropriate number of visits for her pregnancy. Considerations include:

- any conditions that may affect the pregnancy or the woman's health and social and emotional wellbeing
- whether this is the first or a subsequent pregnancy
- the woman's preferences for how antenatal care is provided.

This contact should be used to provide women with much of the information they need in early pregnancy. This includes explanation and appropriate written or other form of information about the different types of maternity care available and what each option entails. Information on each option of care should include:

- who the primary carer or carers will be and how they will care for the woman (one-to-one, as part of a team etc)
- the likely number, timing and content of antenatal visits
- place of labour and birth

postnatal care and support

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Info Box

Content of the first antenatal visit

The first contact with a woman in the antenatal period may be when she attends primary care to confirm the pregnancy. Women will either start antenatal care at that point or be referred to a maternity care provider or service; for example, the local hospital, midwife, obstetrician, GP or Aboriginal health service. Women intending to give birth in hospital will attend a booking visit. This may be their first visit at the hospital if they are receiving care through this service or later in pregnancy if they are receiving care through a private provider.

The first antenatal visit should be longer than most later visits because of the volume of information that needs to be exchanged in early pregnancy. If there is insufficient time in the first antenatal visit, another appointment can be arranged to cover "first visit" activities or these can be incorporated into care as the pregnancy progresses.

Women should be seen alone at least once during pregnancy, particularly during the first antenatal visit, as the presence of the woman's partner may be a barrier to disclosure of domestic violence or other aspects of the woman's personal history.

The need to discuss the many assessments and tests that are offered to women in the first trimester contributes to the length of the first visit. It is important to explain that no assessment or test is compulsory and that women have the right to make informed decisions.

Additional time may be required for the first antenatal visit for women who have:

- *limited experience of the health system or a limited understanding of health care processes*: clear explanation of the reasons for antenatal visits, the need for tests and screening and the use of technology is needed
- *limited understanding of English*: accredited interpreters should be involved and time for interpretation taken into consideration (see Section 4.2.1)
- *hearing impairment*: use of Auslan (Australian Sign Language) should be used to facilitate communication
- *past experiences that affect their trust in authorities or health professionals*: reassurance and explanation of the care being offered and collaboration with other services may be required to build necessary confidence and trust
- psychosocial circumstances that may mean they need more intensive psychosocial support (eg young women, women with vulnerabilities); or
- other conditions that usually require additional care (see Table B1).

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Table B1: Content of first antenatal visit

Woman-centred care
Seek woman's thoughts, views and opinions
Ask open-ended questions and provide an opportunity to discuss issues and ask questions
Offer verbal information supported by written or other appropriate form of information (on topics such as diet and lifestyle, available pregnancy care services, maternity benefits, screening and tests, breastfeeding)
Discuss involvement of the woman's partner/family in antenatal care, using gender neutral language until the gender of the partner is established
Provide emotional support and empathy
Discuss any costs that may be involved in a woman's antenatal care

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Undertake a comprehensive history
Current pregnancy (planned, unplanned, wishes to proceed with or terminate the pregnancy)
Medical (history, medicines, family history [high blood pressure, diabetes, genetic conditions], cervical smears, immunisation, breast surgery)
Obstetric (previous experience of pregnancy and birth)
Infant feeding experiences
Nutrition and physical activity
Smoking, alcohol and other substance misuse
Expectations, partner/family involvement, cultural and spiritual issues, concerns, knowledge, pregnancy, birth, breastfeeding and infant feeding options
Factors that may affect the pregnancy or birth (eg female genital mutilation/cutting)
Psychosocial factors affecting the woman's emotional health and wellbeing
The woman's support networks and information needs

Clinical assessment
Discuss conception and date of last menstrual period and offer ultrasound scan for gestational age assessment (carried out between 8 and 14 weeks of pregnancy)
Measure height and weight and calculate body mass index and provide advice on appropriate weight gain
Measure blood pressure
Test for proteinuria
Delay auscultation of fetal heart until after 12 weeks gestation if using a Doppler and 28 weeks gestation if using Doppler or a Pinard stethoscope
Assess risk of pre-eclampsia and advise women at risk that low-dose aspirin from early pregnancy may be helpful in its prevention
Assess risk of preterm birth and provide advice on risk and protective factors
Administer the EPDS at this visit or as early as practical in pregnancy
Ask questions about psychosocial factors that affect mental health

Maternal health testing
Check blood group and antibodies, full blood count and haemoglobin concentration and consider testing ferritin in areas where prevalence of iron-deficiency anaemia is high
Assess risk of diabetes and offer testing to women with risk factors
Recommend testing for HIV, hepatitis B, hepatitis C, rubella non-immunity, syphilis, and asymptomatic bacteriuria
Offer testing for gonorrhoea to women with identified risk factors
Offer chlamydia testing to all women who are younger than 25 years
In areas with a high prevalence of sexually transmitted infections, consider offering chlamydia and gonorrhoea testing to all pregnant women
Offer testing for trichomoniasis to women who have symptoms
Offer cytomegalovirus testing to women who have frequent contact with large numbers of very young children
Offer thyroid function testing to women who have symptoms or high risk of thyroid dysfunction
Only offer testing for vitamin D deficiency if there is a specific indication
Offer testing for chromosomal anomalies
Offer cervical screening to women who have not had a screen in the recommended period
Advise women about measures to avoid toxoplasmosis or cytomegalovirus infection

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Assessment
Estimated date of birth/gestational age
Risk factors: physical, social, emotional
Need for referral
Need for further investigation/ treatment/ preventive care
Actions
Advice on options for antenatal care and place of birth
Referral if required
Further investigation as required
General advice (also for the partner/family): pregnancy symptoms, supplements, smoking, nutrition, alcohol, physical activity, substance use, dental visits
If required, access to counselling and termination (where permitted under jurisdictional legislation)
Preventive interventions: folate, iodine, others as needed (eg iron supplement)
Specific vaccinations including influenza and pertussis[11]

These Guidelines include recommendations on baseline clinical care for women with low-risk pregnancies but do not include information on the additional care that some women will require. Pregnant women with the conditions listed in Table B2 usually require care additional to that detailed in these Guidelines. Some resources that may assist in providing appropriate care are listed in Section 8.6.

Table B2: Women who may require additional care

Existing conditions
Overweight or underweight
Cardiovascular disease (eg hypertension, rheumatic heart disease)
Other conditions (eg kidney disease; type 1 or type 2 diabetes; thyroid, haematological or autoimmune disorders; epilepsy; malignancy; severe asthma; HIV, hepatitis B or hepatitis C infection)
Mental health disorders
Disability
Female genital mutilation/cutting
Experiences in previous pregnancies
Termination of pregnancy
More than two miscarriages
Preterm birth
Pre-eclampsia or eclampsia
Rhesus isoimmunisation or other significant blood group antibodies
Uterine surgery (eg caesarean section)
Antenatal or postpartum haemorrhage
Postpartum psychosis
Four or more previous births
A stillbirth or neonatal death
Gestational diabetes
Small or large-for-gestational-age baby
Baby with a congenital anomaly (structural or chromosomal)

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Previous major surgery
Cardiac (including correction of congenital anomalies)
Gastrointestinal (eg bowel resection)
Bariatric (gastric bypass, lap-banding)
Gynaecological (eg myomectomy, cone biopsy, large loop excision of the transformation zone [LLETZ])
Lifestyle considerations
History of alcohol misuse
Use of recreational drugs such as marijuana, heroin, cocaine (including crack cocaine), amphetamines (eg 'ice') and ecstasy
Psychosocial factors
Developmental delay or other disabilities
Vulnerability or lack of social support
Previous experience of violence or social dislocation

Source: Adapted from NICE (2008).

[11] See Part 3 of the *Australian Immunisation Handbook* 10th edition for discussion of specific vaccinations during pregnancy

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Info Box

Planning for subsequent antenatal visits

Determining the pattern of visits and the activities that are undertaken at each visit requires flexibility. Care should be collaboratively planned with the woman based on the needs identified through assessments, with a focus on continuity of care wherever possible. Planning should also take into account the involvement of the woman's partner/family. For women who start antenatal care late in pregnancy, arrangements will be needed to 'catch up' on information and assessments that are usually offered earlier in pregnancy.

At all visits, opportunities should be provided for the woman to share her expectations and experiences as well as discuss any issues and/or concerns that may have arisen since her last visit, including psychosocial support and mental health issues. Women should also be offered information on aspects of health in pregnancy and early parenthood (eg nutrition, alcohol, smoking, symptom relief if conditions common in pregnancy are being experienced, breastfeeding, reducing the risk of sudden and unexpected death in infancy [SUDI]). A woman's confidence in her ability to labour, give birth and look after her new baby should be supported throughout antenatal care and antenatal education should also support her in preparing for changes to her life and her relationship with her partner and understanding the physical and emotional needs of the baby. The woman's needs should dictate the type of information and support provided (eg while many women will benefit from written information, other forms of information such as audio or video are sometimes more suitable). The woman should also direct the type of issues and questions discussed.

Table B3 indicates appropriate stages of gestation for screening, tests and clinical assessments, although flexibility is needed. Different women will need different aspects of care at different times. If any assessments or tests identify a need for follow-up, additional visits may be required.

Table B3: Additional specific activities at subsequent antenatal visits

16-19 weeks
Review, discuss and record the results of all tests undertaken
Reassess planned pattern of care for the pregnancy and identify whether additional care or referral is needed
Assess fetal growth
Offer fetal anatomy scan to be carried out at 18-20 weeks gestation
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity

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20-27 weeks
Assess fetal growth
Discuss fetal movements: timing, normal patterns etc
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Test for hyperglycaemia between 24 and 28 weeks gestation
Repeat ferritin testing if levels were identified as low in the first trimester
28 weeks
Assess fetal growth
Discuss fetal movements
Test for anaemia, blood group and antibodies
Recommend Anti-D to rhesus-negative non-isoimmunised women
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Test for hyperglycaemia if this has not already been tested
Enquire about mental health and administer the EPDS
29-34 weeks
Assess fetal growth
Discuss fetal movements
Review, discuss and record the results of tests undertaken at 28 weeks
Reassess planned pattern of care for the pregnancy and identify women who need additional care, arranging referral if required
Give information, with an opportunity to discuss issues and ask questions on preparation for labour and birth, including the birth plan, recognising active labour and positively managing the pain of normal labour (this may need to take place earlier in remote areas)
Discuss breastfeeding (eg skin-to-skin contact at birth, early feeding, rooming-in, attachment, exclusive breastfeeding, feeding on demand, partner support); discuss safe infant formula feeding if a woman chooses to formula feed
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Offer repeat ultrasound at 32 weeks to women whose placenta extended over the internal cervical os (the opening of the cervix into the vagina) in the 18-20 week scan.
Recommend a second dose of Anti-D to rhesus-negative non-isoimmunised women at 34 weeks

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35-37 weeks
Assess fetal growth
Discuss fetal movements
Give information, including care of the new baby, reducing risk of sudden and unexpected death in infancy (SUDI), newborn screening tests and vitamin K prophylaxis, psychosocial support available in the postnatal period including maternal and child health services and psychosocial supports, with an opportunity to discuss issues and ask questions
Assess fetal presentation by abdominal palpation from 36 weeks and confirm suspected malpresentation by ultrasound
For women whose babies are not a cephalic presentation, discuss a range of options, including external cephalic version for breech presentation
Offer testing for Group B streptococcus if organisational policy is to routinely test all women
Measure blood pressure
Test for proteinuria in women who have clinical indications of or risk factors for pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
38-40 weeks
Assess fetal growth
Give information, including normal length of pregnancy and onset of labour, with an opportunity to discuss any fears and worries and ask questions
Discuss fetal movements, including the need for prompt contact with a health professional if there are any concerns about reduced or absent movements
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity
Women who have not given birth by 41 weeks
Give information, including discussion about options for prolonged pregnancy (eg membrane sweeping), with an opportunity to discuss issues and ask questions
Discuss fetal movements, including the need for prompt contact with a health professional if there are any concerns about reduced or absent movements
Measure blood pressure
Test for proteinuria in women who have clinical indications of pre-eclampsia (eg high blood pressure)
Offer women the opportunity to be weighed, encourage self-monitoring of weight gain and discuss weight change, diet and level of physical activity

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Strong recommendation

Determine the schedule of antenatal visits based on the individual woman's needs. For a woman's first pregnancy without complications, a schedule of ten visits should be adequate. For subsequent uncomplicated pregnancies, a schedule of seven visits should be adequate.

Approved by NHMRC in December 2011; expires December 2016

Consensus recommendation

At the first contact with a woman during pregnancy, make arrangements for the first antenatal visit, which requires a long appointment and should occur within the first 10 weeks.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Early in pregnancy, provide women with information in an appropriate format about the likely number, timing and content of antenatal visits associated with different options of care and the opportunity to discuss this schedule.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC

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Info Box

Resources

AHMC (2010) *National Maternity Services Plan*.

Bouverie Centre (2012) *Guidelines for Healthcare Providers Working with Same-sex Parented Families*. Melbourne: Bouverie Centre, LaTrobe University, Vic Health.

NHMRC (2009) *Clinical Practice Guideline for the Prevention of Venous Thromboembolism (Deep Vein Thrombosis and Pulmonary Embolism) in Patients Admitted to Australian Hospitals*. Canberra: National Health and Medical Research Council.

Remote Primary Health Care Manuals. (2017). Antenatal Care. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Nutrition and physical activity

See Section 0

Prevention

Australian Technical Advisory Group on Immunisation (2017 update) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health.

NHMRC (2005) *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen Detected Abnormalities*. Canberra: National Health and Medical Research Council.

Safe sleeping resources. [missing link]

Family violence

See Section 29.4

Sexually transmitted infections

ASHA (2016) *Australian STI Management Guidelines for Use in Primary Care*. Australasian Sexual Health Alliance. Accessed: 7 August 2018.

NSW STI Programs Unit (2013) *General Practice Resources*. Sydney: NSW STI Programs Unit. *Queensland Sexual Health Clinical Management Guidelines*

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5.3 Preparing for pregnancy, childbirth and parenthood

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Info Box

Structured antenatal education that is suited to the individual can help women to be informed about pregnancy, birth and parenting. Psychological preparation for parenthood may have benefits for parents' mental health, parenting and infant development.

Background

Structured education in preparation for childbirth and parenthood has come about as traditional methods of information sharing have declined *[116]*. Many maternity health care providers, including public health departments, hospitals, private agencies and charities, and obstetricians' and midwives' practices, provide antenatal education for expectant parents. Antenatal education may be delivered one-on-one or in groups (eg in a women's group, couples' workshop or a class situation).

Antenatal education programs have a range of aims including *[116]*:

- influencing health behaviours
- preparing women and their partners for childbirth, including building women's confidence in their ability to labour and give birth
- preparing women for the pain of labour and supporting their ability to give birth without pain relief *[123]*
- discussing breastfeeding
- enhancing maternal–fetal relationship *[133]*
- preparing for parenthood (eg changes in relationships, physical and emotional needs of the baby, balancing the needs of the newborn and other children) and promoting confident parenting
- developing social support networks
- contributing to reducing perinatal morbidity and mortality.

Antenatal education programs generally cover a range of topics and may include:

- physical wellbeing (nutrition, physical activity, smoking, alcohol, oral health)
- emotional wellbeing and mental health during pregnancy and after the baby is born (maternal-fetal attachment, adapting to change, expectations, coping skills, knowing when to get help)
- labour (stages of labour, positions, breathing and relaxation, support, pain relief)
- birth (normal birth, assisted births, caesarean section, perineal tears)
- options for women with previous pregnancy or birth complications
- breastfeeding (skin-to-skin contact, benefits of early breastfeeding, attachment, breastfeeding as the physiological norm)
- early parenthood (normal newborn behaviour, settling, sleep safety, immunisation, infant attachment)
- ways to find support and build community networks after the baby is born.

Antenatal couple education programs, which aim to enhance the couple relationship and the parent–child relationship, are also available.

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Info Box

Discussing antenatal education

The evidence on antenatal education is heterogeneous, with outcomes measured including experience of birth and parenting, postnatal mental health and experience of antenatal education.

Knowledge and health behaviours

A Cochrane review found that women gain knowledge from antenatal education but that the effect of this knowledge on childbirth or parenthood remains largely unknown *[116]*. A prospective cohort study found that 74% of first-time mothers considered that antenatal education helped them to prepare for childbirth but only 40% considered that the education helped them prepare for parenthood *[111]*.

Low level evidence suggests that antenatal education may improve some health behaviours during pregnancy (eg nutrition, physical activity)*[128]* and in early parenthood (eg prevention of sudden unexpected death in infancy [SUDI]) *[118]*.

Birth experience and outcomes

Studies have found no statistically significant difference in the overall birth experience between women who participate in antenatal education programs and those who do not *[111][108][126]*. Studies into specific outcomes have found the following.

- *Mode of birth*: There is mixed evidence on the effect of antenatal education on mode of birth *[113]*. Antenatal education does not appear to significantly affect mode of birth among women in general *[111][116]* or among women with a previous caesarean section *[116]*. Specific education on bearing down technique in labour did not affect mode of birth *[132]*. Including a component on the risks of induction in antenatal education decreased rates of non-medically indicated elective induction of labour *[136]*.
- *Pain*: One study found that women who participated in antenatal education experienced lower levels of pain during birth *[120]*. Others have reported that participating women had lower epidural analgesia use *[126]*, higher analgesia use *[111]* or there was no difference in epidural analgesia use *[109]* or overall pain relief *[126]*.
- *Self-diagnosis of labour*: Women given education about self-diagnosis of labour pains had a higher rate of correct self-diagnosis than women who did not *[124]*. However, a small systematic review found no evidence of criteria for identifying labour *[122]*.

While the overall experience and outcomes of birth do not seem to be affected by antenatal education, there is some evidence that it reduces anxiety about the birth *[125][106][120][113][107]*, increases use of coping strategies *[110]* and partner involvement *[113]* and that participants experience greater childbirth self-efficacy *[120]*.

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Psychological preparation for parenthood

Studies into the inclusion of psychological preparation for parenthood in antenatal care vary in the content covered. Studies have found that at 6 weeks after the birth:

- women with depression antenatally who participated in antenatal group education focusing on coping skills, recognising distress and seeking help had a reduced risk of subsequent postnatal depression (odds ratio [OR] 0.83; 95% confidence interval [CI] 0.65–0.98; n=1,719) *[121]*
- women who participated in antenatal sessions focusing on coping skills, cognitive restructuring, problem-solving and decision-making skills had an overall reduction in depressive symptoms compared with women in the control group (mean Chinese EPDS score 6.5 vs 8.9) and the effect persisted at 6 months (5.8 vs 7.6; n=184) *[129]*
- women who participated in antenatal interpersonal psychotherapy had fewer depressive symptoms (changes in EPDS score: −1.56 vs 0.94; n=194) and greater satisfaction with interpersonal relationships than women who received only antenatal education *[117]*
- antenatal education on psychosocial issues associated with parenthood had a positive effect on mood (mean EPDS score 4.5 compared with 11.4 at baseline; n=268) in women who reported low self-esteem antenatally (but not those with medium or high self-esteem antenatally) and partners were significantly more aware of the woman's experience of parenthood *[127]*.

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Small randomised controlled trials (RCTs) have reported benefits from antenatal couple education programs that aim to enhance the couple relationship and the parent-child relationship *[134][135][131][140]*.

Parents' experience of antenatal education

Parents have expressed satisfaction with antenatal education as preparation for childbirth *[111][109]*. Mothers who were young, single, with a low level of education, living in a small city or who smoked were less likely to find the classes helpful *[111]*. Male participants valued the inclusion of an all-male session *[141]*.

Studies into parents' preferences for antenatal education have found that the following factors are valued:

- *style of education*: information provided by a health professional in person rather than sole use of other impersonal media *[130]* and using a range of learning strategies *[138]*
- *discussion*: parents value being encouraged to ask questions, seek clarification, and relate information to their own circumstances *[137][130]*
- *social networking:* one of the core aims of antenatal education is to assist women to develop social support networks *[111][137][138]*
- *group size*: small peer groups encourage participants to get to know and support each other, while larger groups make it harder for women to ask questions *[130]*
- *practising skills*: parents value experiential learning with plenty of opportunity to practise hands-on skills *[137][138]*
- *content*: parents have expressed a preference for antenatal education to include more information on psychoprophylaxis during labour *[109]*, psychological care *[119]*, preparation for parenthood *[137][109][119]* and breastfeeding *[137]*
- *timing of education*: education is helpful early in pregnancy when information needs are high *[137]*, with a component offered postnatally *[139][130]*.

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Info Box

Practice summary: antenatal education

When: At an early antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the benefits of antenatal education**: Explain that, while antenatal education is unlikely to change the mode of birth, it may help women to prepare for the birth. It is also a good opportunity to establish a network of peers and to develop skills for adapting to parenthood.
- ☐ **Involve partner and/or family**: Discuss the benefits of partners and/or other family members attending antenatal education with the woman.
- ☐ **Provide information**: Support antenatal education by asking women about any topics on which they would like additional information and suggesting or providing appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video, web sources).
- ☐ **Take a holistic approach**: Give information about locally available antenatal education programs and assist women to select a program that is suitable for them. Give expectant parents booklets/ handouts relating to emotional health and wellbeing during pregnancy and early parenthood.

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Strong recommendation

Advise parents that antenatal education programs are effective in providing information about pregnancy, childbirth and parenting but do not influence mode of birth.

Approved by NHMRC in June 2014; expires June 2019

Strong recommendation

Include psychological preparation for parenthood as part of antenatal care as this has a positive effect on women's mental health postnatally.

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Assist pregnant women and expectant parents to find an antenatal education program that is suitable to their learning style, language and literacy level to improve uptake of information.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

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Info Box

Resources

Consumer resources

- *Pregnancy, birth and baby* website, or Helpline 1800 882 436
- *National Prescribing Service*
- *Better Health Channel*
- *Smart Eating for You*
- *Raising children*
- *Australian Breastfeeding Association*
- *Healthinsite*
- *Eat for Health*

Safe infant sleeping

Resources specific to Aboriginal and Torres Strait Islander women

NSW Health *Strong Women Strong Babies Pregnancy Diary*.

Queensland Centre for Mothers and Babies. *Aboriginal and Torres Strait Islander Resources*.

Remote Primary Health Care Manuals. (2017). Antenatal education and birth planning. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Remote Primary Health Care Manuals. (2017). *CARPA Standard Treatment Manual* (7th edition). Alice Springs, NT: Centre for Remote Health

Western Australia Department of Health. *Having a Baby — Aboriginal resources*.

Multicultural resources

Multicultural Health (Queensland Health): Pregnancy and postnatal topics

NSW Multicultural Health Communication Service: Pregnancy and postnatal topics

Mental health resources, referral and advice
See Section 0

Sources of reliable online health information
Health on the Net Foundation

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5.4 Preparing for breastfeeding

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Info Box

Assisting women to plan for breastfeeding by providing information and support may increase initiation and duration of breastfeeding, with health benefits for mother and infant.

Background

In Australia, the Australian National Breastfeeding Strategy 2010–2015 *[143]* (a revised strategy is under development) and the Infant Feeding Guidelines *[172]* provide guidance on supporting breastfeeding at primary care, hospital and government levels.

Health benefits of breastfeeding

A large body of Australian and international evidence shows that breastfeeding is of significant benefit to babies and mothers *[143]*.

- *Babies*: Breastfeeding has a range of benefits for the developing baby, including improved visual acuity, psychomotor development *[157]* and cognitive development *[165]*. Breastfed babies have a reduced risk of a range of serious illnesses and conditions such as gastroenteritis, respiratory illness, otitis media, allergy and sudden unexpected death in infancy (SUDI) *[159]*. They are also less likely to develop chronic disease later in life *[159][157]*
- *Mothers*: Breastfeeding promotes faster maternal recovery from childbirth and return to pre-pregnancy weight and delays return of menstrual periods. Women who have breastfed have reduced risk of breast and ovarian cancer in later life *[171]*
- *Mother-infant attachment:* Breastfeeding may assist bonding and attachment between mothers and babies *[171]*.

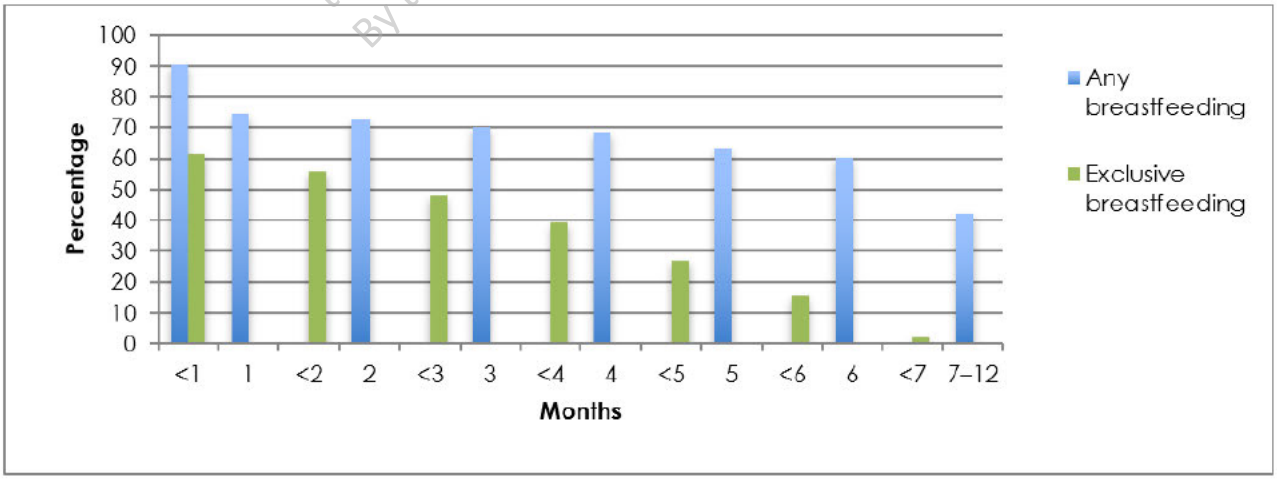
Exclusive breastfeeding (no solids or liquids besides human milk, other than vitamins and medications) for 6 months has several advantages over exclusive breastfeeding for 3 to 4 months, including reduced risk of gastrointestinal and respiratory infection *[164]*. No adverse effects on growth have been documented with exclusive breastfeeding for 6 months, but a reduced level of iron has been observed in developing-country settings *[164]*.

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Initiation and duration of breastfeeding in Australia

The Australian Infant Feeding Guidelines recommend exclusive breastfeeding for 6 months and continuing breastfeeding for one year or for as long as mother and child desire *[172]*. The 2010 Australian National Infant Feeding Survey found that breastfeeding was initiated for around 96% of infants and that around 90% of infants received breast milk as their first feed *[144]*. Figure 10.1 shows rates of exclusive and any breastfeeding over the first year of life from the survey.

Figure B1: Duration of exclusive and any breastfeeding among babies aged 0-12 months, 2010



Note: Rates of exclusive breastfeeding were reported up to each month of age (eg an infant who received fluids other than breast milk at 5 months of age was exclusively breastfed for <6 months). Any breastfeeding was reported at <1 month (age 0) and then in completed months.
Source: AIHW 2011.

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There are regional and jurisdictional variations in rates of breastfeeding *[143]*. Rates of breastfeeding are also influenced by other demographic factors *[144]*.

- *Aboriginal and Torres Strait Islander mothers*: The 2010 National Infant Feeding Survey found that 59% of Aboriginal and Torres Strait Islander infants were exclusively breastfed at less than 1 month, 33% at less than 3 months and 7% at less than 6 months *[151]*. Rates of 'any breastfeeding' were higher in advantaged areas than disadvantaged areas (99% vs 93%) *[151]*. Recent studies in Aboriginal health services in Darwin *[161]* and Brisbane *[181]* have found rates of exclusive breastfeeding on discharge from hospital of 88% and 69%, respectively. A survey conducted in Western Australia in 2000–2002 found that breastfeeding duration increased with remoteness *[148]*.
- *Country of origin*: Evidence is mixed as to whether breastfeeding rates among migrant and refugee women are comparable to the general Australian population rates, with studies finding no difference in rates of exclusive breastfeeding on discharge from hospital *[150]* but lower rates of breastfeeding at 3 months among migrant and refugee women *[182]*. It has been reported that breastfeeding practices vary between different cultural groups in Australia, reflecting trends in their countries of origin *[143]*.
- *Age:* In 2010, breastfeeding at 6 months was reported by 64.1% of women aged more than 35 years, 63.5% of women aged 30–35 years, 56.7% of women aged 25–29 years and 39.1% of women aged 24 years or younger *[144]*.
- *Socioeconomic status*: In 2010, breastfeeding at 6 months was reported by 68.7% of women in the least disadvantaged quintile and 52.4% in the most disadvantaged quintile *[144]*.
- *Education:* In 2010, breastfeeding at 6 months was reported by 73.1% of women with a Bachelor degree or higher, 52.0% of women with Year 12 or equivalent and 40.3% of women who did not complete Year 12 *[144]*.

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Factors affecting establishment of breastfeeding

The Infant Feeding Guidelines identify a range of factors that affect establishment of breastfeeding *[172]*:

- caesarean section
- separation of mother and baby (eg not 'rooming in')
- early use of bottles or pacifiers (dummies)
- offering supplementary feeds (water, glucose or formula milk) when there is no medical reason.

The Baby Friendly Hospital Initiative, which aims to support successful initiation and maintenance of breastfeeding, recommends that women be assisted to initiate breastfeeding within 1 hour of birth and given advice on maintaining lactation.

Factors affecting decision-making about breastfeeding

Environmental factors and societal considerations have an impact on a mother's commitment to and ability to continue breastfeeding *[143]*. Factors that negatively influence initiation and continuation of breastfeeding include *[174]*:

- *physical*: maternal obesity, maternal diabetes, low birth weight or prematurity, multiple birth, congenital anomalies, cracked nipples, separation of mother and baby after birth leading to a delay in onset of milk (eg following caesarean section)
- *psychological*: lack of confidence in breastfeeding, personal image, depression and anxiety
- *social*: maternal attitude (eg lack of intention to breastfeed), knowledge and attitude of partner and family, community customs and traditions, cultural attitudes to breastfeeding, isolation from family or community, relationship problems, public perceptions, return to work
- *environmental*: overcrowding in the home environment, lack of facilities to breastfeed in public areas, employment and work environments that do not support breastfeeding.

Some women (eg adolescent women, young Aboriginal and Torres Strait islander women) experience a cluster of these factors, which can influence their decisions about continuing breastfeeding.

A planned approach and continuity of care and support during pregnancy, birth and early parenthood can ensure that women receive opportunities for education, consistent advice, and appropriate support to continue breastfeeding that considers their individual situation.

Maternal conditions and breastfeeding

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The Infant Feeding Guidelines *[172]* advise that:

- women with HIV should avoid breastfeeding if replacement feeding is acceptable, feasible, affordable, sustainable and safe
- women with hepatitis B or hepatitis C can breastfeed without risk of transmission to the baby.

Tobacco, alcohol and illicit drugs

The Infant Feeding Guidelines *[172]* advise that:

- breastfeeding remains the best choice, even if the mother continues to smoke
- not drinking alcohol is the safest option for women who are breastfeeding
- illicit drugs should be avoided while breastfeeding (specialist advice is needed for each individual).

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Info Box

Antenatal breastfeeding promotion

The objectives of antenatal breastfeeding promotion are to *[143]*:

- provide opportunities for pregnant women and their families to learn about the benefits of breastfeeding
- encourage and enable pregnant women to make informed decisions about breastfeeding
- encourage families and support networks to appreciate the benefits of breastfeeding.

Health professionals have a responsibility to promote breastfeeding first but to educate parents individually about formula feeding where it is needed. This responsibility is outlined in the WHO International Code of Marketing of Breast-milk Substitutes and the Australian Infant Feeding Guidelines *[172]*.

Effect on initiation and duration of breastfeeding

Systematic reviews have shown that antenatal breastfeeding promotion can be effective in increasing initiation rates and duration of breastfeeding, especially among groups of women with low breastfeeding rates *[152][177][149][169]* . Evidence from small RCTs *[146][166][175]* and lower level studies *[176][154][168][158][180]* is inconsistent.

A combination of antenatal and postnatal interventions increases the initiation and duration of breastfeeding *[149]*.

Models of care

Studies evaluating breastfeeding promotion interventions have found that:

- initiation rates were significantly improved by antenatal interventions, including health professional support *[152]*, peer support/counselling *[152][149][169]* and education sessions for fathers *[184]*
- duration of exclusive breastfeeding was improved by antenatal group education about breastfeeding *[169]*, health professional support provided antenatally *[169]* and home visits both antenatally and postnatally *[145]*
- duration of 'any breastfeeding' was improved by antenatal group education about breastfeeding *[178]*, health professional support provided antenatally *[169][173]*, peer support *[162]* and home visits provided both antenatally and postnatally *[163]*
- combined antenatal and postnatal group education about breastfeeding and peer counselling for adolescent women positively influenced duration of breastfeeding *[183]*.

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Although peer support interventions increase breastfeeding continuation in low- or middle-income countries, especially exclusive breastfeeding, the effect does not seem to be as strong in high income countries *[160]*.

Educational materials provided antenatally were effective when combined with counselling but not as a stand-alone intervention *[170]*.

A combination of methods of education and support is more effective than a single method *[155]*. A collaborative approach to breastfeeding promotion that involves local health professionals may be more effective than a breastfeeding expert approach *[156]*.

There is no evidence to support antenatal breast examinations as a means of promoting breastfeeding *[167]*.

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Info Box

Discussing breastfeeding

Discussing breastfeeding is an important part of antenatal care. As the preparatory stage for breastfeeding, the goal is to enable women to develop knowledge and commitment and establish or consolidate support networks *[143]*. A commitment to breastfeeding includes viewing it as the biological and social norm for infant and young child feeding. The extent to which a mother commits to breastfeeding can influence the duration of breastfeeding *[179]*.

Discussion of breastfeeding should involve partners and cover:

- the health benefits of breastfeeding for the infant (eg lower risk of infection) and the mother (eg improved recovery from childbirth and return to pre-pregnancy weight, reduced risk of pre-menopausal breast cancer)
- a woman's previous experiences of breastfeeding and any concerns related to these
- how partners can support the mother to breastfeed and be involved in other aspects of baby care (eg bathing, nappy changing)
- the importance of uninterrupted skin-to-skin contact at birth and early breastfeeding, including the benefits of colostrum for the infant
- that it is recommended that babies be exclusively breastfed for 6 months and that breastfeeding continue for one year or for as long as mother and child desire
- the importance of good positioning and attachment, rooming in and feeding on demand
- indications that the baby is ready for a feed and is receiving enough milk
- the need to avoid bottles, teats and dummies while breastfeeding is being established
- that water is not necessary for the baby: breast milk is sufficient food and drink for the first 6 months
- the importance of healthy eating (see Section 0) and iodine supplementation (see Section 0) when breastfeeding
- when to seek advice (eg while some discomfort is not unusual at initiation, advice on attachment should be sought if pain continues)
- the availability of breastfeeding support locally (eg peer support, lactation consultant).

Women may choose not to breastfeed for a range of reasons (eg anxiety, medication use) and the discussion should be approached with sensitivity to these issues. A mother's informed decision not to breastfeed should be respected and support and information from a health worker and/or other members of the multidisciplinary team provided *[172]*.

Some centres encourage women to express and store colostrum before the birth so that it can be provided to the baby if needed (eg if the mother has insulin treatment for diabetes). While the benefits of early colostrum are well documented *[172]*, the benefits of antenatal breast expression are yet to be substantiated *[147]*. However, it does not appear to be harmful among women with diabetes in pregnancy who are at low risk of complications *[153]*.

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Info Box

Practice summary: breastfeeding

When: At all antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; lactation consultant; peer breastfeeding counsellor; childbirth educator; accredited dietitian

- ☐ **Discuss why breastfeeding from birth is important:** It is important to provide consistent information on the health benefits to baby and mother. Explain that exclusive breastfeeding is biologically and nutritionally appropriate to support growth for 6 months and means that the baby receives only breast milk (ie no other liquids or solids except vitamins or medications if indicated).
- ☐ **Provide practical advice:** Give information about local support for timely assistance with breastfeeding difficulties (eg postnatal home visits, lactation consultants, Australian Breastfeeding Association, peer support).
- ☐ **Involve partner or family:** Discuss the importance of support for the mother to enable breastfeeding.
- ☐ **Provide information:** Give booklets/ handouts relating to breastfeeding that are appropriate for the woman. Information should be available in a language that is understood. All information should be free of marketing for formula, bottles and teats.
- ☐ **Take a holistic approach:** In discussing breastfeeding, do not assume that a woman knows how to breastfeed. Reinforce positive attitudes to breastfeeding and tailor advice and support to a woman's individual circumstances, including cultural background. Be aware of different beliefs and cultural practices and explore these with women during pregnancy. Discuss solutions for potential difficulties (eg need to return to work).
- ☐ **Document discussions:** Note a woman's intentions about breastfeeding in her antenatal record. The use of a checklist may provide a prompt for health professionals to ensure discussion regarding feeding intentions has taken place.

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Weak recommendation

Routinely offer education about breastfeeding as part of antenatal care.

Approved by NHMRC in June 2014, expires June 2019

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Info Box

Resources

AHMC (2009) *The Australian National Breastfeeding Strategy 2010–2015*. Canberra: Australian Government Department of Health and Ageing.

Australian Breastfeeding Association

NHMRC (2012) Appendix G: Australian nutrition and breastfeeding resources and websites. In: *Infant Feeding Guidelines for Health Workers*. Canberra: National Health and Medical Research Council.

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: National Health and Medical Research Council.

Remote Primary Health Care Manuals. (2017). Breastfeeding. In *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Wiessinger D, West D, Pitman T (2010) *The Womanly Art of Breastfeeding.* 8th Edition. New York: Ballantine Books.

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6. Lifestyle considerations

Info Box

This section discusses lifestyle factors that contribute to the health and wellbeing of a woman and her baby during pregnancy. Recommendations are based on evidence about the health risks and benefits associated with a range of lifestyle factors.

Table C1 provides a summary of advice on lifestyle considerations during pregnancy considered a priority for inclusion in these Guidelines. Advice on immunisation during pregnancy is included in the *Australian Immunisation Handbook [434]*.

Table C1: Summary of advice for women about lifestyle considerations during pregnancy

Health behaviours		Chapter
Nutrition	Healthy dietary patterns are characterised by high intake of fruits, vegetables, legumes, wholegrains, fish, seafood, unprocessed meats, dairy foods and water Diets with high intake of sweetened foods and drinks, foods high in saturated fats (eg fried foods), processed meats and refined grains are associated with poorer outcomes The *Eat for Health website* provides further details	11.1
Physical activity	Usual physical activity during pregnancy has health benefits and is safe	11.3
Tobacco smoking	Smoking and passive smoking can have negative effects on the pregnancy and the baby	12
Alcohol	Not drinking alcohol is the safest option for women who are pregnant	13
Substance use	Illicit substances and non-medical use of medications (eg opioids) have negative effects on the pregnancy and the baby	15
Preventive health interventions		
Folic acid	Dietary supplements of 400 µg folic acid a day, ideally taken from 1 month before conception and throughout the first 3 months of pregnancy, reduce the risk of a baby having neural tube defects	11.2.1
Other vitamins	In the absence of identified deficiency, supplements of vitamins A, C and E are of little or no benefit during pregnancy and may cause harm	11.2.1
Iron	The need for iron supplementation is assessed through a blood test at 28 weeks	11.2.2
	If an iron supplement is necessary, weekly supplementation (80-300 mg elemental iron) is as effective as daily supplementation (30-60 mg elemental iron) in preventing (but not treating) iron-deficiency anaemia, with fewer adverse effects	
Calcium	Calcium supplements are recommended for women at high risk of pre-eclampsia	11.2.2
Iodine	Iodine requirements increase during pregnancy and a supplement of 150 micrograms a day is advised	11.2.2
Omega-3 fatty acids	Supplementation with omega-3 long-chain polyunsaturated fatty acids (800 mg docosahexaenoic acid [DHA] and 100 mg eicosapentaenoic acid [EPA] per day) may reduce the risk of preterm birth among women who are low in omega-3	11.2.3
Herbal preparations	The effectiveness and safety of herbal preparations varies according to the herbal preparation and the condition being treated	11.2.3
Medicines		
Medicines	Use of medicines should be limited to circumstances where the benefit outweighs the risk	14

Health behaviours		Chapter
General advice		**Chapter**
Oral health	Good oral health is important to a woman's health and treatment can be safely provided during pregnancy.	16
Sexual activity	Sexual intercourse in pregnancy is not known to be associated with any adverse outcomes.	17
Travel	Correct use of three-point seatbelts during pregnancy is to have the belt 'above and below the bump, not over it'.	18
	Long-distance air travel is associated with an increased risk of venous thrombosis.	
	Pregnant women should discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas	
	If a pregnant woman cannot defer travel to malaria-endemic areas, she should use an insecticide-treated bed net.	
	Some medications to prevent malaria can be safely used in pregnancy.	

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6.1 Nutrition and physical activity

6.1.1 Nutrition

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Info Box

Consuming a wide variety of nutritious foods during pregnancy is important to ensure that the nutritional requirements of both mother and baby are met. While supplementation of vitamins and minerals is common during pregnancy, only some supplements are beneficial. Regular physical activity has health benefits for mother and baby and is safe.

Nutrition

The nutritional status of a woman before and during pregnancy plays a vital role in fetal growth and development. The basic principles of healthy eating remain the same, though requirements for some nutrients (eg iron, folic acid) may increase.

Background

Knowledge about healthy eating during pregnancy
Observational studies carried out in Australia have found:

- low levels of awareness of dietary guidelines during pregnancy among women *[206][298]*
- low levels of women meeting dietary recommendations for the five food groups *[207][330][315][206][299]*
- low levels of knowledge of foods to avoid during pregnancy *[211]*
- limited dietary counselling by health professionals *[298][300]*.

An Irish cohort study *[324]* found that women with a 'health conscious' dietary pattern were older, had a higher level of education and had a lower BMI than those with an 'unhealthy' dietary pattern. A study in New Zealand also found that a 'health conscious' dietary pattern was associated with increasing age, better self-rated health, lower pre-pregnancy BMI and not smoking *[419]*.

Access to healthy food

- *Geographical location:* The decreased availability and affordability of nutritious foods (such as fresh fruit and vegetables and wholegrain bread), especially in remote and regional areas in Australia has been described frequently. The cost of nutritious foods in these areas can be over 30% higher than in major cities and may affect food purchases *[342][347][271][295]*.
- *Socioeconomic status*: In some urban centres, there is less access to supermarkets and greater access to fast food outlets than in more socioeconomically advantaged areas *[215][197]*.
- *Aboriginal and Torres Strait Islander women:* Diet and nutritional status of Aboriginal and Torres Strait Islander people are influenced by many factors, such as socioeconomic disadvantage and geographical, environmental and social factors *[301]*. Very few Aboriginal and Torres Strait Islander people meet dietary recommendations for intake of healthy foods *[301]*. A high proportion (41%) of daily energy intake is derived from unhealthy 'discretionary' foods and drinks that are high in saturated fat, added sugar and salt, compared to 35% among non-Indigenous Australians. The current nutritional health of Aboriginal and Torres Strait Islander people is in marked contrast to the situation prior to European settlement in Australia, when Aboriginal and Torres Strait Islander peoples were generally healthy and enjoyed a varied traditional diet low in energy density and rich in nutrients *[301]*.
- *Migrant and refugee women:* Following migration, dietary behaviour may be influenced by post-migration environments, culture, religion and food-related beliefs and perceptions *[341]*. Similarly, financial and language difficulties may affect access to education and employment opportunities, which then affects income, health and nutrition literacy, and access to nutritious foods. Some migrant people experience disadvantages such as social isolation and poor housing, which can affect access to safe food and safe preparation of food, and are generally in a relatively vulnerable position in their new environments, regardless of the type of migration *[424]*.

Discussing nutrition

Australian dietary guidelines for pregnant women
As outlined in the *Australian Dietary Guidelines [343]*, consuming a variety of nutritious foods is particularly important during pregnancy and breastfeeding.

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- *Vegetables, legumes/beans and fruit:* Consumption of vegetables and fruit before and during pregnancy make important contributions to health outcomes for women and their children.
- *Grain (cereal) foods*: Wholegrain foods are a valuable source of iron and zinc and fibre. Most bread in Australia is fortified with folic acid and made with iodised salt.
- *Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans*: Lean red meat and chicken are good sources of protein, iron and zinc. Maternal consumption of fish during pregnancy is likely to have a range of health benefits for women and their children but the fish should be low in mercury (see Table 2). Nuts, seeds and legumes/ beans are important foods for people who choose vegetarian or vegan dietary patterns and meals without meat, as they can provide an alternative source of nutrients. For several nutrients, including iron, calcium and vitamin B_{12}, care needs to be taken to include a variety of alternatives if animal foods are excluded.
- *Milk, yoghurt and cheese and/or their alternatives*: Milk, yoghurt and cheese or their alternatives are good sources of calcium.
- *Water*: Pregnant women require more water to support fetal circulation, amniotic fluid and a higher blood volume — fluid need is 750–1,000 mL a day above the estimated daily intake of 2.1 L.
- *Foods containing saturated fat, added salt, added sugars*: Intake of these foods should be limited in general and during pregnancy. The additional energy requirements of pregnancy should be met through additional serves of foods from the five food groups rather than energy-dense foods.
- *Alcohol*: Not drinking alcohol is the safest option during pregnancy (see Section 6).

Table 1 outlines the recommended number of serves of different food groups during pregnancy. However, it is acknowledged that dietary patterns may vary depending on cultural background.

Table C2: Recommended number of daily serves for women who are pregnant or breastfeeding

Food group	Sample serve	Pregnancy		Breastfeeding	
		<18 yrs	19-50 yrs	<18 yrs	19-50 yrs
Vegetables of different types and colours, and legumes/ beans	½ cup cooked green or orange vegetables; ½ cup legumes; 1 cup raw green leafy vegetables; ½ medium potato (or sweet potato, taro or cassava); ½ cup sweet corn; 1 medium tomato	5	5	5 ½	7 ½
Fruit	1 medium apple, banana, orange or pear; 2 small apricots, kiwi fruits or plums; 1 cup diced or canned fruit (no sugar), 30 g dried fruit (only occasionally)	2	2	2	2
Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa and barley	1 slice bread; ½ medium roll or flat bread; ½ cup cooked rice, pasta, noodles, polenta or quinoa; ½ cup porridge; 2/3 cup wheat cereal flakes; ¼ cup muesli; 3 crispbreads	8	8 ½	9	9
Lean meats and poultry, fish, eggs, tofu, nuts* and seeds, and legumes/beans	65 g cooked lean red meat; 80 g cooked chicken; 100 g cooked fish fillet; 2 large eggs; 1 cup cooked lentils or canned beans; 170 g tofu; 30 g nuts, seeds, peanut or almond butter or tahini	3 ½	3 ½	2 ½	2 ½

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Food group	Sample serve	Pregnancy		Breastfeeding	
		<18 yrs	19-50 yrs	<18 yrs	19-50 yrs
Milk, yoghurt, cheese and/or their alternatives (mostly reduced fat)	1 cup milk; 200 g yoghurt; 40 g hard cheese; ½ cup ricotta cheese; 1 cup soy, rice or other cereal drink with added calcium	3 ½	2 ½	4	2 ½
Approximate number of additional serves from the five food groups or discretionary choices		0-3	0-2 ½	0-3	0-2 ½

* Note that nuts need only be avoided if the woman has an allergy to them.

Source: (NHMRC 2013).

Table C3: Foods to be consumed with caution during pregnancy

- Due to the risk of listeriosis, pre-prepared or pre-packaged cut fruit or vegetables should be cooked. Pre-prepared salad vegetables (eg from salad bars, including fruit salads and cut melon) should be avoided
- Raw or undercooked meat, chilled pre-cooked meats, and pâté and meat spreads should be avoided during pregnancy due to risk of listeriosis
- Care needs to be taken with consumption of some fish species (eg shark/flake, marlin or broadbill/swordfish, orange roughy and catfish) due to the potentially higher mercury content
- Foods containing raw eggs should be avoided due to the risk of salmonella
- Unpasteurised dairy products and soft, semi-soft and surface-ripened cheese should be avoided due to the risk of listeriosis
- Sugar-sweetened drinks are associated with dental conditions, such as caries
- Food Standards Australia and New Zealand suggests limiting intake during pregnancy to 200 mg/day of caffeine (FSANZ 2019), noting that caffeine is present in coffee (145 mg/50 mL espresso; 80 mg/250 mL instant coffee), tea (50 mg/220 mL), colas (36 mg/375 mL), energy drinks (80 mg/250 mL) and chocolate (10 mg/50g).

Source: (NHMRC 2013; FSANZ 2019).

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[343][256]

Recent evidence on dietary patterns

Dietary patterns associated with healthy outcomes generally have high intake of fruits, vegetables, legumes, wholegrains, fish, seafood, lean meats, low-fat dairy and water. Dietary patterns associated with poorer outcomes include those high in sweetened foods and beverages, foods high in saturated fats (eg fried foods), red and processed meats and refined grains.

A healthy dietary pattern can help reduce the risk of:

- excessive gestational weight gain *[367]*
- gestational diabetes *[319][386][191][430][362]*
- gestational hypertension *[385][263][283]*
- antenatal depression *[333]*.

Conversely, an unhealthy dietary pattern may increase the risk of gestational diabetes *[391][251]* and antenatal depression *[202]*.

The evidence is inconsistent on the association between dietary pattern in pregnancy and:

- preterm birth *[243][368][384][397][191][192][224][225][366]*
- fetal growth *[318][251][263][191][224][242][321][193][225][244]*
- childhood growth *[414][249][220][250]*
- childhood cardiometabolic health *[249][220][303]*
- childhood wheeze *[217][190][432]*.

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Systematic reviews into vegan-vegetarian diets found inconsistency in results on birthweight, similar duration of pregnancy between vegan-vegetarian and omnivorous diets and a suggestion of risk of iron, vitamin B_{12} *[363]* and zinc deficiency *[363][252]*) with vegan-vegetarian diets.

A systematic review found that fasting during Ramadan among well-nourished women did not increase the risk of preterm birth or low birthweight *[260]*.

Recent evidence on consumption of specific foods/food categories during pregnancy

The systematic review conducted to inform development of these Guidelines *[367]* found that the recent evidence on specific foods or food categories that should be promoted or avoided during pregnancy was generally observational but was consistent with the findings on dietary patterns.

Fruit, vegetables and legumes

There is evidence from observational studies that eating vegetables, fruit and legumes during pregnancy is beneficial to both mother and baby, with

- a reduction in risk of neural tube defects (OR 0.32; 95%CI 0.14 to 0.71; n=918) *[420]*
- possible associations with improvements in glucose tolerance (p<0.05; n=180) *[399]*, fetal growth (aOR 0.63; 95%CI 0.40 to 0.98; n=1,036) *[320][321]*, pre-eclampsia (aRR 0.20; 95%CI 0.04 to 0.98; p for trend=0.041; n=987) *[410][328]*, preterm birth (OR 0.67; 95%CI 0.50 to 0.91; n=923) *[397][223]* and wheeze at 12 months (OR: 0.44; 95%CI 0.20 to 0.99; n=1,087) *[190]*.

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Low fruit intake is associated with higher prevalence of major depressive disorder (PR 1.43, 95%CI 1.04 to 1.95; n=712) and low intake of legumes is associated with generalised anxiety disorder (PR 1.40, 95%CI 1.01 to 1.93; n=712) (n=712) *[355]*. A lower risk of childhood leukaemia is associated with maternal consumption of fruit (OR: 0.81, 95% CI: 0.67 to 0.99), vegetables (OR: 0.51, 95% CI: 0.28 to 0.94) and legumes (OR 0.76, 95% CI: 0.62 to 0.94) (n=903) *[236]*. Total daily fruit and vegetable consumption during pregnancy does not appear to be associated with maternal sleep duration (ß -0.03; 95%CI -0.07 to 0.00; n=2,951) *[240]*.

Dairy

There is evidence from observational studies that higher maternal intake of all dairy products (255 vs 32 g/day) is associated with a reduced risk of eczema in babies (aOR 0.64; 95%CI 0.42 to 0.98) *[332]*. Maternal milk intake is associated with reduced risk of neural tube defects (1-2 vs <1 time/week; OR 0.50; 95%CI 0.28 to 0.88; n=918) *[420]*, asthma (OR 0.83; 95% CI 0.69 to 0.99; n=1,227), allergic rhinitis (OR 0.85; 95%CI 0.74 to 0.97; n=1,227) *[213]* and cow's milk allergy in children (OR 0.56, 95%CI 0.37 to 0.86; p<0.01; n=6,288) *[411]*. Higher yoghurt intake (80 g vs 4 g a day) is associated with lower prevalence of depressive symptoms during pregnancy (aOR 0.69; 95%CI 0.48 to 0.99, p for trend0.03; n=1,745) *[332]*.

Potential allergens

There is evidence from observational studies that a lower risk of peanut allergy in the infant is associated with maternal peanut consumption during the first trimester (OR 0.53; 95%CI 0.30 to 0.94; n=1,227) *[213]* or pre-pregnancy and during pregnancy (≥5 times vs <1 time per month: OR 0.31; 95% CI 0.13 to 0.75; P(trend)=0.004; n=8,205) *[255]*. Maternal wheat intake during the second trimester may reduce atopic dermatitis in the infant (OR 0.64; 95%CI 0.46 to 0.90; n=1,227) *[213]*.

Meat

There is evidence from observational studies that lower maternal meat consumption may be protective against wheeze in the child (p=0.039; n=1,000) *[217]* but that maternal intake of cured meats may be associated with a risk of childhood retinoblastoma (OR 5.07, 95 % CI 1.63 to 15.70; n=199) *[309]*.

Fish

There is evidence from systematic reviews of observational studies that maternal fish intake may be associated with positive neurodevelopmental outcomes (qualitative review; 8 studies)*[401]* and a reduced risk of childhood leukaemia (OR 0.27, 95% CI: 0.14 to 0.53; 2 studies) *[236]*. It does not appear to affect the risk of infant eczema (RR 0.88; 95%CI 0.75 to 1.04; 10 studies), wheeze (RR 0.94; 95%CI 0.83 to 1.07; 8 studies), allergic rhinitis (RR 0.95; 95%CI 0.62 to 1.45; 3 studies) or asthma (RR 0.94; 95%CI 0.75 to 1.18; 4 studies) *[431]*.

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Observational studies have found positive associations between maternal seafood intake during pregnancy and language and communication scales in the infant (n=38,351) *[417]* and metabolic health of children (β = -0.96; 95%CI -1.49 to -0.42; n=805) *[403]* but were inconsistent regarding the effect on child growth *[402][413]*.

There is evidence from observational studies that low intake of seafood may be associated with increased risk of antenatal depression (aOR 1.54; 95%CI 1.25 to 1.89; n=12,418) *[241]*.

A cohort study (n=3,279) *[336]* found a possible association between lean fish intake and preterm birth (RR 1.55; 95% CI 1.04 to 2.30). The study noted that studies of mechanisms and potential contributing factors (including seafood preparation and nutrient contaminant content) are warranted. There was no association between fatty fish intake and preterm birth and no association between other pregnancy complications and either lean or fatty fish consumption.

While fish consumption during pregnancy may have benefits for the women and child, high fetal exposure to mercury through maternal fish consumption is associated with low birthweight (MD -34 g; 95%CI -46 g to -22 g; n=56,988) and small-for-gestational age (aOR 1.19; 95%CI 1.08 to 1.30; n=56,988) *[415]*, delayed language and communication skills in a generally low exposed population (n=46,750 mother-child pairs) *[416]* and an unfavourable metabolic profile in children (β per 2-fold increase in mercury concentration 0.18; 95% CI 0.01 to 0.34) *[403]*. Types of fish that should be avoided during pregnancy due to potential high mercury content are listed in Table 2.

Carbohydrates

There is evidence from secondary analysis of RCT participants that, in obese women with impaired glucose tolerance, a lower carbohydrate intake in late pregnancy is associated with a lower fat mass in the baby at birth (188 vs 238 g/day; p-trend=0.006; n=222) *[370]*. There is evidence from cohort studies that high maternal carbohydrate consumption may be associated with increases in birthweight (4g for each additional 10 g/day; 95%CI 1.0 to 7.0; p=0.003; n=1,196) *[389]* and with infant wheeze (potatoes once or twice a week OR 1.75; 95%CI 1.22 to 2.51; n=1,087; pasta never or occasionally; p=0.049) *[217][190]*.

Protein

There is evidence from observational studies that maternal protein intake may be associated with a higher risk of gestational diabetes (OR highest vs lowest quartile of intake 2.15; 95% CI 1.27 to 3.62; p=0.016; n=980) *[354]*, may increase fat-free mass in the infant (ß 0.14; 95 % CI 0.03 to 0.25 for highest vs lowest quartile of intake; n=2,694 mother-child pairs) *[409]*, may reduce newborn abdominal adipose tissue (-0.18 mL; 95%CI -0.35 to -0.001 mL per 1% protein-to-carbohydrate substitution and -0.25 mL; 95%CI -0.46 to -0.04 mL per 1% protein-to-fat substitution; n=320 mother-child pairs) *[222]* and may reduce early length growth (-0.09 cm/year 6 months to late childhood; 95% CI: -0.14 to -0.05; n=1,961) *[405]*.

Fats

There is evidence from observational studies that women with uncomplicated pregnancies had lower daily fat intake (32.1%) than women who developed gestational diabetes (36.2%) (p=0.0251; n=55) *[334]*) and that an additional 10 g/day fat intake was associated with a lower birthweight (MD -8 g; 95%CI -16 to -0.3; p=0.04; n=1,196), with the authors concluding that balancing intake of dietary carbohydrate and fat during pregnancy could support optimal birthweight *[389]*.

Sweetened foods and drinks

There is evidence from secondary analysis of RCT participants that higher consumption of foods and drinks that contribute to intake of added sugars (2 times daily versus <1 time/week) is associated with higher gestational weight gain (MD 5.4 kg; 95% CI 2.1 to 8.7; n=342) *[371]*. Observational studies report an association between sugar-sweetened foods and drinks and impaired glucose tolerance (p<0.05; n=180) *[399]* and gestational diabetes (aOR for highest vs lowest category 2.03; 95%CI 1.25 to 3.31; n=3,396) *[239]*. It is also associated with an increased prevalence of major depressive disorder (adjusted prevalence ratio [aPR] 1.91; 95%CI 1.19 to 3.07; n=712) *[355]*.

Fetal and child growth is also affected by higher intake of sweetened foods and drinks, with increased risks of large for gestational age (aRR 1.57; 95%CI 1.05 to 2.35; n=918 mother-child pairs) *[433]*, increased infant BMI z score (0.20-unit increase in infant BMI z score; 95% CI 0.02 to 0.38; n=2,686) and overweight at 1 year (aOR 2.19; 95%CI 1.23 to 3.88,686) *[194]* and 7 years of age (aRR 1.93; 95%CI 1.24 to 3.01; 918 mother-child pairs) . Maternal consumption of sweetened foods and beverages is also associated with infant atopy (OR for highest versus lowest quintile of sugar intake 1.38, 95%CI 1.06 to 1.78; per quintile p-trend=0.006; n=8,956) and asthma (OR 2.01, 95% CI 1.23-3.29; per quintile p-trend=0.004 n=8,956) *[203]*.

Fast foods

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There is evidence from cohort studies that 'fast food' (eg ready-to-eat food and drinks that are typically higher in energy (kilojoules), low in nutrition and prepared away from home) consumption is associated with an increased risk of gestational diabetes (aOR for high vs low consumption 1.86; 95% CI 1.13 to 3.06; n=3,048) , infant eczema (p=0.005; n=1,000) *[217]* and asthma (RR 4.46; 95%CI 1.36 to 14.6; n=1,201 mother-child pairs) *[418]*. A small case-control study found a positive association between maternal intake of fried foods and retinoblastoma in the child (OR 4.89, 95 % CI 1.72 to 13.89; n=299) *[309]*.

Caffeine

There is insufficient evidence to confirm or refute the effectiveness of caffeine avoidance on birth weight or other pregnancy outcomes *[284]*. Food Standards Australia and New Zealand suggests limiting intake during pregnancy to 200 mg of caffeine *[256]*, noting that caffeine is present in coffee, tea, colas, energy drinks and chocolate.

There is evidence from observational studies that the risks of preterm birth (OR per 100 mg/d caffeine increase 1.28; 95%CI 1.03 to 1.58; P=0.03; n=858) *[350]* and childhood brain tumours (OR ≥2 cups per day 2.52; 95% CI 1.26 to 5.04; n=1,019) *[262]* increase with caffeine intake.

6.1.2 Nutritional supplements

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Info Box

Nutritional supplements

Dietary patterns consistent with the *Australian Dietary Guidelines* will allow the general population to meet nutrient requirements. However, the recommended dietary intake is higher for some nutrients during pregnancy *[344]* and supplementation of some nutrients (eg folic acid and iodine) is recommended. Some women may also seek advice on other supplements.

Vitamins

Pregnancy multivitamins

Background

In Australian observational studies:

- 79% of pregnant women used multivitamin supplements *[388]*
- 42% of participants used pregnancy multivitamins, with 26.8% using multivitamins in combination with individual micronutrients and 9.8% using specific micronutrient supplements; nulliparous women were more likely to take supplements *[322]*
- 83% of women took a multivitamin during pregnancy, with 90% of women with post-secondary education and 64% of women with secondary education only using these supplements *[316]*
- pregnancy-specific multivitamin use was reported by 47% of women in the first trimester, 51% in the second trimester and 46% in the third trimester and general multivitamin use was reported by 31% of women in the first trimester, 27% in the second trimester and 35% in the third trimester *[308]*.

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Summary of recent evidence

There is very low to low certainty evidence that antenatal multivitamin supplementation among women in high income countries is associated with a reduced risk of small for gestational age (RR 0.77; 95%CI 0.63 to 0.93; 3 cohort studies; very low certainty) and some congenital anomalies and a possible reduced risk of preterm birth (RR 0.84; 95%CI 0.69 to 1.03; 4 cohort studies; very low certainty) *[425]*.

Folic acid (vitamin B_9)

Background

A survey of pregnant women conducted in Sydney found that 30.6% were taking a supplement of folic acid alone *[388]*. A cross-sectional study that included national and South Australian cohorts found that, while awareness of recommendations on folic acid supplementation was high (90%), adherence was low (27%) *[314]*.

In an Australian cohort study *[308]*, 19-46% of women did not meet the recommended daily intake for folate. Conversely, 15-19 % of women consumed beyond the recommended upper limit for folate.

Dietary sources of folate include green vegetables (eg spinach), legumes, rice, avocado, fruit, beef liver and fortified products (many breakfast cereals, bread, fruit juice, vegemite).

Summary of the evidence

There is high certainty evidence that folic acid supplementation ≥400 µg per day preconception and in the first 3 months of pregnancy is associated with a reduction in risk of neural tube defects (RR 0.32; 95%CI 0.17 to 0.60; 4 RCTs; n=6,708)*[234]*. There was no evidence of any preventive or negative effects on other congenital anomalies.

Evidence from observational studies suggests it may reduce congenital heart defects (RR 0.72; 95%CI 0.63 to 0.82 *[248]*; OR 0.60; 95%CI 0.49 to 0.71 *[427]*).

There is evidence from systematic reviews of observational studies that folic acid supplementation during pregnancy may reduce the risk of acute myeloid leukaemia (OR 0.52; 95%CI 0.31 to 0.89) *[327]*, brain and spinal cord tumours in the child (OR 0.77; 95%CI 0.66 to 0.90) *[226]* and autism spectrum disorders (RR 0.77; 95%CI 0.64 to 0.93, 16 studies) *[421]*.

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The evidence suggests that folic acid supplementation during pregnancy does not affect the risk of early or late miscarriage (RR 0.97; 95%CI 0.65 to 1.44; 1 RCT; n=903), stillbirth (RR 0.67; 95%CI 0.11 to 4.02; 1 RCT; n=903), total fetal loss (RR 0.95; 95%CI 0.64 to 1.40; 1 RCT; n=903) *[198]*, preterm birth (RR 0.99; 95%CI 0.82 to 1.18; 1 RCT; n=1,654 *[379]*; RR 1.09; 95%CI 0.77 to 1.54; 1 RCT; n=2,797 *[297]*), low birthweight (RR 0.79; 95%CI 0.49 to 1.28; 4 RCT; n=4,453 *[379]*; RR 0.80; 95%CI 0.63 to 1.02; 3 studies; n=3,089 *[297]*), infant asthma (RR 1.04; 95%CI 0.94 to 1.16; 3 observational studies) or infant wheeze (RR 1.04; 95%CI 0.94 to 1.16; 3 observational studies) *[422]*.

There is inconclusive evidence on the effect of folic acid supplementation on gestational hypertension, pre-eclampsia *[280][212][306][423]* and acute lymphoblastic leukaemia in the infant *[327][236]*.

Other vitamins

- *Vitamin B_6*: There is insufficient evidence to detect clinical benefits in pregnancy *[380]*, although it appears to be of benefit in reducing nausea (MD in nausea score -3.7; 95%CI -6.9 to -0.5; very low certainty) *[400]*. See also Section 12.
- *Vitamin B_{12}*: The evidence on vitamin B_{12} supplementation in pregnancy is of insufficient certainty to draw conclusions. However, it may be of benefit for women with vegetarian or vegan diets, as vitamin B_{12} is generally not present in plant foods *[356]*. See also Section 9.
- *Vitamin C*: The evidence does not support routine high dose (1,000 mg/day) vitamin C supplementation for fetal loss (RR 1.28; 95%CI 0.58 to 2.83; 2 RCTs; n=224) *[198]* or perinatal death (RR 0.51; 95%CI 0.05 to 5.54; 1 RCT; n=182) *[378]*, intrauterine growth restriction (RR 1.56; 95%CI 0.63 to 3.89; 1 RCT; n=159; high certainty), preterm birth (RR 1.06; 95%CI 0.75 to 1.48; 5 RCTs; n=1,685; high certainty) or pre-eclampsia (RR 0.88; 95%CI 0.48 to 1.61; 3 RCTs; n=1,191) *[378]*. Further research is required to clarify the possible role of vitamin C in the prevention of placental abruption and prelabour rupture of membranes *[378]*.
- *Vitamin D:* Vitamin D supplementation may be a consideration for women with vitamin D levels lower than 50 nmol/L. The evidence for vitamin D supplementation is discussed in Section 10.
- *Vitamin E*: The evidence on vitamin E supplementation during pregnancy is of insufficient certainty to draw conclusions on efficacy and safety *[257]*.
- *Vitamins C and E combined*: Supplementation with vitamins C and E (500 to 1,000 mg vitamin C plus 400 IU vitamin E) during pregnancy appears to reduce the risk of placental abruption (RR 0.64; 95% CI 0.44 to 0.93, 7 RCTs, n=14,922; high certainty) but increases the risk of term prelabour rupture of the membranes (RR 1.77; 95% CI 1.37 to 2.28, 2 RCTs, n=2,504) *[377]*. It does not appear to affect other perinatal outcomes *[377][198][412][257][408]*. Combined vitamins C and E may reduce the risk of preterm birth (RR 0.76; 95% CI 0.58 to 0.99) and placental abruption (RR 0.09; 95% CI 0.00 to 0.87) in pregnant women who smoke *[186]*.
- *Vitamin A*: The evidence does not support vitamin A supplementation for the prevention of fetal loss (RR 1.05; 95%CI 0.90 to 1.23; 3 RCTs; n=52,480) *[198]*, maternal mortality (RR 0.88; 95%CI 0.65 to 1.20; 4 RCTs; n=154,039; high certainty), perinatal mortality (RR 1.01; 95%CI 0.95 to 1.07; 1 RCT, n=76,178; high certainty) or preterm birth (RR 0.98; 95%CI 0.94 to 1.01; 5 RCTs; n=48,007; high certainty) *[323]*. The evidence on the role of vitamin A supplementation in reducing risk of maternal clinical infection (RR 0.45; 95%CI 0.20 to 0.99; 5 RCTs; n=17,313; low certainty) and preventing anaemia (RR 0.64; 95%CI 0.43 to 0.94; 3 RCTs; n=15,649; moderate certainty) *[323]* may not be generalisable to the Australian context.

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Minerals

Iron

Background

Studies have investigated rates of iron intake, supplementation and iron-deficiency anaemia among Australian women during pregnancy. In a cohort study *[308]* 68-82% of women did not meet the recommended daily intake level for iron; conversely, 11-24% of women consumed beyond the recommended upper limit for iron. Cross-sectional studies have found that levels of iron-only supplementation are relatively low in general (7-30%) *[219][388]* and among women with diagnosed iron deficiency (65%) or with diagnosed iron-deficiency anaemia (62%) *[219]*.

Studies among Aboriginal and Torres Strait Islander women have found very low levels of women meeting the estimated average requirement for iron in some areas *[302]* and high levels of iron deficiency and anaemia *[305]*.

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Iron-rich staple foods include meat, seafood, poultry and wholegrains *[344]*. Iron in foods can come in two general forms — as haem or non-haem iron. Iron from animal food sources may be either haem or non-haem whereas the iron in plant sources such grains and vegetables is non-haem *[344]*. The haem form is more bioavailable to humans than the non-haem. Absorption is aided by vitamin C and limited by tea and coffee *[317]*. Where iron-rich foods are not available (eg due to geographical location or socioeconomic factors), women may be at high risk of iron deficiency.

Summary of the recent evidence

There is moderate certainty evidence that preventive iron supplementation in pregnancy may reduce the risk of preterm birth (RR 0.93; 95%CI 0.84 to 1.03, 13 RCTs, n=19,286) *[357][358][185]*.

There is low certainty evidence that iron supplementation in pregnancy reduces the risk of maternal anaemia at term (RR 0.30; 95%CI 0.19 to 0.46, 14 RCTs, n=2,199 *[357][358]*; RR 0.38; 95% CI 0.27 to 0.33; 13 RCTs *[185]*) and iron deficiency at term (RR 0.43; 95%CI 0.27 to 0.66, 7 RCTs, n=1,256) *[357][358]*. There is also low certainty evidence that iron supplementation has no clear effect on neonatal death (RR 0.91; 95%CI 0.71 to 1.18, 4 RCTs, n=16,603 *[357][358]*; RR 0.93; 0.72 to 1.20; 7 RCTs *[185]*), low birthweight (RR 0.84; 95%CI 0.69 to 1.03; n=17,613; 11 RCTs *[357][358]*; RR 0.94, 95% CI 0.79 to 1.13; 7 RCTs *[185]*) or congenital anomalies (RR 0.88, 95%CI 0.58 to 1.33, 4 RCTs, n=14,636) *[357][358]*.

There is very low certainty evidence that iron supplementation in pregnancy has no clear effect on the risk of maternal death (RR 0.33; 95%CI 0.01 to 8.19, 2 RCTs, n=12,560) *[357][358]* or maternal adverse effects (RR 1.29; 95%CI 0.83 to 2.02, 11 RCTs, n=2,423 *[357][358]*; RR 1.42; 95%CI 0.91 to 2.21; 12 RCTs *[185]*). A systematic review indicates that iron supplementation has no clear effect on infant neurodevelopment (MD 0.54 units across different measures; 95% CI -0.67 to 1.75; 3 RCTs) *[285]*.

There is low certainty evidence that weekly (80-300 mg elemental iron) versus daily (30-60 mg elemental iron) supplementation in pregnancy has no clear effect on preterm birth (RR 1.03; 95%CI 0.76 to 1.39; n=1,177; 5 RCTs), birthweight (MD 5.13 g; 95%CI -29.46 to 39.72; n=1,939; 9 RCTs) or low birthweight (RR 0.82; 95%CI 0.55 to 1.22; n=1,898; 8 RCTs) *[357][358]*.

There is very low certainty evidence that maternal adverse effects such as constipation and nausea (RR 0.56; 95%CI 0.37 to 0.84; n=1,777; 1 RCT) are reduced with weekly versus daily iron supplementation with no clear effect on the risk of maternal anaemia at term (RR 1.22; 95%CI 0.84 to 1.80; n=676; 4 RCTs), maternal iron-deficiency at term (RR 0.71; 95%CI 0.08 to 6.63; 1 RCT) or neonatal death (RR 0.49; 95%CI 0.04 to 5.42; n=795; 1 RCT) *[357][358]*.

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Calcium

Background

A survey of pregnant women conducted in Sydney found that 13% were taking a supplement of calcium alone *[388]*.

Calcium is found predominantly in milk and milk-based foods, with smaller amounts in bony fish, legumes and most nuts, fortified soy beverages and breakfast cereals *[344]*.

Calcium requirements during pregnancy are higher among adolescent women than among women older than 18 years *[344]*.

Summary of recent evidence

There is consistent evidence from systematic reviews that calcium supplementation reduces the risk of gestational hypertension *[277][404]* and pre-eclampsia *[276][291][277][404]*.

High-dose calcium supplementation (≥1 g/day) reduces the risk of gestational hypertension (RR 0.65; 95%CI 0.53 to 0.81; 12 RCTs; n=15,470), with a clearer effect among women with low dietary calcium (RR 0.44; 95%CI 0.28 to 0.70; 7 RCTs; n=10,418) than among women with adequate dietary calcium (RR 0.90; 95%CI 0.81 to 0.99; 4 RCTs; n=5,022) *[277]*. High-dose calcium also reduces the risk of pre-eclampsia (RR 0.45; 95CI 0.31 to 0.65; 13 trials; n=15,730; low certainty).

Low-dose calcium (<1 g/day) also reduces the risk of gestational hypertension (RR 0.57; 95%CI 0.39 to 0.82; 3 RCTs; n=558) *[277]* and pre-eclampsia (RR 0.36; 95%CI 0.23 to 0.57; 4 RCTs; n=980) *[276]*.

A Cochrane review *[277]* found a possible reduction in risk of preterm birth <37 weeks with high-dose calcium among all women (RR 0.76; 95%CI 0.60 to 0.97; 11 trials, n=15,275; low certainty). Another Cochrane review of calcium supplementation trials not specifically targeted at preventing pre-eclampsia *[214]* found no clear difference in risk of preterm birth at <37 weeks (RR 0.86; 95% CI 0.70 to 1.05; 13 studies, n=16,139; moderate certainty) or at <34 weeks (RR

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1.04; 95%CI 0.80 to 1.36; 4 RCTs, n=5,669; moderate certainty).

Calcium supplementation does not appear to be of benefit in preventing low birthweight (RR 0.93; 95%CI 0.81 to 1.07; 6 RCTs; n=14,162; moderate certainty) *[214]*.

A systematic review found no difference in rates of adverse effects between women taking calcium supplements and those taking a placebo *[214]*.

There is some evidence that routine calcium supplementation in pregnancy in high-income countries such as the Netherlands is more cost-effective than selective supplementation *[325]*.

Iodine

Background

The NHMRC (2010) *Public Statement: Iodine Supplementation for Pregnant and Breastfeeding Women* suggests pregnant women take an iodine supplement of 150 µg each day to avoid poor infant neurodevelopment.

Evidence of iodine deficiency re-emerged in Australia in the 1990s, motivating mandatory fortification of bread with iodised salt in 2009. The AIHW reports that, while mandatory fortification delivered sufficient amounts of iodine to the general population, intakes for many pregnant and breastfeeding women were insufficient due to their increased requirements *[189]*.

In a review of Australian cohort studies post-fortification (7 studies) *[281]* three studies found that the pregnant women in their studies were iodine replete and four studies found that pregnant women were in the mild-to-moderate iodine deficiency category. Only two studies documented iodine sufficiency among pregnant women in the absence of iodine supplementation.

A survey of pregnant women conducted in Sydney found that 6.3% were taking an iodine supplement *[388]*. A study conducted in Gippsland Victoria, a mildly iodine deficient area, found that only 18.9% of participants followed the NHMRC advice, with 42.3% of participants not taking any supplements (or supplements with no iodine or insufficient iodine) *[331]*. The remaining women (38.7%) were taking supplements with doses of iodine much higher (200-300 µg) than the NHMRC recommended dose or were taking multiple supplements containing iodine. In a South Australian study, 85.9% women met the estimated average requirement (≥160 µg/day) for iodine intake from food and supplements *[228]*. When iodine from supplements was excluded, 44.5% of women met the estimated average requirement for iodine intake during pregnancy. In a Western Australian study, 66% of pregnant women were taking iodine supplements *[274]*. A Tasmanian study (n=255) found that, despite recommendations for iodine supplementation, pregnant Tasmanian women remain at risk of iodine deficiency *[282]*.

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An analysis of cross-sectional data from two Australian longitudinal studies pre- and post-fortification of iodine (n=368) *[394]* found that the median urinary iodine concentration of pregnant Indigenous women in remote locations remains low and targeted interventions are needed to ensure healthy fetal development. In a cross-sectional study in Western Australia (n=425) *[390]* ethnicity was associated with iodised salt use, with 76% of Asian women used iodised salt compared with 33% of Caucasian women.

In a national survey of maternity care providers, while 71% were aware of the NHMRC advice on iodine supplementation, fewer were aware of the recommended dose (38%) or duration (44%), with 73% advising iodine supplements in pregnancy *[265]*.

Summary of recent evidence

There is low certainty evidence that, in settings with mild to moderate iodine deficiency, iodine supplementation may reduce the risk of postpartum hyperthyroidism (average RR 0.32; 95%CI 0.11 to 0.91; three RCTs; n=543 women) with very low certainty evidence of an increased likelihood of gastrointestinal intolerance during pregnancy (average RR 15.33; 95%CI 2.07 to 113.70; one RCT; n=76) *[269]*. There is low certainty evidence that iodine supplementation has any effects on other outcomes or side effects for mothers or infants *[269][247]*.

RCTs have reported that iodine supplementation:

- increased maternal urinary iodine levels in areas with iodine deficiency ($p<0.05$) *[221]* and mild-moderate deficiency ($p<0.0001$) *[218]*

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- decreased maternal thyroglobulin levels (p=0.02) *[218]*
- decreased median neonatal thyroid stimulating hormone levels (p<0.05) *[221]*
- had no effect on child neurodevelopment at age 5–6 years in mildly iodine-deficient pregnant women *[261]*.

Zinc

Background

A survey of pregnant women conducted in Sydney found that 5.6% were taking a zinc supplement *[388]*. In an Australian cohort study *[308]* 17-24% of pregnant women did not meet the recommended daily intake for zinc.

Summary of recent evidence

There is some evidence that zinc supplementation may slightly reduce the risk of preterm birth with no clear effect on low birthweight or other outcomes, possibly indicating that low zinc status reflects poorer overall nutrition in some pregnant women *[352][307]*. Zinc supplementation does not appear to increase or reduce the risk of other outcomes *[346][352][429][349]*.

Other minerals

- There is insufficient high-certainty evidence to show whether dietary magnesium supplementation during pregnancy is beneficial *[312]*.
- There is insufficient evidence to draw conclusions on selenium supplementation in pregnancy *[407][369]*.

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Other nutritional supplements

Other multiple micronutrients

Summary of recent evidence

There is high certainty evidence from studies conducted in low- to middle-income countries that the use of multiple micronutrients (including iron and folic acid) during pregnancy reduces the risk of low birthweight and may reduce the risk of stillbirth but does not affect the risk of perinatal or neonatal mortality *[290]*. There is moderate certainty evidence of a reduction in risk of small for gestational age and a possible reduction in risk of preterm birth (<37 weeks) *[290]*. There is evidence that multiple micronutrient use is associated with a reduction in risk of early preterm birth (<34 weeks), a possible reduction in risk of miscarriage, with no effect on maternal mortality, maternal anaemia, caesarean section or congenital anomalies *[290]*. These findings may not be generalisable to the Australian context.

Omega-3 fatty acids

Background

Omega-3 fatty acids are found predominantly in oily fish such as mackerel, herrings, sardines, salmon and tuna *[344]*.

In an Australian cross-sectional study, 12% of women took fish oil during pregnancy *[388]*.

Summary of the evidence

There is high certainty evidence that rates of preterm birth <37 weeks (10.1% versus 8.1%%; RR 0.89, 95%CI 0.82 to 0.97; 30 RCTs, n=21,271) and early preterm birth <34 weeks (2.6% vs 1.6%; RR 0.64, 95%CI 0.44 to 0.93; 11 RCTs, n=15,750) are lower in women receiving omega-3 long-chain polyunsaturated fatty acids compared with no omega-3 *[329]*. There is moderate-certainty evidence that prolonged pregnancy >42 weeks is probably increased with omega-3 fatty acid supplementation (RR 1.61 95%CI 1.11 to 2.33; n=5,141; 6 RCTs) but insufficient evidence to determine the effect of supplementation on induction post-term *[329]*. There is high certainty evidence of a reduced risk of low birthweight (15.6% vs 14%; RR 0.90, 95%CI 0.82 to 0.99; 15 trials, n=8,449;) and moderate certainty evidence for a possible reduced risk of perinatal death (RR 0.75, 95%CI 0.54 to 1.03; 10 RCTs, n=7,416), neonatal care admission (RR 0.92, 95%CI 0.83 to 1.03; 9 RCTs, n=6,920) and a possible small increase in risk of large-for-gestational age babies (RR 1.15, 95%CI 0.97 to 1.36; 6 RCTs, n=3,722) with omega-3 fatty acid supplementation (*[329]*.

The large ORIP (Omega-3 fats to Reduce the Incidence of Prematurity) trial *[313]* used a dose of 800 mg docosahexaenoic acid (DHA) and 100 mg eicosapentaenoic acid (EPA) per day. Further analysis of this trial indicates that women with low

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omega-3 status will benefit most from supplementation with omega-3 *[393]*.

Omega-3 fatty acids
Background

Omega-3 fatty acids are found predominantly in oily fish such as mackerel, herrings, sardines, salmon and tuna *[344]*.

In an Australian cross-sectional study, 12% of women took fish oil during pregnancy *[388]*.

Summary of the evidence

There is high certainty evidence that rates of preterm birth <37 weeks (10.1% versus 8.1%%; RR 0.89, 95%CI 0.82 to 0.97; 30 RCTs, n=21,271) and early preterm birth <34 weeks (2.6% vs 1.6%; RR 0.64, 95%CI 0.44 to 0.93; 11 RCTs, n=15,750) are lower in women receiving omega-3 long-chain polyunsaturated fatty acids compared with no omega-3 *[329]*. There is moderate-certainty evidence that prolonged pregnancy >42 weeks is probably increased with omega-3 fatty acid supplementation (RR 1.61 95%CI 1.11 to 2.33; n=5,141; 6 RCTs) but insufficient evidence to determine the effect of supplementation on induction post-term *[329]*. There is high certainty evidence of a reduced risk of low birthweight (15.6% vs 14%; RR 0.90, 95%CI 0.82 to 0.99; 15 trials, n=8,449;) and moderate certainty evidence for a possible reduced risk of perinatal death (RR 0.75, 95%CI 0.54 to 1.03; 10 RCTs, n=7,416), neonatal care admission (RR 0.92, 95%CI 0.83 to 1.03; 9 RCTs, n=6,920) and a possible small increase in risk of large-for-gestational age babies (RR 1.15, 95%CI 0.97 to 1.36; 6 RCTs, n=3,722) with omega-3 fatty acid supplementation *[329]*.

The large ORIP (Omega-3 fats to Reduce the Incidence of Prematurity) trial *[313]* used a dose of 800 mg docosahexaenoic acid (DHA) and 100 mg eicosapentaenoic acid (EPA) per day. Further analysis of this trial indicates that women with low omega-3 status will benefit most from supplementation with omega-3 *[393]*.

Probiotics

A meta-analysis of RCTs conducted to inform these Guidelines *[367]* found low certainty evidence that supplementation with probiotics may be associated with a possible reduction in caesarean section (RR 0.92; 95%CI 0.81 to 1.05; 15 RCTs; n=2,650), and very low certainty evidence of a reduction in Group B streptococcus colonisation (RR 0.76; 95%CI 0.61 to 0.97; n=244) and a possible reduction in risk of gestational diabetes (RR 0.87; 95%CI 0.71 to 1.08; 8 RCTs; n=1,722).

There is very low or low certainty evidence that probiotic supplementation does not reduce gestational hypertension (RR 1.24; 95%CI 0.74 to 2.06; 4 RCTs; n=955), pre-eclampsia (RR 1.88; 95%CI 0.96 to 3.71; 2 RCTs; n=598), bacterial vaginosis (RR 1.73; 95%CI 0.89 to 3.38; 2 RCTs; n=509), perinatal death (RR 1.17; 95%CI 0.62 to 2.24; 6 RCTs; n=1,670), preterm birth (RR 1.10; 95%CI 0.81 to 1.50; 16 RCTs; n=3,671), small for gestational age (RR 1.04; 95%CI 0.55 to 1.94; 3 RCTs; n=318), large for gestational age (RR 0.95; 95%CI 0.47 to 1.93; 3 RCTs; n=316) or macrosomia (RR 1.06; 0.85 to 1.33; 7 RCTs; n=1,407).

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Herbal preparations
Background

An Australian cohort study (n=1,835) found that 34.4% of women were using herbal preparations during pregnancy, of whom 77.9% were self-prescribing these products *[253]*. Women were more likely to use herbal medicine if they had anxiety (OR 1.30; 95%CI, 1.02 to 1.64; p=0.031), sleeping problems (OR 1.55; 95%CI 1.15 to 2.11; p=0.005) or fatigue (OR 1.32; 95%CI 1.04 to 1.68; p=0.025) and less likely to use herbal medicine if they had nausea (OR 0.71; 95%CI 0.56 to 0.91; p=0.007). Women who used herbal preparations viewed them as a preventative measure, were looking for something holistic and were concerned about evidence of clinical efficacy when considering the use of these products during pregnancy *[254]*.

Each herbal preparation needs to be considered as a potentially unique therapeutic agent, different in action from any other herbal medicine; even those within the same genus or produced from different parts of the same plant. The use of herbal preparations by pregnant women should be supervised by an appropriately qualified health professional.

Summary of the evidence

The evidence on the efficacy and safety of herbal preparations during pregnancy is limited. There is moderate certainty evidence that ginger reduces nausea (MD -4.2 nausea score; 95%CI -6.5 to -1.9), with a low risk of adverse effects (OR 0.4;

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95%CI 0.1 to 0.9) *[400]*. There is very low certainty evidence that chamomile is also effective in reducing nausea (MD -4.2; 95%CI -6.7 to -1.7; 1 RCT) *[400]*. There is evidence from a systematic review that garlic may reduce gestational hypertension (RR 0.50; 95%CI 0.25 to 1.00) but does not affect the risk of pre-eclampsia (RR 0.78, 95% CI 0.31 to 1.93) or caesarean section (RR 1.35, 95% CI 0.93 to 1.95), with odour likely to be experienced (RR 8.50, 95%CI 2.07 to 34.88) *[326]*. There is insufficient evidence on the efficacy and safety of echinacea, raspberry leaf, elderberry and St John's wort during pregnancy *[235][278][339]*.

Consensus recommendation

Advise women that healthy dietary patterns are characterised by high intake of fruits, vegetables, legumes, wholegrains, fish, seafood, unprocessed meats, dairy foods and water. Diets with high intake of sweetened foods and drinks, foods high in saturated fats (eg fried foods), processed meats and refined grains are associated with poorer outcomes. Refer women to the *Eat for Health website* for further details.

Approved by NHMRC in Nov 2020; expires Nov 2025

Good practice statement

Ask pregnant women whether they are currently taking or plan to take multivitamin supplements, and take this information into account when providing advice.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

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Advise dietary supplementation of 400 µg per day folic acid, ideally from 1 month before conception and throughout the first 3 months of pregnancy to reduce the risk of neural tube defects.

Approved by NHMRC in Nov 2020; expires Nov 2025

Advise iron supplementation to pregnant women based on their haemoglobin concentration at 28 weeks (see Section 9).

Approved by NHMRC in Nov 2020; expires Nov 2025

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Advise pregnant women taking an iron supplement that weekly supplementation (80-300 mg elemental iron) is as effective as daily supplementation (30-60 mg elemental iron) in preventing (but not treating) iron-deficiency anaemia, with fewer adverse effects.

Approved by NHMRC in Nov 2020; expires Nov 2025

Recommendations for testing and treatment of iron-deficiency anaemia are included in Section 9.

Advise pregnant women at risk of hypertension to take a calcium supplement.

Approved by NHMRC in Nov 2020; expires Nov 2025

Consensus recommendation

Suggest that pregnant women take an iodine supplement of 150 µg each day. Women with pre-existing thyroid conditions should seek advice from their medical practitioner before taking a supplement.

Approved by NHMRC in Nov 2020; expires Nov 2025

Advise pregnant women that supplementation with omega-3 long-chain polyunsaturated fatty acids (800 mg DHA and 100 mg EPA per day) may reduce their risk of preterm birth, if they are low in omega-3.

Approved by NHMRC in Nov 2020; expires Nov 2025

Consensus recommendation

Advise women that the effectiveness and safety of herbal preparations varies according to the herbal preparation and the condition being treated.

Approved by NHMRC in Nov 2020; expires Nov 2025

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6.1.3 Physical activity

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Info Box

Background

Physical activity can be defined as any movement that expends energy. This includes sport, exercise and recreational activities and incidental activity that accrues throughout the day (eg walking to the shops, climbing stairs).

The *Australian Physical Activity and Sedentary Behaviour Guidelines [237]* recommend that adults aged 18-64 years:

- accumulate 150 to 300 minutes (2½ to 5 hours) of moderate intensity physical activity or 75 to 150 minutes (1¼ to 2½ hours) of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week
- do muscle strengthening activities on at least 2 days each week
- minimise the amount of time spent in prolonged sitting
- break up long periods of sitting as often as possible.

Table 3: Definition of levels of physical activity

Moderate intensity	Physical activity that requires some effort, but still allows the person to speak easily while undertaking the activity
Vigorous intensity	Physical activity that requires more effort and makes the person breathe harder and faster ("huff and puff")

Source: (DoH 2014)

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Levels of physical activity in Australia

Recent data specific to pregnant women are not available but results from national surveys give some indication of patterns of physical activity and sedentary behaviour.

In Australia in 2017-18 among 18-64 year olds *[187]*:

- the majority (83.5%) engaged in some form of deliberate voluntary exercise (not including workplace physical activity) but only 15.0% of these participants met both the physical activity and muscle strengthening aspects of the guidelines
- more than half (55.4%) undertook 150 minutes or more of exercise in the last week, excluding workplace physical activity
- one quarter (24.9%) did strength or toning activities on two or more days in the last week as recommended in the guidelines
- more than two thirds (69.6%) did not conduct any strength or toning activities.

An Australian cross-sectional study found that fewer women participated in exercise during pregnancy (61%) compared to before pregnancy (87%) and that they exercised at a significantly lower frequency ($p<0.05$), intensity ($p<0.05$) and for a shorter time/duration ($p<0.05$) *[272]*.

Awareness of and barriers to physical activity among pregnant women

In a survey of regionally-based Australian women (n=142) *[273]*, around half of women (53%) reported receiving advice on exercise as part of antenatal care. However, the advice given was frequently inconsistent with evidence–based guidelines concerning frequency, intensity, duration and benefits and harms.

Systematic reviews have found that barriers to participating in physical activity were:

- categorised as intrapersonal (pregnancy-related symptoms and limitations, time constraints, perceptions of already being active, lack of motivation and mother-child safety concerns), interpersonal (lack of advice and information and lack of social support) and environmental, organisational and policy barriers (adverse weather, lack of resources) *[227]*
- predominantly intrapersonal barriers such as fatigue, lack of time and pregnancy discomforts, while enablers included maternal and fetal health benefits (intrapersonal), social support (interpersonal) and pregnancy-specific programs *[270]*.

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Discussing physical activity

Guidelines on physical activity in pregnancy

The *Evidence-based Physical Activity Guidelines for Pregnant Women* recommend that *[210]*:

- all women without contraindications be encouraged to meet the *Australian Physical Activity and Sedentary Behaviour Guidelines* (see above) before, during and after pregnancy
- modifications to physical activity/exercise may be required to accommodate the physical changes that occur as the pregnancy progresses — if there are any concerns (including warning signs and contraindications), women are advised to seek advice from a qualified health professional
- all pregnant women are advised to do pelvic floor exercises during and after pregnancy
- health professionals support women to take an active role in shared decision-making about their physical activity/ exercise during and after pregnancy.

Recent evidence on the effects of physical activity during pregnancy

Physical fitness and quality of life

There is a possible increase in physical fitness associated with exercise in pregnancy *[279] [233][268][205][264][387][216]* and rates of injury appear to be low (4.1 per 1,000 exercise hours; n=1,469). The evidence on the effect on quality of life suggests an improvement with physical activity *[337][266][267][365][373][376]*. Structured exercise interventions reduce the risk of antenatal (RR 0.44; 95%CI 0.32 to 0.61; 6 RCTs; n=798; moderate certainty) and postnatal (RR 0.47; 95%CI 0.34 to 0.65; 5 RCTs; n=1,613; moderate certainty) depression *[367]*.

Effect of physical activity on complications of pregnancy

The meta-analysis of RCTs conducted to inform the development of these Guidelines *[367]* found that structured exercise interventions during pregnancy were highly beneficial. The interventions mostly involved aerobic (treadmill, stationary cycling, walking, dance, circuit training, swimming) and muscle strengthening exercises (including pelvic floor exercises) for around 60 minutes, three times a week at an intensity of 60-80% of maximum heart rate or 12-14 on the Borg scale and continued to 36 to 39 weeks pregnancy. Compared to women who did not participate in the interventions, participants had lower mean gestational weight gain (MD -0.95 kg; 95%CI -1.20 to -0.69; 29 RCTs; n=5,680; moderate certainty) and were at lower risk of:

- weight gain exceeding US Institute of Medicine (IOM) recommendations (RR 0.77; 95%CI 0.69 to 0.87; 16 RCTs; n=4,333; low certainty)
- gestational diabetes (RR 0.74; 95%CI 0.60 to 0.90; 20 RCTs; n=5,592; low certainty)
- gestational hypertension (RR 0.51; 95%CI 0.37 to 0.71; 7 RCTs; n=3,060; moderate certainty)
- caesarean section (RR 0.85; 95%CI 0.74 to 0.98; 25 RCTs; n=5,704; moderate certainty)
- macrosomia >4,000 g (RR 0.75; 95%CI 0.59 to 0.96; 15 RCTs; n=4,759; moderate certainty).

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Positive impact of physical activity on common conditions in pregnancy

- *Incontinence*: Pelvic floor muscle exercises appear to reduce the risk of urinary incontinence in late pregnancy (RR 0.38; 95%CI 0.20 to 0.72; 6 studies; n=624; low quality) and at 3-6 months postpartum (RR 0.71; 95%CI 0.54 to 0.95; 5 studies; n=673; moderate quality) but do not appear to affect the risk of faecal incontinence (RR 0.61; 95%CI 0.30 to 1.25; 2 studies; n=867; moderate quality) *[426]*.
- *Glycaemic control:* An acute bout of exercise is associated with a decrease in maternal blood glucose from before to during exercise (MD -0.94 mmol/L, 95%CI -1.18 to -0.70;6 studies, n=123) and following exercise (MD -0.57 mmol/L, 95% CI -0.72 to -0.41; n=333) *[229]*.
- *Pelvic girdle and low back pain*: There is evidence from systematic reviews *[392] [231]*, an RCT *[395]* and a cohort study *[259]* that physical activity during pregnancy is associated with a possible reduction in risk of low back (RR 0.91, 95%CI 0.83 to 0.99; 7 studies; n=1,175) and lumbopelvic pain (RR 0.96, 95%CI 0.90 to 1.02; 8 studies; n=1,737) and a reduction in severity of pain during pregnancy (SMD -1.03; 95%CI -1.58 to -0.48; 10 studies; very low to moderate certainty). The evidence on the effect of exercise on pelvic girdle pain and pain in the postpartum period is unclear.
- *Sleep*: It is unclear whether moderate to vigorous exercise during pregnancy improves sleep quality *[310][292]* Ro*[373][428]* and it is not effective in treating insomnia in pregnancy *[428]*.

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Effect on labour

One systematic review *[294]* and eleven RCTs *[381] [195][199][382][359][360][361][406][201][383][374]* reported on duration of labour among women who had participated in a physical activity intervention during pregnancy and those who had not. The systematic review found no clear difference in length of the first (MD 2.00; 95%CI -1.15 to 5.15; 1 study; n=18) or second (MD -5.72; 95%CI -15.22 to 3.78; 1 study; n=18) stage of labour *[294]*. With some exceptions, *[382] [359][201][374] [361]*, the RCTs found no clear difference in duration of any stage of labour.

Five RCTs *[195][200][382][406][383]* reported on pain relief during labour among women who had participated in a physical activity intervention during pregnancy and those who had not. One study reported fewer requests for analgesia in labour (RR 0.42; 95%CI 0.23 to 0.77; n=71) *[195]* but there was no clear difference in the other studies.

Five RCTs *[381][382][258][387][375]* reported on perineal tears among women who had participated in a physical activity intervention during pregnancy and those who had not. One study found higher rates of intact perineum among the intervention group (aOR 8.57; 95% CI 1.85 to 39.68) *[375]* but there was no clear difference in rates of perineal tears in any other study.

Effect on the infant and child

There is evidence from systematic reviews that leisure-time exercise during pregnancy is not associated with congenital anomalies (OR 1.23, 95%CI 0.77 to 1.95; 14 studies; n=78,735; very low certainty) *[232]* and appears to be protective against macrosomia (aOR 0.77; 95%CI 0.61 to 0.96; n=36,896) *[353]* and low birthweight, with women who did not exercise before and during pregnancy having an increased risk of very low birthweight (OR 1.75; 95%CI 1.50 to 2.04; n=2,245) *[304]*. Cohort studies suggest a positive association between physical activity during pregnancy and offspring neurodevelopment (4 studies) *[345]*. Physical activity during pregnancy does not appear to affect childhood weight (n=802) *[293]*.

Safety of physical activity during pregnancy

The evidence did not support an association between:

- any exercise during pregnancy and:
- risk of miscarriage (OR 0.69; 95%CI 0.40 to 1.22; 10 studies) or perinatal mortality (OR 0.79; 95%CI 0.26 to 2.38; 6 studies) *[230]*
- adverse impact on fetal heart rate or uteroplacental blood flow metrics (9 studies; 4,651 women) *[396]*
- vigorous exercise during pregnancy and:
- risk of small for gestational age, low birthweight *[204][275]*, large for gestational age or high birthweight *[275]*
- risk of preterm birth with exercise in the first (OR 0.80; 95%CI 0.48 to 1.35) or second trimester (OR 0.52; 95%CI 0.24 to 1.11; n=1,699) *[246]*
- risk of preterm birth with vigorous activity up to 435 min/week (OR 1.2; 95%CI 0.5 to 3.1; n=1,647) *[289]*
- risk of post-term birth with exercise in the first (OR 0.93; 95%CI 0.45 to 1.89) or second (OR 1.15; 95%CI 0.47 to 2.79) trimester (n=1,699) *[246]*
- supine exercise and low birthweight (3 RCTs; very low to low certainty) *[338]*
- swimming or aqua aerobics and:
- risk of miscarriage <22 weeks (19-22 weeks HR 0.9; 95%CI 0.4 to 1.9; n=92,671) *[311]*
- risk of spina bifida (aOR 0.68; 95%CI 0.47 to 0.99; n=8,655)*[188]*
- significant increase in maternal body temperature (mean increase 0.16±0.35°C; n=109) *[208]*.

A systematic review noted that there was insufficient evidence to ascertain whether maternal exercise in the supine position is safe or should be avoided during pregnancy *[338]*.

Further information about physical activity during pregnancy, including contraindications and signs and symptoms that suggest that physical activity/exercise should be modified, is included in *Evidence-based Physical Activity Guidelines for Pregnant Women*.

Recent evidence on the effects of occupational physical activity during pregnancy
The evidence on risks associated with occupational physical activity during pregnancy is unclear.

Heavy lifting (eg >200 kg/day) may be associated with an increased risk of pelvic pain (201-500 kg/day: aOR 1.45; 95%CI 1.31 to 1.60; n=50,143) *[296]*, stillbirth among women with a previous fetal loss (201-975 kg per day: adjusted hazard ratio [aHR] 2.87; 95%CI 1.37 to 6.01; n=68,086) *[287]* and preterm birth among primigravid women (201-975 kg/day: aHR 1.43; 95%CI 1.13 to 1.80; n=65,530) *[335]* but does not appear to be associated with small-for-gestational age *[364][398][288]* or

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low birthweight *[398]*.

There is a possible association between occupational standing and increased risk of miscarriage (>6 hours a day: RR 1.16; 95%CI 1.01 to 1.32; 30 studies) or preterm birth *[372]* (>3 hours per day: OR 1.25; 95%CI 0.99 to 1.57; 11 studies) but no clear difference in small-for-gestational age, birthweight *[245]* or pelvic pain *[286]*.

There is insufficient evidence to draw conclusions on strenuous occupational physical exertion in pregnancy but it may be associated with preterm premature rupture of the membranes (OR 1.72; 95%CI 1.16 to 2.56; n=2,929) (Newman et al 2001) and pelvic pain (OR 1.47; 95%CI 1.17 to 1.84; n=2,758) *[286]*.

Advise women that usual physical activity during pregnancy has health benefits and is safe.

Approved by NHMRC in Nov 2020; expires Nov 2025

6.1.4 Lifestyle interventions

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Lifestyle interventions

The literature review conducted to inform these Guidelines *[367]* analysed the results of randomised controlled trials that compared usual care to:

- *dietary intervention*: common themes in dietary advice provided included increasing consumption of fruit and vegetables, protein and fibre and reducing intake of saturated fats, carbohydrates and sugar (eg in soft drinks)
- *exercise intervention*: interventions mostly involved aerobic (treadmill, stationary cycling, walking, dance, circuit training, swimming) and muscle strengthening exercises (including pelvic floor exercises) for around 60 minutes, three times a week at an intensity of 60-80% of maximum heart rate or 12-14 on the Borg scale and continued to 36 to 39 weeks pregnancy
- *lifestyle counselling intervention*: most interventions involved counselling with a focus on gestational weight gain, diet and exercise with weight gain recommendations based on the US Institute of Medicine (IOM) guidelines and encouraged some form of self-monitoring (eg through weight gain charts, log books, pedometers).

Mean gestational weight gain was lower among women participating in a dietary intervention (MD -3.76 kg; 95%CI -6.38 to -1.13; 6 RCTs; n=1,432; very low certainty), exercise intervention (MD -0.95 kg; 95%CI -1.20 to -0.69; 29 RCTs; n=5,680; moderate certainty) or lifestyle counselling (MD -1.25 kg; 95%CI -1.64 to -0.86; 36 RCTs; n=9,083; low certainty). The risk of weight gain exceeding guidelines was also reduced by dietary intervention (RR 0.65; 95%CI 0.54 to 0.77; 4 RCTs; n=538; very low certainty), exercise intervention (RR 0.77; 95%CI 0.69 to 0.87; 16 RCTs; n=4,333; low certainty) and lifestyle counselling intervention (RR 0.83; 95%CI 0.78 to 0.89; 29 RCTs; n=7,905; low certainty). The risk of postnatal weight retention was reduced with lifestyle counselling (MD -1.19 kg; 95%CI -1.62 to -0.76; 11 RCTs; n=2,483; moderate certainty). There was no clear difference in postnatal weight retention with a dietary intervention (MD -0.55 kg; 95%CI -2.02 to 0.92; 2 RCTs; n=556; very low certainty) or exercise intervention (MD −0.20 kg; 95%CI −1.48 to 1.09; 5 RCTs; n=388; moderate certainty).

Risk of gestational diabetes was reduced by exercise interventions (RR 0.74; 95%CI 0.60 to 0.90; 20 RCTs; n=5,592; low certainty), probably reduced by lifestyle counselling (RR 0.90; 95%CI 0.81 to 1.01; 26 RCTs; n=9,011; moderate certainty) with no differences seen with dietary interventions (RR 0.86; 95%CI 0.64 to 1.17; 6 RCTs; n=1,424; very low certainty).

There was a reduced risk of gestational hypertension with dietary intervention (RR 0.29; 95%CI 0.13 to 0.61; 3 RCTs; n=429; moderate certainty) or exercise intervention (RR 0.51; 95%CI 0.37 to 0.71; 7 RCTs; n=3,060; moderate certainty) but not with lifestyle counselling (RR 0.99; 95%CI 0.77 to 1.28; 13 RCTs; n=4,890; low certainty). No difference in risk of pre-eclampsia was seen with any type of intervention (low to moderate certainty).

Risk of caesarean section was reduced with exercise intervention (RR 0.85; 95%CI 0.74 to 0.98; 25 RCTs; n=5,704; moderate certainty) and probably reduced with lifestyle counselling (RR 0.95; 95%CI 0.89 to 1.02; 25 RCTs; n=9,049; low certainty). There was no difference in risk of caesarean section with a dietary intervention (RR 0.85; 95%CI 0.64 to 1.11; 6 RCTs; n=1,461; very low certainty).

The risk of antenatal depression was reduced with exercise intervention (RR 0.44; 95%CI 0.32 to 0.61; 6 RCTs; n=798; moderate certainty) but not lifestyle counselling (RR 0.99; 95%CI 0.80 to 1.22; 2 RCTs; n=2,908; low certainty). The risk of postnatal depression was reduced with exercise intervention (RR 0.47; 95%CI 0.34 to 0.65; 5 RCTs; n=1,613; moderate certainty).

The risk of preterm birth was reduced with a dietary intervention (RR 0.43; 95%CI 0.24 to 0.79; 4 RCTs; n=1,296; moderate certainty), probably reduced with lifestyle counselling (RR 0.85; 95%CI 0.72 to 1.01; 18 RCTs; n=7,497; moderate certainty) but not changed by exercise intervention (RR 0.95; 95%CI 0.74 to 1.22; 15 RCTs; n=4,388; moderate certainty).

No difference was seen in risk of macrosomia >4,000g with dietary intervention (RR 0.97; 95%CI 0.84 to 1.11; 3 RCTs; n=1,138; very low certainty) but there was a reduction with exercise intervention (RR 0.75; 95%CI 0.59 to 0.96; 15 RCTs; n=4,759; moderate certainty) and a probable reduction with lifestyle counselling (RR 0.91; 95%CI 0.82 to 1.01; 17 RCTs; n=7,664; low certainty). There was also a reduction of risk of macrosomia >4,500 g with lifestyle counselling (RR 0.67; 95%CI 0.46 to 0.97; 5 RCTs; n=3,435; moderate certainty). There was no difference seen in risk of low birthweight with an exercise intervention (RR 0.94; 95%CI 0.68 to 1.28; 11 RCTs; n=3,247; moderate certainty) or lifestyle counselling (RR 0.87; 95%CI 0.65 to 1.17; 4 RCTs; n=3,665; low certainty). There was a possible reduction in risk of large-for-gestational age with lifestyle counselling (RR 0.89; 95%CI 0.79 to 1.00; 22 RCTs; n=8,455; moderate certainty) but no clear difference in risk with the other interventions.

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There was no clear difference in risk of small-for-gestational age, Apgar score <7 at 5 minutes or weight in early childhood with any intervention.

An Australian study found that antenatal lifestyle interventions for preventing gestational diabetes and hypertensive diseases of pregnancy are likely to be cost effective *[196]*. Studies from overseas found that lifestyle interventions were cost-effective for gestational weight gain *[209]* but not blood glucose levels, insulin resistance *[351][209]* or infant weight *[351]*, were inconsistent regarding quality-adjusted life years *[351][209]* and a better understanding of the short- and long-term costs of large for gestational age and weight gain exceeding IOM recommendations is necessary *[348]*.

Advise women that structured lifestyle interventions improve maternal and infant outcomes and are effective in preventing excessive weight gain.

Approved by NHMRC in Nov 2020; expires Nov 2025

Consensus recommendation

At every antenatal visit, give women advice on the benefits of a healthy diet and regular physical activity in preventing adverse outcomes, including excessive weight gain.

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6.1.5 Practice summary: nutrition and physical activity

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Info Box

Nutrition

When: All antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian; nutritionist

- ☐ **Assess levels of nutrition:** Ask women about their current eating patterns.
- ☐ **Promote healthy eating:** Explain the benefits of healthy nutrition for the mother and baby. Give examples of healthy dietary patterns, including 'eating a rainbow' (ie eating fruits and vegetables of different colours to promote adequate vitamin and mineral consumption).
- ☐ **Discuss foods to avoid:** Give examples of foods that can cause harm during pregnancy, including alcohol, sources of listeria and fish high in mercury (see Table 2).
- ☐ **Discuss use of nutritional supplements:** Explain that some supplements (folic acid, iodine) are recommended for all women during some stages of pregnancy, while others may be harmful at levels higher than the recommended daily intake.
- ☐ **Consider referral:** Referral to an accredited practising dietitian may be a consideration if there is concern about the quality of nutritional intake, the woman would like information about nutrition for herself and her family, clinical assessment confirms that the women is underweight, overweight or obese or there are other factors of concern (eg diabetes, gastrointestinal disorders). An accredited practicing dietitian may also need to be consulted if the woman is under 18 years of age due to increased dietary need; most guidelines are based on adult needs.
- ☐ **Take a holistic approach:** Tailor dietary advice to the individual woman. Consider the availability and affordability of foods appropriate to the woman's cultural practices and preferences and the need for and affordability of supplements.

Physical activity

When: All antenatal visits.

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist, accredited exercise physiologist or accredited exercise scientist

- ☐ **Assess levels of activity:** Ask women about their current levels of physical activity, including the frequency, intensity, duration and type of activity.
- ☐ **Promote healthy levels of physical activity**: Give women advice based on the *Australian Physical Activity and Sedentary Behaviour Guidelines* and explain that physical activity during pregnancy has health benefits and is safe.
- ☐ **Provide information:** Give information about local supports for physical activity (eg women's walking groups, swimming clubs). Advise women to avoid exercising in the heat of the day and to drink plenty of water when active.
- ☐ **Consider referral:** Referral to an accredited exercise physiologist may be a consideration if there is a concern about the safety of physical activity for the woman and her family or the woman has not been physically active prior to pregnancy, clinical assessment confirms underweight or overweight of the woman or there are other factors of concern (e.g. diabetes, musculoskeletal conditions).
- ☐ **Take a holistic approach:** Assist women to identify ways of being physically active that are appropriate to their cultural beliefs and practices (eg activities they can do at home).

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6.1.6 Resources

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Info Box

Nutrition

FSANZ (2011) *Mercury in Fish*. Food Standards Australia New Zealand.

FSANZ (2018) *Listeria*. Food Standards Australia New Zealand.

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: National Health and Medical Research Council.

NHMRC (2010) *NHMRC Public Statement: Iodine Supplementation for Pregnant and Breastfeeding Women*. Canberra: National Health and Medical Research Council.

NHMRC (2006) *Nutrient Reference Values for Australia and New Zealand*. Canberra: National Health and Medical Research Council.

Physical activity

Brown et al (2020) *Evidence-based Physical Activity Guidelines for Pregnant Women*. Report prepared for the Australian Government Department of Health.

DoH (2014) *Australia's Physical Activity and Sedentary Behaviour Guidelines*.

RANZCOG (2020) *Exercise During Pregnancy*

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6.2 Tobacco smoking

Info Box

Health professionals have an important role in advising women of the risks associated with smoking in pregnancy, assessing smoking status on first contact with a woman and supporting efforts to stop or reduce smoking at subsequent contacts.

The effects of tobacco smoking on an individual's health are well documented. Tobacco smoking in pregnancy is a risk factor for complications, and is associated with low birth weight, preterm birth, small-for-gestational-age babies and perinatal death *[1124]*. While the prevalence of smoking in pregnancy has declined in high-income countries over the last decade, this decline has not been consistent across all sectors of society.

6.2.1 Background

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Info Box

Background

Smoking during pregnancy among Australian women

One in 9 women (11%) who gave birth in Australia in 2014 smoked at some time during their pregnancy, a decrease from 15% in 2009 *[1124]*. Rates of smoking were slightly higher in the first 20 weeks of pregnancy (11%) compared with after 20 weeks of pregnancy (8%).

Among women who gave birth in 2014, some were more likely than others to smoke in the first 20 weeks of pregnancy. Proportions were highest among the following women, noting that some may fall into more than 1 of these categories *[1124]*.

- *Adolescent women*: almost one-third (32%) of mothers under 20 smoked, compared with rates of 6% and 7% of mothers aged 35–39 and 40 and over, respectively.
- *Aboriginal and Torres Strait Islander women*: 44% of Indigenous mothers smoked, compared with 12% of non-Indigenous mothers (age-standardised percentages).
- *Socioeconomic status:* around one-fifth (19%) of mothers living in the lowest SES areas smoked, compared with 4% of mothers in the highest SES areas
- *Geographical location:* around one-third (34%) of mothers in *Very remote* and one-fifth (20%) in *Remote* areas smoked, compared with only 8% of women living in *Major cities*.

On average, women who smoked at any time during pregnancy *[1124]*:

- attended their first antenatal visit later in pregnancy than those who did not smoke (15 vs 13 weeks)
- had one less antenatal care visit (nine visits) than women who did not smoke (ten visits).

These patterns were present even when taking into consideration the effect of differences in SES.

Prevalence of smoking during pregnancy is higher among women with severe mental disorders than among women in general (eg 51% vs 24% for women with schizophrenia *[1154]*). A considerable proportion of adverse pregnancy outcomes among women with serious mental health disorders is attributable to smoking *[1140] [1144][1151]*.

Risks associated with smoking during pregnancy

High-level evidence identified in the NICE guidelines indicates a significant association between smoking in pregnancy and adverse outcomes. These include:

- *birth defects* including cleft lip and palate *[1170]*
- *effects on the pregnancy* including perinatal mortality *[1132]*, placental abruption *[1125][1128]*, preterm premature rupture of membranes (Castles et al 1999), ectopic pregnancy *[1128]*, placenta praevia *[1128]*, preterm birth *[1161]*, and miscarriage *[1132]*
- *effects on the baby,* in particular reduced birth weight (with babies born to smokers being a consistent 175–200 g smaller than those born to similar non-smokers) *[1148]*, small-for-gestational-age baby *[1129]*, stillbirth *[1160]*, fetal and infant mortality *[1145]* and sudden infant death syndrome *[1132]*
- although studies into *long-term effects* report conflicting results *[1133] [1150][1165]*, there is evidence of an association between low birth weight and coronary heart disease, type 2 diabetes and adiposity in adulthood *[1137]*.

Passive smoking (exposure to second-hand or environmental tobacco smoke) during pregnancy may also be associated with increased risk of low birth weight or preterm birth *[1143]*.

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6.2.2 Assessing smoking status

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Info Box

While many women who smoke quit spontaneously before their first antenatal visit, a significant proportion will relapse during or after pregnancy *[1157]*. Other women may not be aware of the risks associated with smoking in pregnancy or find it difficult to quit. It is important that women are asked early in pregnancy about their smoking status and whether others in the household smoke.

Women may feel guilty or stigmatised if they smoke during pregnancy, and as a result may deny or underreport their smoking *[1166][1167][1135]*. Questions about smoking should be phrased in a non-judgmental way, or collected using a written questionnaire rather than verbally, for example using a multiple-choice question as outlined below.

'Which of the following statements best describes your cigarette smoking?

- I smoke daily now, about the same as before finding out I was pregnant
- I smoke daily now, but I've cut down since I found out I has pregnant
- I smoke every once in a while
- I quit smoking since finding out I was pregnant
- I wasn't smoking around the time I found out I was pregnant and I don't currently smoke.'

Specific resources to assist with assessing smoking status are available (see Section12.7).

Strong recommendation

At the first antenatal visit:

- assess the woman's smoking status and exposure to passive smoking
- give the woman and her partner information about the risks to the unborn baby associated with maternal and passive smoking
- if the woman smokes, emphasise the benefits of quitting as early as possible in the pregnancy and discuss any concerns she or her family may have about stopping smoking.

Approved by NHMRC in December 2011; This recommendation is currently considered stable and no update is planned.

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6.2.3 Interventions to assist women to stop smoking

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Info Box

Pregnancy is a time when women who smoke may be more receptive to quitting *[1152]* and there are many opportunities for supporting women to quit at this time. This section summarises the available evidence on smoking cessation interventions in pregnancy. Discussion of ways to support people to quit smoking is included in specific smoking cessation guidelines (see Section 12.7).

Effectiveness of interventions

There is high-level evidence, based on systematic reviews and RCTs, that smoking cessation interventions reduce smoking rates in pregnant women. A Cochrane review *[1149]*, which is the largest study on this topic to date, found that interventions:

- improved smoking cessation rates by 6% (relative risk [RR] 0.94; 95% CI 0.93–0.96)
- reduced rates of low birth weight (RR 0.83; 95% CI 0.73–0.95) and preterm birth (RR 0.86; 95% CI 0.74–0.98) and there was a 53.91g increase in mean birth weight (95% CI 10.44–95.38g).

Of the interventions studied, cognitive behavioural interventions (including educational strategies and motivational interviewing; see Glossary) (RR 0.95; 95% CI 0.93–0.97) were similar in effect to interventions in general. Incentives (eg vouchers) increased the effectiveness of interventions (RR 0.76; 95% CI 0.71–0.81), while using the 'stages of change' theory (RR 0.99; 95% CI 0.97–1.00) or providing feedback to the mother (eg fetal health status) (RR 0.92; 95% CI 0.84–1.02) did not. While nicotine replacement therapy (NRT) was as effective as cognitive behaviour therapy (CBT) (RR 0.95; 95% CI 0.92–0.98), there is no clear evidence on its safety during pregnancy.

Other recent studies are consistent with the Cochrane review. Additional findings include that:

- telephone-based support combined with face-to-face sessions is beneficial *[1131]*
- providing information (eg at ultrasound appointments) has a significant effect *[1163]*
- smoking cessation may be influenced by concern about weight gain *[1126]*.

1. Cost-effectiveness of interventions

An economic analysis conducted to inform the development of these Guidelines (see separate document on economic analyses) found that smoking cessation interventions for both pregnant women and the wider population may be cost-effective from both a health system and societal perspective.

CBT and NRT have the same effect on life-years saved but the cost to the health system for NRT is lower. However, NRT is not an appropriate option for women who smoke less than 10 or 15 cigarettes a day *[1142]* and CBT is likely to be more successful in these women. Also, a woman's out-of-pocket costs are higher for NRT. If the health system were to cover the total costs of treatment, CBT would be the more cost-effective option.

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Supporting smoking cessation

Antenatal care is an opportunity to provide women with information about interventions that have been identified as effective (see above), are available locally or through the phone or internet, and are suitable to the individual woman's age, education level, intellectual capacity, language and/or cultural factors and motivation. Providing written or other form of information can reinforce this advice.

Pharmacological therapy

While the safety or otherwise of single-agent NRT in pregnancy has not been established *[1149]*, a large cohort study *[1146]* found no serious effect on birth weight unless more than one type of NRT product was used.
NRT appears to be effective in reducing smoking among pregnant women with nicotine dependence *[1162][1156]*.
Prescribing NRT or other pharmacological therapy requires consideration of the risks from the treatment versus the benefits of the woman not smoking. If NRT is prescribed, women should be advised that smoking while using NRT leads to high nicotine levels.

Reducing smoking if quitting is not possible

Women who are unable to quit during pregnancy often reduce the number of cigarettes that they smoke. This can reduce nicotine concentrations and offer some measure of protection for the fetus, with a 50% reduction being associated with a

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92g increase in birth weight *[1147][1168]*. However, the greatest health benefits for the woman and baby are from quitting completely.

Weak recommendation

Offer women who smoke referral for smoking cessation interventions such as cognitive behavioural therapy.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

At each antenatal visit, offer women who smoke personalised advice on how to stop smoking and provide information about available services to support quitting, including details on when, where and how to access them.

Approved by NHMRC in December 2011; expires December 2016

Weak recommendation

If, after options have been explored, a woman expresses a clear wish to use nicotine replacement therapy, discuss the risks and benefits with her.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

If nicotine replacement therapy is used during pregnancy, intermittent–use formulations (gum, lozenge, inhaler and tablet) are preferred to continuous-use formulations (nicotine patches).

Approved by NHMRC in December 2011; expires December 2016

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6.2.4 Monitoring and relapse of prevention

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Info Box

Even where women are motivated to quit smoking in pregnancy, they may relapse either later in the pregnancy or after the birth. Health professionals should reinforce quitting behaviours and continue to monitor all women who have recently quit about their willingness to stay smoke free. Partner smoking is highly correlated to relapse so it may be beneficial to extend the offer of smoking cessation support strategies to the woman's partner.

At each visit, congratulate the woman for having quit, review and reinforce the reasons for quitting, and encourage the non-smoker image. Discuss some high-risk times for relapse, such as late pregnancy, post-partum and after breastfeeding has stopped. Remind the woman about useful resources and sources of support *[1159]*. Continue to advise women who are trying to reduce their exposure to passive smoking.

Good practice statement

Monitor whether pregnant women are smoking and provide smoking cessation advice, encouragement and support throughout pregnancy.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

This document has been released under the Freedom of Information Act 1982 (CTH) By the Department of Health, Disability and Ageing

6.2.5 Considerations among specific population groups

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Info Box

Even where women are motivated to quit smoking in pregnancy, they may relapse either later in the pregnancy or after the birth. Health professionals should reinforce quitting behaviours and continue to monitor all women who have recently quit about their willingness to stay smoke free. Partner smoking is highly correlated to relapse so it may be beneficial to extend the offer of smoking cessation support strategies to the woman's partner.

At each visit, congratulate the woman for having quit, review and reinforce the reasons for quitting, and encourage the non-smoker image. Discuss some high-risk times for relapse, such as late pregnancy, post-partum and after breastfeeding has stopped. Remind the woman about useful resources and sources of support *[1159]*. Continue to advise women who are trying to reduce their exposure to passive smoking.

In some areas, women may use chewing tobacco (with or without pituri [12]) and enquiry about this may also be useful.

Effective smoking cessation interventions

A review of evidence regarding smoking cessation and prevention programs for Aboriginal and Torres Strait Islander Australians *[1158]* identified that:

- strategies at the individual level such as culturally appropriate counselling and/or NRT are likely to be effective for Aboriginal and Torres Strait Islander people who are motivated to quit
- brief interventions may be effective *[1139]*
- group-based programs need to be tailored to individual needs
- health workers who are able to quit smoking themselves will be in a stronger position to be a role model for others
- a range of health promotion resources are available and may be used to support other interventions.

National action to reduce smoking in Aboriginal and Torres Strait Islander communities

The Australian Government is funding a national network of regional tobacco coordinators and tobacco action workers to work with Aboriginal and Torres Strait Islander communities to reduce the number of people smoking. This workforce will implement a range of community-based smoking prevention, awareness raising and cessation support activities tailored to local communities.

Adolescent women

Smoking is one of a range of risk-taking behaviours engaged in by adolescents. Adolescents who are pregnant and smoke may be at risk of other behaviours that compromise their health and that of the unborn baby (eg drinking alcohol) *[1153]*.

Very few studies have investigated the effectiveness of interventions designed to help young people stop smoking and none are specific to pregnancy in this age group. It is likely that interventions aimed at young people need to be different from those developed for adults, given differences in lifestyle and attitudes to smoking and quitting *[1155]*.

Smoking cessation programs that combine a variety of approaches show promise, including taking into account the young person's preparation for quitting, supporting behavioural change and enhancing motivation *[1138]*. Nicotine replacement has not yet been shown to be successful with adolescents *[1138]*.

[12] The collective name for wild tobacco plants in Central Australia.

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Good practice statement

L. Health care professionals involved in the care of Aboriginal and Torres Strait Islander women should be aware of the high prevalence of smoking in some communities, and take account of this social norm when discussing smoking and supporting women to quit.

M. Culturally appropriate smoking cessation services should be offered.

Approved by NHMRC in December 2011; expires December 2016

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Good practice statement

In discussing smoking and supporting Aboriginal and Torres Strait Islander women to quit smoking, health professionals should draw on the expertise of anti-tobacco workers where available.

Approved by NHMRC in December 2011; expires December 2016

6.2.6 Practice summary: tobacco smoking

Info Box

Assessing smoking status

When: At the first contact with all women and at subsequent contacts for women who report smoking or have recently quit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss risks to the pregnancy:** Explain that smoking during pregnancy makes it more likely that the baby will be born prematurely and that there are other serious risks to the pregnancy that can be life-threatening to mother or baby.
- ☐ **Discuss risks to the unborn baby:** Discuss the increased risk of the baby having a low birth weight. Explain that this does not just mean that the baby will be small. Low birth weight is known to contribute to the development of coronary heart disease, type 2 diabetes and obesity in adulthood.
- ☐ **Take a non-judgemental approach:** Women may feel uncomfortable telling a health professional that they smoke. They may also under report the amount that they smoke or answer in a way that does not really quantify their level of smoking (eg "half a pack a day", "socially"). The important message to get across is that if they smoke, stopping smoking is the safest option.
- ☐ **Seek information about passive smoking:** Women who are exposed to smoke from others smoking around them may be more likely to have low birth weight or premature babies. Explain that smoke-free environments give people of all ages the best chance to be healthy.

Supporting women to stop or reduce smoking

When: At subsequent antenatal contacts with women who smoke or have recently quit

- ☐ **Be aware of local smoking cessation programs:** Provide women with advice on locally available supports for smoking cessation. Depending on location this may include community support groups, Quitline or State/Territory quit services.
- ☐ **Inform decision-making:** Help each woman to select smoking cessation options that are suitable to her needs. For example, NRT would be inappropriate for a woman who does not appear to be nicotine-dependent or only smokes when she is with friends.

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6.2.7 Resources

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Info Box

Smoking cessation guidelines

Bittoun R & Femia G (2010) *Smoking cessation in pregnancy*. *Obstet Med* 3: 90–93.

Flenady V, New K, MacPhail J (2005) *Smoking Cessation in Pregnancy*. Clinical Practice Guideline Working Party on Smoking Cessation in Pregnancy. Brisbane: Centre for Clinical Studies, Mater Health Services.

RACGP (2011) *Supporting smoking cessation: a guide for health professionals*. Melbourne: The Royal Australian College of General Practitioners.

Psychological services

The *beyondbluewebsite* includes a directory of medical and allied health professionals in mental health, including psychologists, clinical psychologists, social workers and mental health nurses.

Government funding to receive treatment from psychiatrists, psychologists and appropriately trained GPs can be accessed through Better Access to Mental Health Care (Medicare items).

Resources for Aboriginal and Torres Strait Islander women

Resources that are culturally appropriate to the area should be selected, taking into consideration local language and literacy.

SmokeCheck NSW

SmokeCheck QLD

Centre for Excellence in Indigenous Tobacco Control (CEITC) [URL no longer functional]

HealthInfoNet

National action to reduce Indigenous smoking rate [URL no longer functional]

Australian Government, Department of Health and aged care. Australia Quit Services

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6.3 Alcohol

New

Info Box

Although drinking alcohol is generally very common in Australia, alcohol consumption during pregnancy is becoming less common. In 2019, the Australian Institute of Health and Welfare found that 35% of women drank any alcohol while pregnant, compared to 44% in 2016. Around half of women who were unaware of their pregnancy drank alcohol during that time.*[68]*

This recommendation is based on the 2020 NHMRC Australian Guidelines to Reduce Health Risks from Drinking Alcohol,*[51]* incorporating an updated search for new evidence published since that guideline was released. More detailed information on the 2020 Alcohol guidelines is available at https://www.nhmrc.gov.au/health-advice/alcohol.

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Consensus recommendation

Updated

Provide advice not to consume alcohol during pregnancy, or around the time of conception, to prevent potential harm to the developing baby.

Additional information

Consuming alcohol during pregnancy, or around the time of conception, may result in harm to the developing baby. The available evidence does not indicate a safe amount of alcohol that a pregnant woman can consume, or a safer time during pregnancy for consuming alcohol. Alcohol has teratogenic effects, meaning it can permanently harm a baby during fetal development.

It is important to provide clear and consistent information about alcohol in simple language early in pregnancy, along with the reasoning for the recommendation. When asking about alcohol use, it is important to take a supportive approach and avoid judgement, stigma and shame. Some people may have consumed alcohol before finding out they are pregnant, and may have concerns that they wish to discuss. In this context, it can be reassuring for them to know that occasional alcohol consumption during early pregnancy may not always harm the developing baby. It is important to be aware that, for some people, alcohol may be associated with important cultural beliefs. Alcohol use may also be associated with alcohol use disorder, trauma and mental health concerns. Women who are pregnant and find it difficult to stop drinking alcohol should be offered supportive resources and referrals to appropriate services. Partners of women who are pregnant play an important role, and can show support by reducing or stopping their own alcohol consumption.

If a woman consumes alcohol during pregnancy, the alcohol reaches the developing baby via the placenta. A baby's brain starts developing very early in pregnancy, often before the woman knows she is pregnant. Alcohol consumed at any stage of pregnancy can damage the developing baby's brain, body, and organs, and can lead to a lifelong disability known as Fetal Alcohol Spectrum Disorder (FASD). People with FASD can experience impaired physical and emotional development, impaired speech and language development, learning difficulties or behavioural control difficulties.

Because of the difficulty of researching alcohol use in pregnancy, there is limited clinical evidence regarding the impact of alcohol in pregnancy. Various factors, such as genetic factors and metabolism, may influence the risks associated with alcohol consumption while pregnant. Evidence suggests the risk of harm from alcohol exposure may increase with the quantity and frequency of alcohol consumption. Women who do not consume alcohol during pregnancy remove the risk of alcohol-related harm to the developing baby.

In the absence of definitive evidence, the panel has arrived at a consensus recommendation based on the available evidence and their combined clinical expertise.

This recommendation is based on the 2020 NHMRC Australian Guidelines to Reduce Health Risks from Drinking Alcohol,[51] incorporating an updated search for new evidence published since that guideline was released. More detailed information on the 2020 Alcohol guidelines is available at https://www.nhmrc.gov.au/health-advice/alcohol.

Approved by LEAPP Steering Committee 26 October 2023. This is a draft recommendation that has not yet been approved by NHMRC.

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Rationale

Limited evidence suggests that drinking alcohol during pregnancy can result in harm to the developing baby, including fetal alcohol spectrum disorder (FASD). Although the evidence is too uncertain to warrant a strong evidence based recommendation, given the risk of harm, the panel has has arrived at a consensus recommendation based on the available evidence and their combined clinical expertise.

Clinical question/ PICO

Population: Women who are pregnant or are planning pregnancy
Intervention: Consumption of alcohol
Comparator: Abstinence

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Summary

An updated search was conducted in 2023 based on the original 2018 NHMRC '*Australian guidelines to reduce health risks from drinking alcohol' [51]*. Results found that the evidence remains low and very low certainty, on the effects of alcohol consumption during pregnancy and a safe level of alcohol consumption during pregnancy could not be established.

For further details, click here for the full analysis.

Outcome Timeframe	**Study results and measurements**	**Comparator** No alcohol	**Intervention** Alcohol	**Certainty of the Evidence** (Quality of evidence)
See evidence summary for further information [1]	(Observational (non-randomized))	Because of the difficulty of researching alcohol use in pregnancy, there is limited clinical evidence regarding the impact of alcohol in pregnancy.		Very low Due to very serious risk of bias, Due to serious imprecision [2]

1. The evidence remains low and very low certainty, on the effects of alcohol consumption during pregnancy and a safe level of alcohol consumption during pregnancy could not be established.
2. **Risk of Bias: very serious.** High risk of bias. **Inconsistency: no serious. Indirectness: no serious. Imprecision: serious.** Low number of studies. **Publication bias: no serious.**

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References

51. National Health and Medical Research Council (NHMRC). Australian Guidelines to Reduce Health Risks from Drinking Alcohol. Commonwealth of Australia, Canberra 2020. Website

Related resources

Info Box

- Guidelines for the Treatment of Alcohol Problems: Chapter 14 discusses topics relevant to pregnancy
  - https://alcoholtreatmentguidelines.com.au/
- Every Moment Matters: Provides information and resources supporting alcohol-free pregnancies in Australia
  - https://everymomentmatters.org.au/
- Strong Born: Raises awareness among Aboriginal and Torres Strait Islander peoples about Fetal Alcohol Spectrum Disorder
  - https://www.naccho.org.au/fasd/strong-born/

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6.4 Medicines

Info Box

Prescription medicines

Prescribing medicines during pregnancy involves balancing the likely benefit to the pregnant woman against the potential harm to the fetus. Only a small number of medicines have proven safety in pregnancy and a number of medicines that were initially thought to be safe in pregnancy were later withdrawn. General principles include prescribing only well-known and tested medicines at the smallest possible doses and only when the benefit to the woman outweighs the risk to the fetus.

The Therapeutic Goods Administration has categorised medicines that are commonly used in Australia, taking into account the known harmful effects on the developing baby, including the potential to cause birth defects, unwanted pharmacological effects around the time of birth and future health problems (see Table C4).

Table C4: Therapeutic Goods Administration categorisation of medicines

A	Medicines which have been taken by a large number of pregnant women and women of childbearing age without any proven increase in the frequency of malformations or other direct or indirect harmful effects on the fetus having been observed.
B1	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have not shown evidence of an increased occurrence of fetal damage.
B2	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals are inadequate or may be lacking, but available data show no evidence of an increased occurrence of fetal damage.
B3	Medicines which have been taken by only a limited number of pregnant women and women of childbearing age, without an increase in the frequency of malformation or other direct or indirect harmful effects on the human fetus having been observed. Studies in animals have shown evidence of an increased occurrence of fetal damage, the significance of which is considered uncertain in humans.
C	Medicines which, owing to their pharmacological effects, have caused or may be suspected of causing, harmful effects on the human fetus or neonate without causing malformations. These effects may be reversible. Accompanying texts should be consulted for further details.
D	Medicines which have caused, are suspected to have caused or may be expected to cause, an increased incidence of human fetal malformations or irreversible damage. These medicines may also have adverse pharmacological effects. Accompanying texts should be consulted for further details.
X	Medicines which have such a high risk of causing permanent damage to the fetus that they should not be used in pregnancy or when there is a possibility of pregnancy.

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Info Box

Over-the-counter medicines

As few medicines have been established as safe to take during pregnancy, a general principle of use is that as few should be used as possible. However, over-the-counter medicines may be useful for relieving symptoms of pregnancy such as nausea and vomiting (see Section 12), heartburn (see Section 12), constipation (see Section 12) and haemorrhoids (see Section 12).

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Info Box

Providing advice on medicines

Health professionals can support women in safe use of medicines by being well informed themselves and by providing advice on relevant information services. Current information on specific medicines in pregnancy is available from:

- Therapeutic Goods Administration *medicines in pregnancy database*, which can be searched by name or classification level
- medicines in pregnancy information services in each State/Territory, which provide advice to health professionals and consumers on supplements, over-the-counter and prescription medicines (see Section 14.5)
- the *National Prescribing Service* website, which publishes resources for health professionals and consumers, with an emphasis on quality use of medicines.

Info Box

Practice summary: advising women about use of medicines in pregnancy

When: At antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; pharmacist

- ☐ **Discuss use of medicines with women:** Explain that while many medicines are not safe in pregnancy, they may be needed in some situations (eg to treat high blood pressure, epilepsy, depression) or relieve some symptoms of pregnancy. Advise women to tell the pharmacist that they are pregnant if they are purchasing over-the-counter medicines.
- ☐ **Discuss risks and benefits:** If prescribing medicines, explain any risks to the fetus and the benefits of the treatment to the mother so that women can make an informed decision about the treatment.

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Consensus recommendation

Advise women that use of prescription and over-the-counter medicines should be limited to circumstances where the benefit outweighs the risk as few medicines have been established as safe to use in pregnancy.

Approved by NHMRC in December 2011; expires December 2016

Consensus recommendation

Therapeutic Goods Administration Category A medicines have been established to be safe in pregnancy.

Approved by NHMRC in December 2011; expires December 2016

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Good practice statement

Health professionals should seek advice from a tertiary referral centre for women who have been exposed to Category D or X medicines during pregnancy.

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

1. *Medicines in pregnancy information services for health professionals*
2. Websites

Information about specific medicines regarding safety during pregnancy is available from:

- *Medsafe* (NZ)
- *MICROMEDIX*
- *Mothersafe* (NSW)
- *National Prescribing Service*
- Therapeutic Goods Administration *Prescribing Medicines in Pregnancy Database*

References

See full reference list

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6.5 Substance use

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Info Box

Antenatal care provides an opportunity to ask women about substance use. Enquiring in a non-judgmental way may assist women to disclose and enable access to additional support and care, including mental health and drug and alcohol services.

Background

Substance use in pregnancy is an important issue in antenatal care. The use of tobacco and alcohol are common (these are addressed in Sections 6 and and 4) but the use of illicit substances and the misuse of prescription medications is also important. The simultaneous use of several substances (polysubstance use) and comorbid mental health problems are also common.

The substances considered in this chapter include cannabis (marijuana), methylenedioxymethamphetamine (MDMA or ecstasy), meth/amphetamines (including powder/pills [speed] and crystals [crystal meth or ice]), cocaine and opioids (including heroin) and misuse of pharmaceuticals.

No information relevant to lysergic acid diethylamide (LSD) was identified.

Prevalence of substance use in Australia

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According to the 2013 National Drug Strategy Household Survey, trends in substance use 'in the last 12 months' among Australians aged >14 years are as follows *[1111]*:

- *cannabis*: use has remained relatively stable since 2004 (10.2% recent use; 35% in their lifetime)
- *ecstasy*: use has declined (3.0% in 2010 to 2.5% in 2013)
- *meth/amphetamine*: use has remained stable (2.1% since 2007) but, among meth/amphetamine users, use of ice has almost doubled (22% in 2010 to 50% in 2013) and that of speed has almost halved (51% in 2010 to 29% in 2013)
- *cocaine*: use has remained stable (2.1% in 2010 and 2013)
- *heroin*: use has declined (0.8% in 1998 to 0.1% in 2013)
- *misuse of pharmaceutical medications:* misuse has increased (7.4% in 2010 to 11.4% in 2013).

The type of substance use in the last 12 months varied across jurisdictions. For example *[1111]*:

- cannabis was most commonly used in the Northern Territory (17.1%); almost double the usage in Victoria (9.1%)
- meth/amphetamines were used more by people in Western Australia (3.8%) than other jurisdictions
- people in New South Wales (2.7%) and the Australian Capital Territory (2.8%) were more likely to use cocaine than people in other jurisdictions
- ecstasy use was most common in the Northern Territory (3.7%)
- people in Western Australia were more likely to misuse pharmaceuticals (5.6%) than those in any other jurisdiction.

Pregnancy

The National Drug Strategy Household Survey reported that in Australia in 2013 *[1111]*:

- regardless of whether women knew they were pregnant or not, 2.2% had used an illicit substance such as marijuana and 0.9% had misused prescription analgesics
- among pregnant women, a small minority had used illicit substances; 2.4% before knowledge of their pregnancy and 1.6% after they knew they were pregnant.

Risks associated with substance use in pregnancy

Systematic reviews of observational studies have identified the following maternal and perinatal risks associated with substance use.

- *Marijuana use in pregnancy*: One review (n=31) found an association with increased risk of low birth weight (RR 1.43, 95%CI 1.27 to 1.62) and preterm birth (RR 1.32, 95%CI 1.14-1.54) but, when pooled data were adjusted for tobacco use

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and other confounding factors, there was no statistically significant difference (birth weight RR 1.16, 95%CI 0.98 to 1.37; preterm birth RR 1.08, 95%CI 0.82 to 1.43) *[1113]*. Another review that did not adjust for confounders found an increase in risk of low birth weight (OR 1.77; 95%CI 1.04 to 3.01) and maternal anaemia (OR 1.36: 95%CI 1.10 to 1.69) *[1115]*.

- *Amphetamine use in pregnancy:* Significant increases in unadjusted risks of preterm birth (OR 4.11; 95%CI, 3.05 to 5.55), low birthweight (OR 3.97; 95%CI, 2.45 to 6.43), and small for gestational age (OR 5.79; 95%CI 1.39 to 24.06) were identified and mean birthweight was significantly lower (MD –279 g; 95% CI, –485 to -74 g) *[1116]*.
- *Cocaine use in pregnancy:* There was an association with significantly higher risk of preterm birth (OR 3.38; 95%CI 2.72 to 4.21), low birthweight (OR 3.66; 95%CI 2.90 to 4.63), and small-for-gestational-age infants (OR 3.23; 95%CI 2.43 to 4.30), as well as lower gestational age at birth (–1.47 wk; 95%CI –1.97 to –0.98 wk) and reduced birthweight (–492 g; 95%CI –562 to –421 g) (Gouin et al 2011).
- *Opioid dependence in pregnancy*: A review of neurobehavioural function in infants (mean age 14.1 months) found non-significant mean effect sizes in favour of non-opioid exposed controls for cognition (0.24, 95%CI −0.09 to 0.58, Z=1.41, p=0.16), psychomotor function (0.28, 95%CI −0.05 to 0.61, Z=1.67, p=0.09) and behaviour (corrected mean 1.21, 95%CI −0.61 to 3.03, Z=1.30, p=0.19;) *[1112]*.

A cohort study found that births associated with maternal opioid abuse or dependence compared with those without opioid abuse or dependence were associated with an increased odds of maternal death during hospitalisation (aOR 4.6; 95%CI 1.8 to 12.1); cardiac arrest (aOR 3.6; 95% CI 1.4 to 9.1), intrauterine growth restriction (aOR 2.7; 95%CI 2.4 to 2.9), placental abruption (aOR 2.4; 95%CI 2.1 to 2.6), length of stay >7 days (aOR 2.2; 95%CI 2.0 to 2.5), preterm labour (aOR 2.1; 95%CI 2.0 to 2.3), oligohydramnios (aOR 1.7; 95%CI 1.6 to 1.9), transfusion (aOR 1.7; 95% CI 1.5 to 1.9), stillbirth (aOR 1.5; 95%CI 1.3 to 1.8), premature rupture of membranes (aOR 1.4; 95%CI 1.3 to 1.6) and caesarean section (aOR 1.2; 95%CI 1.1 to 1.3) *[1117]*.

No studies were identified that investigated outcomes associated with the use of crystal methamphetamine, LSD or ecstasy in pregnancy.

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Info Box

Assessing substance use

The World Health Organization (WHO) recommends screening for substance use in pregnancy *[1121]*. Periodic screening for substance use in pregnancy is also recommended in Canada *[1120]*. In Australia, guidelines developed nationally and revised by New South Wales Health *[1119]* recommend screening for substance use early in pregnancy. They emphasise the importance of establishing an effective relationship with the woman based on respect and non-judgmental attitudes, of engaging the woman into adequate antenatal care through this relationship, and of maintaining continuity of care and of carers throughout the pregnancy and postnatal period.

Validated screening instruments for substance use are available (see Section 15.5).

Referral and intervention

Australian guidelines *[1119]* recommend that pregnant women with significant problematic substance use will benefit from an appropriate referral for specialist drug and alcohol assessment (in addition to midwifery and obstetric care), appointment of a consistent and continuous case manager and care team who use effective communication systems, and specific treatments for their substance use, which may include counselling, pharmacotherapies and relapse prevention strategies.

Psychosocial interventions

Cognitive behavioural therapy compared to brief advice for pregnant women with problematic substance use had no clear effect on the risk of low birth weight (RR 0.72, 95%CI 0.36 to 1.43; 1 study; n=160; low quality), preterm birth (RR 0.5; 95%CI 0.23 to 1.09; 1 study; n=163; low quality) or maternal substance use (no significant difference at birth or 3 months postpartum) *[1121]*.

Pharmacological interventions

A Cochrane review on treatments for women with opioid dependence in pregnancy *[1118]* did not find sufficient significant differences between methadone and buprenorphine or slow-release morphine to allow conclusions to be drawn on whether one treatment is superior to another for all relevant outcomes. While methadone seems superior in terms of retaining women in treatment, buprenorphine seems to lead to less severe neonatal abstinence syndrome *[1118]*.

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Discussing substance use

Discussions with women identified as using illicit substances or misusing pharmaceuticals may include:

- the harms associated with substance use and the benefits of reducing or ceasing their use
- the availability of local support services, including mental health and drug and alcohol services
- for opioid-dependent women, the benefits and harms of methadone compared to buprenorphine or oral slow-release morphine.

Info Box

Practice summary: substance use

When: Early in pregnancy and at subsequent visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the purpose of enquiring about substance use:** Explain that enquiry about substance use is a routine part of antenatal care and that it aims to identify women who would like assistance.
- ☐ **Take a holistic approach:** If a woman admits that she is using illicit substances or misusing pharmaceuticals (eg prescribed opioids such as codeine, oxycodone, morphine), other considerations include interventions to assist the woman and provide ongoing support. The woman's emotional well-being, her safety and that of children in her care should be assessed and reporting and/or referral to other services (eg community services, emergency housing, police) made as required or mandated.
- ☐ **Learn about locally available support services:** Available support services for women who are using illicit substances or misusing pharmaceuticals will vary by location.
- ☐ **Document the discussion:** Document in the medical record any evidence of substance use, referrals made and any information the woman provides. If woman-held records are used, the information included in these should be limited and more detailed records kept at the health service.
- ☐ **Seek support:** Depending on your skills and experience in discussing substance use with women and assisting them, seek advice and support through training programs, clinical supervision, mentoring and/or helplines.
- ☐ **Be aware of relevant legislation:** Each state and territory has requirements about reporting the potential for harms from substance use to the unborn child as set out in its legislation.

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Consensus recommendation

Early in pregnancy, assess a woman's use of illicit substances and misuse of pharmaceuticals and provide advice about the associated harms.

Approved by NHMRC in October 2017; expires October 2022

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Good practice statement

Ask about substance use at follow-up visits, as some women are more likely to report sensitive information only after a trusting relationship has been established.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

Info Box

Resources

NSW Health (2014) *NSW Clinical Guidelines for the Management of Substance Use during Pregnancy, Birth and the Postnatal period*. Sydney: Ministry of Health NSW. Available at: health.nsw.gov.au

WHO (2014) *Guidelines for the Identification and Management of Substance Use and Substance Use Disorders in Pregnancy*. Geneva: World Health Organization.

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6.6 Oral health

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Info Box

Treatment of periodontal disease improves a woman's wellbeing and is safe in pregnancy.

Background

Oral health refers to the health of tissues in the mouth, including mucous membrane, connective tissue, muscles, bone, teeth and periodontal structures or gums (gingiva). Pregnancy itself does not have a negative effect on oral health, but may increase the risk of dental problems (eg frequent vomiting may raise acidity in the mouth and contribute to caries). As well, high levels of hormones increase blood flow to the gums and may cause inflammation and bleeding (gingivitis) *[656]*. In the absence of local plaque build up, healthy gums will not show changes during pregnancy but the risk of peridontitis (inflammation and destruction of supporting tissues around the teeth *[632]* is increased.

Measures to prevent caries and periodontal disease include regular brushing and flossing and regular dental checkups, with teeth cleaning and treatment as required.

Oral health in Australia

Access to dental services in Australia varies, with limited services available in rural and remote areas and women in all areas potentially affected by the costs of dental services, which are not covered under Medicare.

Data from the Australian Institute of Health and Welfare show that:

- dental care in Australia is largely provided in the private sector, with public dental patients generally being health care card holders and socioeconomically disadvantaged *[635]*
- adults living outside major cities are more likely to have poorer dental health, such as more tooth loss and untreated decay and less likely to have visited the dentist in the previous 12 months than those in major cities *[634]*
- Aboriginal and Torres Strait Islander adults seeking dental care in Australia in 2004–06 had a greater average number of decayed and missing teeth and a lower average number of filled teeth than non-Indigenous adults across most age groups *[633]*.

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Prevalence of periodontal disease in pregnancy

A multicentre randomised trial (n=3,563) found a prevalence of periodontal disease of 50% during pregnancy *[643]*. The incidence of periodontal disease has been associated with lower levels of education and socioeconomic status *[642][638][656]*.

Risks associated with periodontal disease in pregnancy

Associations between periodontal disease and preterm birth *[639][641][650][652]* and low birth weight *[641][654][658]* have been suggested. However, a recent cohort study (n=876) found no association between periodontal disease and adverse pregnancy outcomes *[655]* and a meta-analysis of observational studies *[640]* found that treating periodontal disease did not decrease the rate of preterm birth. Controlled trials into treating periodontitis during pregnancy have also found:

- improved periodontal disease but no significant change in rates of preterm birth, low birth weight or fetal growth restriction (n=812) *[644][645][648]*
- no significant reduction in the risk of preterm birth (n=824) *[643][649]*, although treatment may protect against low birth weight (n=339) *[637]*
- no significant differences between women receiving treatment during or after pregnancy in terms of preterm birth (9.3% vs 9.7%), birth weight (3,450 vs 3,410g) or pre-eclampsia (4.1% vs 3.4%) (n=1,082) *[647]*
- a reduction in the incidence of caries among children whose mothers received oral health advice during pregnancy (1.7% vs 9.6% in the control group) (n=649) *[651]*.

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Providing advice on oral health

Good oral health and control of oral disease is important to a woman's health and quality of life and has the potential to reduce transmission of pathogenic bacteria from mothers to their children *[636]*. Dental treatment can be safely provided at any time during pregnancy *[632]* if the dentist is informed of the pregnancy.

An Australian survey of women who had recently given birth (n=388) *[658]* found that most were knowledgeable about oral and dental health but only a small percentage knew about periodontal disease. Lack of knowledge about oral and dental health was strongly linked to lower educational achievement and lower socioeconomic background. Over half of respondents had not attended a dentist in the previous 12 months, and only 30% attended during their most recent pregnancy.

Nausea and vomiting

Nausea and vomiting have the potential to affect oral health:

- frequent snacks and soft drinks/carbonated drinks and cravings for particular foods (often sweet) can increase risk of tooth decay
- excessive vomiting brings teeth into contact with strong stomach acid
- repeated reflux and vomiting can damage tooth enamel and increase the risk of decay.

Measures to reduce the impact of nausea and vomiting on oral health include *[646][636][653]*:

- rinsing the mouth with a solution of bicarbonate of soda after vomiting, avoiding tooth brushing directly after vomiting as the effect of erosion can be increased by brushing an already demineralised tooth surface
- using fluoridated mouthwash and toothpaste
- eating small amounts of nutritious yet non-cariogenic foods (snacks rich in protein) throughout the day
- chewing sugar-free gum (especially gums containing xylitol or casein phosphopeptide–amorphous calcium phosphate [CPP-ACP]) after meals or high sugar or acidic drinks.

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Info Box

Practice summary: advising women about oral health

When: At antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss oral health with women:** Explain that pregnancy does not cause dental problems but may make them more likely. Advise women to have their oral health checked and to tell the dentist that they are pregnant.
- ☐ **Provide advice on oral health to women experiencing nausea and vomiting:** Explain that vomiting exposes teeth to acid and give tips on how to reduce the impact (see above).

Weak recommendation

At the first antenatal visit, advise women to have oral health checks and treatment, if required, as good oral health is important to a woman's health and treatment can be safely provided during pregnancy.

Approved by NHMRC in December 2011; This recommendation is currently considered stable and no update is planned.

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Info Box

Resources

CDAF (2010) *Oral health during pregnancy and early childhood: evidence-based guidelines for health professionals*. California Dental Association Foundation, American College of Obstetricians and Gynecologists. *J Calif Dent Assoc* 38(6): 391–403, 405–40.

NACOH (2004) *Healthy Mouths Healthy Lives: Australia's National Oral Health Plan 2004-2013*. Adelaide: National Advisory Committee on Oral Health, Australian Health Ministers' Advisory Council. *[Original URL link non-functional. The document available from National Library of Australia]*

6.7 Sexual activity

Info Box

Women and their partners may ask about the safety of sexual activity during pregnancy. They can be reassured that there is little evidence of harm to low-risk pregnancies.

Background

The frequency of sexual activity in pregnancy varies widely, with a tendency to decrease with advancing pregnancy, particularly during the third trimester *[1171][1173][1172][1175][1176][1177]*. Factors contributing to decreased sexual activity include nausea, fear of miscarriage, fear of harming the baby, lack of interest, discomfort, physical awkwardness, fear of membrane rupture, fear of infection, and fatigue *[1175][1174][1177]*.

As well as concerns about the safety of sex during pregnancy, women may ask about sexual activity as a natural way to induce labour at term.

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Info Box

Discussing sexual activity

Most available evidence comes from observational studies and relies on self-reported results. In addition, studies tend to examine any sexual activity in pregnancy, so the effects of different frequencies of intercourse cannot be known. The evidence is inconsistent on the effects of sexual activity on the length of gestation.

The limited available evidence suggests that in low risk pregnancies:

- there is a low risk of adverse outcomes from sexual activity during pregnancy *[1183][1178]*
- sexual activity is unlikely to be associated with preterm birth *[1179][1184]*.

Nipple and genital stimulation have been advocated as a way of naturally promoting the release of endogenous oxytocin, and prostaglandins released in semen as a method of cervical ripening *[1177]*. Overall, there is little evidence to support the theory that sexual activity has an effect in inducing labour at term. One prospective cohort study (n=200) found sexual activity at term was associated with earlier onset of labour and reduced requirement for labour induction at 41 weeks *[1181]*; however, other similar studies have reported either no difference or a reduced rate of spontaneous labour prior to the date of scheduled labour induction *[1180][1182]*.

While there is no evidence to suggest a clear benefit from restricted sexual activity in women who are at risk of preterm labour (eg previous spontaneous preterm birth) or antepartum haemorrhage because of placenta praevia, it may be advisable for them to abstain from sexual activity *[1177]*.

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Practice summary

When: A woman asks about sexual activity during pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss any concerns:** Explain that the desire for sex commonly decreases as the pregnancy progresses and after the birth, and in most women gradually returns over time.
- ☐ **Provide reassurance:** Reassure women that sex is not likely to harm the pregnancy or increase the risk of preterm birth.
- ☐ **Take a holistic approach:** Explain that it is a woman's choice whether she is sexually active and she has the right not to consent. Also explain that childbirth and parenting may have an effect on a couple's sex life.

Weak recommendation

Advise pregnant women without complications that safe sexual activity in pregnancy is not known to be associated with any adverse outcomes.

Approved by NHMRC in June 2014; This recommendation is currently considered stable and no update is planned.

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Resources

Johnson CE (2011) *Sexual health during pregnancy and the postpartum. J Sex Med* 8(5): 1267–84.

Jones C, Chan C, Farine D (2011) *Sex in pregnancy*. *CMAJ* 183(7): 815–18.

6.8 Travel

Info Box

Discussing the risks associated with travel during pregnancy enables women to make informed decisions and take measures to improve their safety.

Background

Studies have identified limited knowledge among women of factors associated with travel during pregnancy, including the correct use of seat belts and risks associated with overseas travel.

Risks associated with travel in pregnancy

- *Car travel*: Severe and non-severe injuries from motor vehicle accidents are associated with adverse maternal and fetal outcomes *[793][770][775][801][760][781][782][794][802][766]*, with a higher risk of adverse outcomes if the birth takes place during an admission for a motor vehicle accident *[799]*. Adverse maternal and fetal outcomes are more likely following a motor vehicle accident if a seat belt is not worn *[776][781][790]*. Airbag deployment does not appear to adversely affect maternal or fetal outcomes *[789][795]*.
- *Long-distance air travel:* Commercial flights are normally safe for pregnant women *[771][792][761]* and frequent air travel during pregnancy (eg by flight crew members) does not appear to increase the risk of adverse outcomes *[777][769]*. However, air travel at 34–37 weeks gestation has been associated with an increased risk of preterm birth *[767][785]*. Venous thrombosis, which is associated with long-distance air travel in the general population *[763]*, is more likely in pregnancy.
- *Overseas travel:* Exposure to infection is increased with travel to certain regions. Pregnant women are more likely than non-pregnant women to become infected with malaria *[768]*. Malaria during pregnancy is associated with spontaneous miscarriage, preterm birth, low birth weight, stillbirth, congenital infection and maternal death *[783]*.

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Info Box

Discussing travel during pregnancy

While the available evidence on travel in pregnancy is from low level studies and is heterogeneous, this evidence largely supports the NICE recommendations.

Car travel

High-level evidence from general populations supports the use of seat belts *[774]*. However, studies examining pregnant women's knowledge and compliance of seat belt use and health professionals' counselling on the use of seat belts in pregnancy have found a lack of knowledge, compliance and advice given *[787][788][762][779][797][796]*. Information provided to pregnant women can promote correct use of seat belts *[788]*.

The Confidential Enquiry into Maternal Deaths in the United Kingdom provides the following advice on the correct use of seatbelts in pregnancy *[784]*:

- straps should be placed above and below the 'bump', not over it
- use three-point seatbelts with the lap strap placed as low as possible beneath the 'bump', lying across the thighs with the diagonal shoulder strap above the bump lying between the breasts
- adjust the fit to be as snug as comfortably possible.

Overseas travel

Overseas travel is increasingly common in pregnancy *[786]*, and women are not always adequately prepared in terms of travel advice and insurance *[780]*. Travel-related morbidity can be avoided by postponing the trip until after the birth, but this may not be feasible due to family desire or emergent situations. It is important to convey the risks associated with travel during pregnancy and to inform women of useful preventive interventions *[786]*.

Long-distance air travel

The policies of commercial airlines regarding travel by pregnant women vary, with most limiting air travel beyond 36 weeks gestation due to associated risks *[764]*. Some airlines require that women carry with them a letter from their doctor or midwife outlining the estimated due date, single or multiple pregnancies, the absence of complications, and fitness to fly for the duration of the flight(s) booked.

A survey of women's knowledge of air travel risks in pregnancy reported that only one-third of respondents sought travel advice and one-quarter were unaware of the risk of venous thrombosis *[780]*. Advice on venous thrombosis provided by health professionals also varies (ranging from simple preventive measures to use of aspirin or heparin) *[800]*.

Preventive measures to minimise the risk of venous thrombosis include *[761][765]*:

- using support stockings and periodic movement of the lower extremities
- avoiding restrictive clothing
- going for a walk occasionally
- maintaining hydration (eg drinking plenty of water, avoiding caffeine and not drinking alcohol).

Vaccinations

Some vaccinations for travel overseas are contraindicated in pregnancy. The NICE Guidelines *[791]* advise:

- in general, killed or inactivated vaccines, toxoids and polysaccharides can be given during pregnancy, as can oral polio vaccine
- live vaccines are generally contraindicated because of largely theoretical risks to the baby
- measles, mumps, rubella, BCG and yellow fever vaccines should be avoided in pregnancy.

The risks and benefits of specific vaccines should be examined for each woman and the advice of a travel medicine doctor sought. Recommendations on vaccinations during pregnancy are included in the Australian Immunisation Handbook and the World Health Organization provides interactive maps on areas where the risk of specific infections is medium to high (see Section 18.4).

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Travel insurance
Women should be advised to compare various policies and read the exclusion clauses carefully.

Travel to malaria-endemic areas
Due to the risks associated with maternal malaria and potential adverse effects associated with preventive medications, the safest option is for women to avoid travel to malaria-endemic areas during pregnancy. When travel cannot be deferred, women should be advised about preventive measures and any risks associated with them.

Taking precautions against mosquito bites is an important preventive measure. Insecticide-treated bed nets have been shown to reduce malarial levels in the general population *[778]* and adverse outcomes among pregnant women *[772]*. Other barrier measures include:

- wearing clothes that have been pretreated with insecticide
- wearing long-sleeved treated clothing when outdoors in the evening and at night
- applying insect repellent regularly to exposed skin.

Barrier measures have the additional advantage of protecting against other mosquito-transmitted infections, such as dengue fever, Japanese encephalitis and yellow fever.

Medications to prevent malaria infection reduce antenatal parasite prevalence and placental malaria among pregnant women, regardless of number of previous pregnancies *[773]*. Among women having their first or second baby, they also have positive effects on birth weight and may reduce the risk of perinatal death *[773]*.

The use of preventive medicine depends on the level of risk (eg travel destination, season, length of stay). The Therapeutic Goods Administration advises that the use of preventive medicines is justified in high-risk situations *[798]*.

Current information on specific medicines in pregnancy is available from the Therapeutic Goods Administration and information on areas where there is a risk of transmission of malaria is available from the WHO and the Centers for Disease Control and Prevention (CDC) (see Section 18.4).

The risks and benefits of specific anti-malarial medications should be examined for each woman and the advice of an expert in travel medicine sought.

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Info Box

Practice summary

When: Early in antenatal care and when women seek advice about travel during pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; infectious disease specialist; travel medicine specialist

- ☐ **Discuss the use of seat belts:** Explain that using a seat belt will not harm the baby and will improve outcomes should an accident occur. Describe how to fit the seat belt correctly.
- ☐ **Discuss air travel:** If a woman is planning long-distance air travel during pregnancy, she should discuss this with a health professional and make enquiries with individual airlines and travel insurers to assess whether planned travel is possible. If travel is arranged, provide advice on minimising the risk of venous thrombosis.
- ☐ **Discuss prevention of infection while travelling:** Explain that vaccinations required for travel to some destinations may be contraindicated during pregnancy. Provide advice on malaria prevention to women who are unable to defer travel to malaria-endemic areas.
- ☐ **Take a holistic approach:** Assist women who are planning to travel to access relevant services (eg health professionals with expertise in travel medicine). Advise that they take their antenatal record with them when travelling.

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Weak recommendation

Inform pregnant women about the correct use of seat belts; that is, three-point seat belts 'above and below the bump, not over it'.

Approved by NHMRC in June 2014; expires June 2019

Weak recommendation

Inform pregnant women that long-distance air travel is associated with an increased risk of venous thrombosis and pulmonary embolism, although it is unclear whether there is additional risk during pregnancy. (Grade C)

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Pregnant women should be advised to discuss considerations such as air travel, vaccinations and travel insurance with their midwife or doctor if they are planning to travel overseas.

Approved by NHMRC in June 2014; expires June 2019

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Weak recommendation

If pregnant women cannot defer travel to malaria-endemic areas, advise them to use insecticide-treated bed nets.

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Beyond the first trimester, mefloquine is approved for use to prevent malaria. Neither malarone nor doxycycline are recommended for prophylaxis any time during pregnancy. Chloroquine (or hydroxychloroquine) plus proguanil is safe but less effective so seldom used. For areas where only vivax is endemic, chloroquine or hydroxychloroquine alone is appropriate.

Approved by NHMRC in June 2014; expires June 2019

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Info Box

Resources

Carroll D (2004) Pre-travel preparation of the pregnant traveller. *Brit Travel Health Assoc J* 5: 20–23.

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Australian Technical Advisory Group on Immunisation (2017 update) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health.

Hezelgrave NL, Whitty CJM, Shennan AH et al (2011) *Advising on travel during pregnancy*. *BMJ* 342(1): d2506–06.

TGA (2013) *Prescribing Medicines in Pregnancy Database*. Therapeutic Goods Administration. Accessed 3 May 2013.

WHO (2010) *Malaria, countries or areas at risk of transmission*. World Health Organization. Accessed 23 February 2013.

WHO interactive disease maps

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7. Clinical assessments

New

Info Box

Download Health Professional Summary Sheet for this section *here*

Info Box

A range of clinical assessments is offered to promote and enhance the physical and emotional wellbeing of a woman and her baby during pregnancy. This section discusses assessments that are offered to all women during pregnancy. Recommendations are based on evidence about the accuracy of assessments in predicting complications in pregnancy and the effectiveness of interventions in reducing symptoms.

Table D1 presents a summary of advice on assessments during pregnancy considered a priority for inclusion in these Guidelines. Advice on other assessments, such as routine breast and pelvic examination (which are not recommended) is included in the NICE Guidelines (NICE 2008).

Table D1: Summary of advice for women about assessments during pregnancy

Clinical assessment	Advice about assessment	Chapter
Weight and body mass index	Calculation of body mass index at the first antenatal visit allows advice about appropriate weight gain during pregnancy to be given	19
	Weighing during pregnancy identifies whether women are gaining too little or too much weight so that associated risks can be monitored	
Gestational age	Ultrasound scanning is most accurate in determining gestational age between 8 and 14 weeks of pregnancy; after 24 weeks of pregnancy, the date of the last menstrual period is used	20
Fetal development and anatomy	Ultrasound scanning at 18-20 weeks of pregnancy detects structural anomalies	21
Fetal growth restriction and wellbeing	Fetal growth is assessed at each antenatal visit	22
	Promoting awareness of the normal pattern of fetal movement assists women in knowing when to seek advice if they perceive decreased or absent movements	
	Hearing the fetal heart is not predictive of pregnancy outcomes	
Risk of preterm birth	Discussing risk and protective factors for preterm birth may assist some women to reduce their risk	23
Blood pressure	Measuring blood pressure at the first antenatal visit allows identification of women who have chronic hypertension and may require additional monitoring during pregnancy.	24
Proteinuria	Testing women for proteinuria at the first antenatal visit identifies existing kidney disease or urinary tract infection	25
Risk of pre-eclampsia	Routine measuring of blood pressure during pregnancy allows monitoring for new onset hypertension	26
	After the first antenatal visit, proteinuria is tested in women with risk factors for, or clinical indications of, pre-eclampsia	

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7.1 Weight and body mass index

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Info Box

Body mass index (prior to pregnancy or at the first antenatal visit) and weight gain during pregnancy are among the important determinants of the health of both mother and baby.

Background

Weight classification

Body mass index (BMI) is commonly used to classify adults as being underweight, of healthy weight, overweight or obese. It is calculated by dividing weight by the square of height: weight (kg)/height $(m)^2$. The WHO classification of BMI classification is given in Table 4.

Table D2: Classification of adult underweight, overweight and obesity according to BMI

BMI (kg/m^2)	Classification
<18.50	Underweight
18.5-24.9	Healthy weight
25.0-29.9	Overweight
≥30.0	Obese

Weight classification during pregnancy in Australia

Among women who gave birth in Australia in 2018 *[1458]*:

- 3.8% were underweight, 49.5% were in the healthy weight range, 26.0% were overweight but not obese and 21.0% were obese at the first antenatal visit
- Aboriginal and Torres Strait Islander women were more likely than non-Indigenous women to be either obese (31.0% vs 21.0%) or underweight (6.8% vs 3.8%) and less likely to be in the healthy weight range (38% vs 49.5%), with a similar likelihood of being overweight but not obese (24%)
- compared to women in the highest socioeconomic status quintile, those in the most disadvantaged quintile were more likely to be obese (26.7 vs 12.4%), less likely to be in the healthy weight range (42.0 vs 60.3%) and had a similar likelihood of being overweight (27.1 vs 23.1%) or underweight (both 4.2%)
- obesity was most common in very remote areas (27.1 vs 18.7% in major cities), prevalence of overweight was similar across geographical regions, prevalence of healthy weight decreased with increasing remoteness (51.7% in major cities to 39.2% in very remote areas) and underweight was more common in very remote areas (7.1 vs 3.8% in major cities).

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Weight stigma

Determinants of heath, including weight status, involve complex interactions between multi-level factors including policy, community, socio-demographic, psychosocial, family and genetic influences. Awareness of weight stigma can help health professionals to provide care that recognises the complexity of these interacting factors and removes inadvertent blame from the individual for less desirable health outcomes. Among the general population, weight stigma is a recognised risk factor for adverse psychological and physical health issues, which can exacerbate unhealthy eating behaviours (such as binge eating) and weight gain *[1514]*.

There is evidence of perceived weight stigma felt by women receiving pregnancy care (regardless of their size) *[1463]*. This can be tied to the fact that high weight status has been linked to adverse pregnancy outcomes. High gestational weight gain has also been linked to increased vulnerability to weight stigmatisation *[1484]*. Evidence from non-pregnant populations highlight the potential for stigma to reinforce an unhealthy weight gain cycle *[1508]*.

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Assessing BMI

Measuring height and weight and calculating BMI

Routine measurement of women's weight and height and calculation of BMI at the first antenatal contact allows identification of women who require additional care during pregnancy. When there is an accurate record of a woman's pre-pregnancy BMI, this may be used to estimate gestational weight gain (see Section 19.3). Note that the BMI can be less accurate for assessing healthy weight in certain groups due to variations in muscle mass and fat mass (eg cut-offs lower than the WHO classifications may be appropriate for women from Asian backgrounds and higher cut-offs for women from the Pacific Islands).

Risks associated with a low or high BMI

Low pre-pregnancy BMI
Systematic reviews are consistent in finding that low pre-pregnancy BMI is associated with an increased risk of:

- preterm birth *[1476][1493]*
- small for gestational age *[1515][1493][1475] [1492]*
- low birthweight *[1476][1515][1493][1492]*.

Systematic reviews have also found a possible increase in risk of miscarriage *[1462]* and placental abruption *[1457]* and a decreased risk of gestational diabetes *[1509]*. There was no clear effect on risk of congenital heart defects *[1516]*.

High pre-pregnancy BMI
Systematic reviews are consistent in finding that pre-pregnancy overweight and obesity is associated with:

- large for gestational age *[1515][1492][1493]*
- macrosomia *[1515][1492][1493]*
- childhood overweight/obesity *[1515][1511]*.

Systematic reviews have also found associations between high pre-pregnancy BMI and:

- increased risk of gestational diabetes *[1509]*, preterm birth, neonatal asphyxia *[1492]*, admission to neonatal intensive care, stillbirth *[1493]* and congenital heart defects *[1466][1516]*
- reduced risk of small for gestational age *[1475]* and placental abruption *[1457]*.

Systematic reviews found a decreased likelihood of initiating breastfeeding among women who were obese *[1472][1482]*.

Discussing BMI with women

Women who have a BMI that is below or above the healthy range are likely to require additional care and support during pregnancy. For women with an elevated BMI, there may be additional implications for care during pregnancy (eg the potential for difficulties with palpation and poor ultrasound visualisation) and the birth (eg need for the birth to take place in a larger centre, difficulties with fetal assessment and monitoring). Relevant risks associated with a woman's BMI should be explained and the woman given the opportunity to discuss these and how they might be minimised.

Assessment of fetal growth is discussed in Section 22.1 and assessment for risk of preterm birth in Section 7.

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Monitoring weight gain

While BMI prior to or early in pregnancy is independently associated with pregnancy outcomes, the amount of weight gained during pregnancy is also a contributing factor. The US Institute of Medicine (IOM) provides guidance on weight gain in pregnancy based on pre-pregnancy BMI. The IOM recommendations are consensus-based and were written in 2009 but have since been assessed using data from 1.3 million women *[1473]*.

Table D3: IOM recommendations for weight gain in pregnancy

Pre-pregnancy BMI (kg/m^2)	Recommended weight gain (kg)	Rates of weight gain* 2nd and 3rd trimester (kg/wk)
<18.5	12.5-18.0	0.51 (0.44-0.58)
18.5 to 24.9	11.5-16.0	0.42 (0.35-0.50)
25.0 to 29.9	7.0-11.5	0.28 (0.23-0.33)
≥30	5.0-9.0	0.22 (0.17-0.27)

* Calculations assume a 0.5-2kg weight gain in the first trimester.
Note: The recommended weight gain ranges are indicative only and provide suggested limits rather than specific goals.
Sources: (NHMRC 2013) based on (IOM 2009).

A number of studies have suggested that the IOM guidelines may not be applicable to all women.

- A systematic review of the utility of IOM-2009 guidelines among Indian and other Asian pregnant women in terms of maternal and fetal outcomes (n=13 studies) *[1460]* highlighted the need for gestational weight gain recommendations across the different body mass index levels specifically for Indian women and other Asian populations.
- A retrospective cohort study in China (n=8,209) *[1486]* found that the lowest accumulated risk of low birthweight and macrosomia was not always achieved among women who gained weight within recommendations and suggested that the IOM weight gain ranges are too high for Chinese women.
- A cohort study in the United States (n=181,948) *[1490]* found that adherence to the 2009 IOM guidelines for weight gain during pregnancy reduced risk for various adverse maternal outcomes in all ethnic groups studied. However, the guidelines were better at predicting small and large for gestational age than other infant outcomes.

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Table D4: Recommendations for weight gain in pregnancy among women from an Asian background

Pre-pregnancy BMI (kg/m^2)	Recommended weight gain (kg)	Rates of weight gain* 2nd and 3rd trimester (kg/wk)
<18.5	12.5-18.0	0.5
18.5-22.9	11.5-16.0	0.4
23-27.5	7.0-11.5	0.3
>27.5	≤ 7.0	–

- Sources: (NHMRC 2013) based on (IOM 2009) and matched with Asian BMI cut-offs .

Determinants of gestational weight gain

Weight gain below guidelines

A systematic review found that women with lower educational attainment had an increased risk of inadequate weight gain (OR 1.3; 95% CI 1.0 to 1.6, p=0.017) *[1499]*.

An analysis of observational data from a longitudinal cohort study of Aboriginal women during pregnancy (n=110)*[1505]* found that 32% of women had inadequate weight gain.

Cohort studies in the United States *[1495][1479][1496]* have found that African American women, Hispanic women and women in socially disadvantaged areas are more likely to experience inadequate weight gain.

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Weight gain exceeding guidelines
Systematic reviews have found associations between weight gain exceeding recommendations and:

- lower educational attainment*[1499]*
- body image dissatisfaction *[1477][1487]*
- lack of social support *[1477]*
- concern about weight gain, negative attitude towards weight gain, inaccurate perceptions regarding weight, higher than recommended target weight gain, less knowledge about weight gain, higher levels of cognitive dietary restraint, and perceived barriers to healthy eating *[1487]*.

There were no clear associations between weight gain exceeding recommendations and:

- anxiety *[1477][1487]*, stress *[1477][1487]*, self-efficacy *[1477]*, self-esteem *[1477]* or social support *[1502]*
- parity (r 0.04, 95%CI 0.10 to 0.16, p=0.61; 17 studies), including after adjusting for pre-pregnancy BMI (r 0.08, 95%CI 0.19 to 0.03, p=0.16; 16 studies) *[1480]*

The evidence of an association between weight gain exceeding recommendations and depression was inconsistent *[1477][1487]*.

Protective factors included a perception of control over weight gain, lower than recommended target weight gain and higher self-efficacy for healthy eating *[1487]*.

Cohort studies have found associations between weight gain exceeding guidelines and:

- pre-pregnancy BMI (≥25 vs <25) (OR 3.35; 95%CI 2.44 to 4.64; p<0.0001) *[1497]*
- stopping smoking compared to women who never smoked (weekly weight gain in second and third trimesters MD 0.09 kg; 95%CI 0.03 to 0.15) *[1483]*

There was no clear association in cohort studies between weight gain exceeding guidelines and:

- experiencing hardship in childhood (OR 1.45, 95%CI 0.99 to 2.14), in adulthood (OR 0.72; 95%CI 0.41 to 1.26) or in pregnancy (OR 1.09; 95%CI 0.43 to 2.76) *[1500]*
- maternal age (<30 vs ≥30) (OR 1.02; 95%CI 0.98 to 1.02; p=0.89) *[1497]*
- household income (
- education level (
- country of birth (other countries vs Canada) (OR 1.05; 95%CI 0.78 to 1.41; p=0.73).*[1497]*.

An analysis of observational data collected from a longitudinal cohort study of Aboriginal women during pregnancy (n=110) *[1505]* found that 54% of women had weight gain exceeding recommendations.

Risks associated with low or high gestational weight gain

A meta-analysis of individual participant data (n=265,270) *[1504]* found that low or high gestational weight gain was associated with pregnancy complications across all BMI classifications.

Weight gain among women of any BMI

Weight gain lower than recommendations

In a systematic review of cohort studies of pregnant women of any BMI (23 studies; 1,309,136 women) *[1473]*, weight gain *lower* than recommendations was associated with an increased risk of:

- preterm birth (OR 1.70; 95%CI 1.32 to 2.20)
- small for gestational age babies (OR 1.53; 95% CI 1.44 to 1.64).

There was an association between weight gain *lower* than recommendations and a lower likelihood of:

- large-for-gestational-age babies (OR 0.59; 95%CI 0.55 to 0.64)
- macrosomia (OR 0.60; 95%CI 0.52 to 0.68).

There was an association between weight gain *lower* than recommendations and a possible lower likelihood of caesarean section (OR 0.98; 95%CI 0.96 to 1.02).

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In an analysis of individual participant data from the control arms of 36 RCTs (n=4,429) *[1503]* the odds of preterm birth (aOR 1.94; 95%CI 1.31 to 2.28) and small-for-gestational-age babies (aOR 1.52; 95%CI 1.18 to 1.96) were increased with gestational weight gain *lower* than recommendations. Findings on caesarean section and large-for-gestational-age babies were inconclusive.

Weight gain higher than recommendations

The systematic review of cohort studies *[1473]* found that weight gain *higher* than recommendations was associated with an increased risk of:

- large-for-gestational age babies (OR 1.85; 95%CI 1.76 to 1.95)
- macrosomia (OR 1.95; 95%CI 1.79 to 2.11)
- caesarean section (OR 1.30; 95%CI 1.25 to 1.35).

There was an association between weight gain higher than recommendations and lower likelihood of small-for-gestational-age babies (OR 0.66; 95%CI 0.63 to 0.69) and preterm birth (OR 0.77; 95%CI 0.69 to 0.86).

The analysis of individual participant data from the control arms of RCTs *[1503]* found that weight gain higher than recommendations was associated with increased odds of caesarean section (aOR 1.50; 95%CI 1.25 to 1.80), large-for-gestational-age babies (aOR 2.00; 95%CI 1.58 to 2.54), and reduced odds of small-for-gestational-age babies (aOR 0.66; 0.50 to 0.87). No significant effect on preterm birth was detected.

A meta-analysis of individual participant data (37 studies, 162,129 mothers and children) *[1511]*found that, relative to the effect of maternal pre-pregnancy BMI, excessive gestational weight gain only slightly increased the risk of childhood overweight/ obesity within each clinical BMI category (p-values for interactions of maternal BMI with gestational weight gain: p=0.038, p<0.001, and p=0.637 in early, mid, and late childhood, respectively).

Systematic reviews of cohort studies have found that:

- the risk of urinary incontinence increased with each 10 kg of weight gain (RR 1.34; 95%CI 1.11 to 1.62) *[1461]*
- weight gain exceeding recommendations may increase the risk of autism spectrum disorder (OR 1.23; 95%CI 1.09 to 1.38; p=0.0008) but more studies are needed to confirm this result *[1507]*.

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High weight gain in early pregnancy

A secondary analysis of an RCT (n=7,895) *[1467]* found that among women who gained weight exceeding the IOM guidelines by week 15-18, 93% exceeded the recommended total gestational weight gain. In contrast, 55% of women with early gestational weight gain within recommendations had total gestational weight gain higher than recommendations (p<0.001). Women with excessive early gestational weight gain had higher rates of gestational diabetes (OR 1.4; 95%CI 1.1 to 1.9), large-for-gestational-age babies (OR 1.4; 95%CI 1.2 to 1.6), and macrosomia >4,000 g (OR 1.5; 95%CI 1.3 to 1.8).

Outcomes among women from US/Europe and Asia

Weight gain lower than recommended was associated with preterm birth among women from the USA/Europe (OR 1.35; 95%CI 1.17 to 1.56) but not women from Asia (OR 1.06; 95%CI 0.78 to 1.44) *[1474]*. It was associated with an increase in risk of small-for-gestational-age babies among women from both groups.

Weight gain higher than recommended was associated with large-for-gestational age babies, macrosomia and caesarean section among women from both groups.

Gestational weight gain among underweight women

A meta-analysis of individual participant data (n=265,270) *[1504]* found that among underweight women:

- low weight gain was associated with an increased risk of preterm birth and small for gestational age (both p<0.001) and a reduced risk of gestational hypertension (p<0.05) and large for gestational age (p<0.001)
- high weight gain was associated with a reduced risk of small for gestational age (p<0.05).

Gestational weight gain among women with healthy pre-pregnancy weight

In the meta-analysis of individual participant data (n=265,270) (Santos et al 2019), among women with pre-pregnancy BMI in the healthy range:

- low weight gain was associated with an increased risk of preterm birth and small for gestational age and a reduced risk of

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large for gestational age (all p<0.001)
- high weight gain was associated with an increased risk of gestational diabetes, gestational hypertension, pre-eclampsia, preterm birth and large for gestational age and a reduced risk of small-for-gestational age (all p<0.001).

Gestational weight gain among pregnant women who are overweight

In the meta-analysis of individual participant data (n=265,270) *[1504]*, among women who were overweight:

- low weight gain was associated gestational diabetes, gestational hypertension, pre-eclampsia, small for gestational age (all p<0.001) and preterm birth (p<0.05)
- high weight gain was associated with gestational diabetes, gestational hypertension, pre-eclampsia, preterm birth and large for gestational age (all p<0.001).

Gestational weight gain among pregnant women with obesity

In the meta-analysis of individual participant data (n=265,270) *[1504]*, among women with obesity both low and high weight gain were associated with increased risk of gestational diabetes, gestational hypertension, pre-eclampsia, preterm birth and large for gestational age (all p<0.001).

Weight gain lower than recommendations

A retrospective cohort study in the United States (n=~12,000,000 birth records) *[1506]* found that weight gain lower than the IOM guidelines among women with obesity reduced the risk of gestational hypertension, eclampsia, induction of labour and Caesarean section but was also associated with increased risks for multiple adverse neonatal outcomes with macrosomia the exception.

A systematic review of cohort studies of pregnant women with obesity (18 cohort studies; 99,723 women) *[1488]* found that weight gain *lower* than recommendations was associated with an increase in risk of:

- preterm birth (aOR 1.46; 95%CI 1.07 to 2.00)
- small-for-gestational-age babies (OR 1.24; 95%CI 1.13 to 1.36).

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Weight gain lower than recommendations was associated with a lower likelihood of:

- large-for-gestational-age babies (aOR 0.77; 95%CI 0.73 to 0.81)
- macrosomia (aOR 0.64; 95%CI 0.54 to 0.77)
- gestational hypertension (aOR, 0.70; 95%CI 0.53 to 0.93)
- pre-eclampsia (aOR 0.90; 95%CI 0.82 to 0.99).
- caesarean section (aOR 0.87; 95%CI 0.82 to 0.92).

There was no difference in risk of gestational diabetes (aOR 1.15; 95%CI 0.91 to 1.45), low birthweight (aOR1.08; 95%CI 0.76 to 1.54), Apgar score <7 at 5 minutes (aOR 0.92; 95%CI 0.67 to 1.27) or postpartum weight retention (MD -5.3 kg; 95%CI -9.0 to 1.17).

Weight loss

A systematic review of cohort studies (n=60,913) *[1489]* found that, among women who were obese, gestational weight loss compared to weight gain within the guidelines:

- increased the risk of small-for-gestational-age babies (aOR 1.76; 95%CI 1.45 to 2.14; 2 studies) and low birthweight (aOR 1.68; 95%CI 1.10 to 2.57; 1 study)
- was associated with a lower likelihood of large for gestational age (aOR 0.57; 95%CI 0.52 to 0.62; 2 studies), macrosomia (aOR 0.58; 95%CI 0.38 to 0.89; 1 study) and caesarean section (aOR 0.73; 95%CI 0.67 to 0.80; 2 studies).

There was a possible reduction in risk of pre-eclampsia (aOR 0.82; 95%CI 0.66 to 1.02; 1 study) and no clear difference in risk of gestational diabetes (aOR 0.88; 95%CI 0.62 to 1.25; 1 study) or Apgar score <7 at 5 minutes (aOR 1.08; 95%CI 0.81 to 1.44; 2 studies). No studies reported on preterm birth.

Women's views on advice on weight gain during pregnancy

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A systematic review of qualitative studies *[1510]* found that women are highly motivated to change their behaviour to improve fetal health but may not recognise the link between excess gestational weight gain and negative fetal health outcomes. Regular, clear, sensitive counselling geared to individual circumstances was frequently mentioned as a strong facilitator of healthy weight gain in pregnancy.

An Australian cross-sectional study (n=536) *[1481]* found that only half of pregnant women were aware of IOM recommendations on gestational weight gain.

Cross-sectional studies from overseas have found that:

- more than half (57%) of women reported that their healthcare provider talked to them about personal weight gain limits during pregnancy and a third of these women were counselled regularly; among those not counselled, over half (56%) reported that healthcare provider guidance would have been helpful to achieve their target weight (Weeks et al 2020)
- two-thirds (67%) of women received advice on gestational weight gain as part of antenatal care and women who reported following this advice had lower odds of weight gain exceeding recommendations (OR 0.18; 95%CI 0.03 to 0.91) (n=91) *[1494]*
- experiences of regular weighing were positive and participants believed it should be part of standard antenatal care, that there was a lack of information provided on gestational weight gain and healthy lifestyle in pregnancy, and that healthcare professionals are ideally placed to provide this advice (n=10) *[1459]*.

Health professional's views on weight monitoring as part of pregnancy care

An Australian focus group that examined barriers and enablers to the regular weighing of women throughout pregnancy (n=44) *[1478]* found that, while most health professionals supported regular weighing, various concerns were raised. These included access to resources and staff, the ability to provide appropriate counselling and evidence-based interventions, and the impact of weighing on women and the therapeutic relationship.

In an Australian study following introduction of a pregnancy weight gain chart (n=42) *[1470]*, 63% of health professionals surveyed used the chart, 76% reported that they needed more training in counselling pregnant women about weight gain, and insufficient time was the main barrier to weighing and discussing weight gain with women.

An Australian cohort study found that recording of weight is improved by providing scales to clinics and staff training (18.9%) and medical record prompts (61.8%) (n=~13,000 per cohort) *[1513]*.

A cohort study in the United States (n=733) *[1491]* found that introduction of a "best practice alert" into an electronic medical record system improved the rate of gestational weight counselling (p<0.001), documented weight gain (p<0.001) and weight gain consistent with guidelines (p=0.003).

Recent evidence on regular weighing

A systematic literature review found no clear difference in weekly weight gain (MD -0.00 kg; 95%CI -0.03 to 0.02) or weight gain exceeding the IOM guidelines for women who were underweight (OR 1.50; 95%CI 0.14 to 16.54), in the healthy weight range (OR 0.72; 95%CI 0.48 to 1.09), overweight (OR 0.85; 95%CI 0.45 to 1.62) or obese (OR 1.60; 95%CI 0.72 to 3.54) (*[1471]*. The interventions assessed in the two included studies (n=977) differed in that one involved regular weighing by a health professional *[1464]* and the other involved self-weighing *[1485]*).

The systematic literature review conducted to inform these Guidelines *[1501]* focused on weighing by a health professional and included three studies.

An Australian RCT (n=782) *[1464][1465]* addressed regular weighing at antenatal care visits plus advice on weight gain versus usual care. The study found no difference in weight gain, proportion of women gaining more weight than IOM recommended range or secondary outcomes *[1464]*. Among a subset of women who provided feedback (n=586), 73% were comfortable with being weighed routinely *[1465]*.

A pilot study in the United Kingdom (n=76) *[1469]* combined regular weighing by midwives and advice on weight gain with self-weighing between antenatal visits. Compared to usual care, there was no difference in the percentage of women gaining excessive weight during pregnancy or in mean depression and anxiety scores. Feedback in a subset of participants showed support for routine weighing among participants (9/12) and midwives (7/7). The same group then conducted a larger study of the intervention (n=656) *[1468]*, which also found no clear difference in weight gain exceeding IOM guidelines, depression or anxiety.

When these three trials were pooled, there was no difference in weight gain exceeding guidelines (RR 1.01 95% CI 0.92 to 1.12;

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3 RCTs; n=1,327; very low certainty) or mean weekly weight gain (MD 0.01 kg per week 95%CI –0.03 to 0.05; 2 RCTs; n=711; very low certainty). When the two United Kingdom studies were pooled, there was a small reduction in the risk of depression (MD -0.77; 95%CI -1.44 to -0.09; low certainty) and anxiety (MD -0.77; 95%CI -1.48 to -0.06; low certainty). There was no indication in the three trials that either excessive gestational weight gain or mean gestational weight gain differed in women in the healthy weight range at the beginning of pregnancy compared with women who were overweight or obese.

Other considerations include

- The potential for sub-optimal visualisation on ultrasound for women with elevated BMI (delaying the ultrasound until 20 to 22 weeks pregnancy for women with BMI ≥30 may provide better results but needs to be balanced against the possibility of a delayed diagnosis of structural anomalies) (SOGC 2010).
- Antenatal consultation with an obstetric anaesthetist to identify any potential difficulties with venous access, regional or general anaesthesia for women with a BMI ≥40.
- For women with a high BMI, ongoing nutritional advice following childbirth from an appropriate health professional, with a view to weight reduction and maintenance.

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Practice summary: weight and BMI

When: At all antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner, Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Explain the purpose of assessing weight and weight gain during pregnancy:** Discuss the benefits of having weight within the healthy range before, during and in between pregnancies. For women with a BMI outside the healthy range, explain that assessing weight gain during pregnancy is helpful in identifying women whose weight gain is below or above recommendations.
- ☐ **Engage women in discussions about weight gain:** Offer women the opportunity to be weighed and to discuss their weight gain since the last antenatal visit. Use the IOM recommendations to give women advice about the risks of inadequate or excessive weight gain. Provide advice on nutrition and exercise based on the Australian dietary and physical activity guidelines (see Chapter 11).
- ☐ **Consider referral:** Women with a BMI above or below the healthy range or who are gaining weight at a rate below or above recommendations may benefit from referral for nutrition advice from an accredited practising dietitian.
- ☐ **Take a holistic approach:** Provide women with culturally appropriate advice on the benefits of a healthy diet and regular physical activity. When making referrals, consider access to and costs of care and develop alternative care pathways for women who experience health inequalities as a result of social and cultural barriers.

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Good practice statement

Adopting a respectful, positive and supportive approach and providing information about healthy eating and physical activity in an appropriate format may assist discussion of weight. This should be informed by appropriate education for health professionals.

Approved by NHMRC in Nov 2020; expires Nov 2025

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Consensus recommendation

With women's consent, measure their weight and height at the first antenatal visit, calculate their pre-pregnancy body mass index (BMI) and give them advice about the benefits of meeting the recommended healthy weight gain for their pre-pregnancy BMI.

Approved by NHMRC in Nov 2020; expires Nov 2025

Consensus recommendation

At every antenatal visit, offer women the opportunity to be weighed so that low or high gestational weight gain is identified and risk of associated adverse outcomes monitored.

Approved by NHMRC in Nov 2020; expires Nov 2025

Info Box

Resources

Health professionals

CMACE & RCOG (2010) *CMACE & RCOG Joint Guideline. Management of Women with Obesity in Pregnancy.* London: Centre for Maternal and Child Enquiries & Royal College of Obstetricians and Gynaecologists.

IOM (2009) *Weight Gain During Pregnancy. Re-examining the Guidelines.* Institute of Medicine and National Research Council. Washington DC: National Academies Press.

NHMRC (2013) *Australian Dietary Guidelines: Providing the Scientific Evidence for Healthier Australian Diets.* Canberra: Commonwealth of Australia.

NHMRC (2005) *Nutrient Reference Values for Australia and New Zealand.* Canberra: National Health and Medical Research Council.

NICE (2010) *Dietary Interventions and Physical Activity Interventions for Weight Management Before, During and After Pregnancy.* NICE public health guidance 27. London: National Institute for Health and Clinical Excellence.

SOGC (2010) *Obesity in pregnancy. J Obstet Gynaecol Can* 32(2): 165–73.

Women and families

DoHA (2014) *Australia's Physical Activity & Sedentary Behaviour Guidelines for Adults (18-64 years).* Accessed 5 August 2020.

NHMRC/DoHA (2015) *Australian Guide to Healthy Eating.* Accessed 5 August 2020.

NHMRC/DoHA (2015) *Healthy Eating When You're Pregnant or Breastfeeding.* Accessed 5 August 2020.

References

See full reference list

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7.2 Gestational age

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Info Box

Ultrasound examination in the first trimester allows accurate assessment of gestational age, and identifies and allows for appropriate care of women with multiple pregnancies.

Assessing gestational age

Methods used to assess gestational age include known date of ovulation, date of the last menstrual period (LMP) and diagnostic ultrasound. Diagnostic ultrasound is a sophisticated electronic technology, which uses pulses of high frequency sound to produce an image.This imaging enables measurement of the fetus and estimation of the gestational age.

Accuracy and effectiveness

The NICE guidelines reviewed the diagnostic value and effectiveness of screening methods in determining gestational age. Studies identified included a Cochrane review, four RCTs and a number of observational studies. Findings were as follows.

- *Accuracy of screening tests*: Evidence suggests that ultrasound is a more accurate predictor of gestational age than LMP *[1201][1203][1185][1190][1208][1205][1202]*. If only LMP is available, the estimated date of birth should be calculated as the first day of the LMP plus 282 days *[1200]*. The estimated date of birth based on LMP is subject to significant error and will be influenced by the woman's age, number of previous pregnancies, BMI and whether she smokes *[1205][1199]*.
- *Measurements used:* Crown–rump length (CRL) measurement should be used in the first trimester for estimating gestational age *[1206][1208]*. CRL > 90 mm is unreliable in estimating gestational age in second trimester and head circumference (HC) measurement, which appears more reliable than the biparietal diameter (BPD) *[1195]*, should be used instead when establishing an estimated date of birth in the second trimester.

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These findings are largely supported by subsequent lower level studies as follows.

- A small comparative study (n=30) *[1197]* suggested that fetal head and trunk volume (HT) could be more accurate than CRL for estimating gestational age, possibly due to flexion of the fetal head affecting CRL measurement.
- An Australian prospective cohort study (n=396) *[1198]* found that CRL measurement predictions were superior to BPD measurement predictions.
- A retrospective comparative study (n=165,908) *[1191]* found that ultrasound-based estimates of gestational age were more accurate than LMP based-estimates of gestational age.
- A prospective cohort study *[1194]* found that LMP classified more births as post term than ultrasound (4.0% vs 0.7%), with a greater difference among young women, non-Hispanic Black and Hispanic women, women of non-optimal body weight and mothers of low birth weight babies.
- A retrospective study (n=40,730) *[1196]* showed that the estimation of gestational age from CRL was not consistent, with reported age for a single CRL differing by up to 10 days. This highlights the need to ensure that reference curves and standards are consistently applied.
- A prospective cross-sectional study (n=200) *[1204]* concluded that significant ethnic differences between mothers were not reflected in fetal biometry at second trimester. The results support the recommendation that ultrasound in practical health care can be used to assess gestational age in various populations with little risk of error due to ethnic variation.

A Cochrane review *[1210]*, which compared selective versus routine use of ultrasound in pregnancy, concluded that ultrasound improves the early detection of multiple pregnancies.

Timing of assessment

The systematic review conducted to inform the development of these Guidelines identified one prospective cohort study (n=8,313) *[1209]* that investigated the best time to conduct gestational age assessment. The study found that the earlier the ultrasound assessment in pregnancy (preferably between 10 and 12 weeks), the more accurate the prediction of date of birth. The results indicate that after 24 weeks of pregnancy, a reliable LMP provides better estimates.

Calculating the estimated date of birth

The ability to estimate the range of dates during which birth may occur is influenced by the regularity and length of a woman's

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menstrual cycle, whether the date of ovulation (rather than that of intercourse) is known and the timing of any ultrasound assessment. Selection of the better estimate of the date of birth is based on the following criteria *[1186][1189][1188]*:

- if the LMP was certain and menstruation regular, compare the LMP estimate to the ultrasound estimate:
- *ultrasound performed between 6 and 13 weeks pregnancy*: if the two dates differ by 5 days or less, use the LMP estimate; if the dates differ by more than 5 days, use the ultrasound estimate
- *ultrasound performed between 13 and 24 weeks pregnancy*: if the two dates differ by 10 days or less, use the LMP estimate; if the dates differ by more than 10 days, use the ultrasound estimate
- if the ultrasound was performed between 6 and 24 weeks pregnancy and the LMP was not certain or menstruation irregular, use the ultrasound estimate
- if the LMP was certain and menstruation regular and no ultrasound was performed between 6 and 24 weeks pregnancy (or none with a heartbeat), use the LMP estimate.

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Other considerations in gestational age assessment

Safety

The NICE guidelines do not discuss the safety of ultrasound and the literature review conducted to inform these Guidelines identified only a single prospective observational study (n=52) *[1207]*. The study found a negligible rise in temperature at the ultrasound beam's focal point. No studies were identified that assessed psychological harms to the mother, risk of overdiagnosis of placenta praevia or its contribution to anxiety.

Cost-effectiveness

An analysis of the cost implications of recommending routine ultrasound for gestational age assessment in the first trimester was undertaken to inform the development of these Guidelines (see separate document on economic analyses). The analysis aimed to balance the costs of additional scans undertaken against the savings resulting from:

- optimising the timing and performance of maternal serum testing and thereby reducing the number of diagnostic tests (chorionic villus sampling and amniocentesis) undertaken
- reducing rates of inductions (which in turn may reduce the rate of caesarean section).

The analysis was limited by a lack of data on privately funded ultrasounds and those carried out in hospitals and therefore could only identify implications for Medicare expenditure. Data limitations also meant that the analysis had to rely on a range of assumptions and on the literature, which is inconsistent in some areas. While some studies have found no significant difference in the rate of induction between women who have a first trimester scan and women who have both a first and second trimester scan *[1190][1192][1193][1210]*others have found decreased rates of induction associated with first trimester screening *[1187]*.

The analysis was therefore unable to conclusively determine whether the benefits of the recommendation would be likely to outweigh the costs. While a maximum number of additional scans (75,500) and associated costs ($A4.53 million) was estimated, the benefits vary considerably depending on whether a decrease in inductions is assumed; from $A230,000 if only improved power of maternal serum testing is included, to around $A17 million if a decrease in inductions is assumed, with an additional saving of around $A5 million if the link between induction and caesarean section is included.

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Who should conduct the assessment?

A range of health professionals may be trained to carry out ultrasounds, including midwives, Aboriginal health workers and GPs. In addition to having appropriate training and accreditation, it is important that caseload is sufficient to maintain skills.

Minimum standards for health professionals conducting ultrasound assessments are disseminated by the Australian Society for Ultrasound in Medicine, the Australasian Sonographer Accreditation Registry, the Royal Australian and New Zealand College of Radiologists, and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Additional considerations for Aboriginal and Torres Strait Islander women

Accurately assessing gestational age is particularly important among Aboriginal and Torres Strait Islander women as:

- many women live in rural and remote areas and move to a larger centre to give birth, requiring logistical arrangements to be made around the estimated date of birth (see below)
- the higher rates of preterm birth and intrauterine growth restriction.

Issues of access in rural and remote areas

In remote regions, it may be difficult for women to access ultrasound examination early in pregnancy due to limited availability of adequate equipment, health professionals not offering ultrasound, a lack of accredited and trained professionals in some areas and the costs involved in travelling for the assessment (this is not consistently funded under State/Territory schemes to support travel and accommodation for women from rural and remote areas to access care and services). Health professionals should ensure that history taking is comprehensive and detailed, paying attention to ongoing assessment of fetal growth and wellbeing.

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Practice summary

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss the purpose of the ultrasound:** Explain that it is intended to assess the gestational age of the baby (when the conception date is not known) to enable other screenings that a woman elects to have to be conducted at the appropriate time.
- ☐ **If a woman chooses to have an ultrasound, arrange an appointment or referral:** Whether providing the ultrasound or arranging referral, ensure that the ultrasound takes place between 8 weeks 0 days and 13 weeks 6 days of pregnancy.

Weak recommendation

Provide information and offer pregnant women who are unsure of their conception date an ultrasound scan between 8 weeks 0 days and 13 weeks 6 days to determine gestational age, detect multiple pregnancies and accurately time fetal anomaly screening.

Approved by NHMRC in December 2011; expires December 2016

Weak recommendation

Use crown–rump length (CRL) measurement to determine gestational age. If the CRL is above 84 mm, estimate the gestational age using head circumference.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

The timeframe for ultrasound assessment of gestational age overlaps with that for assessment of nuchal translucency thickness as part of testing for fetal chromosomal anomalies (11 weeks to 13 weeks 6 days), which may enable some women to have both tests in a single scan. This should only occur if women have been provided with an explanation of the purpose and implications of the tests and have given their informed consent to both tests.

Approved by NHMRC in December 2011; expires December 2016

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Good practice statement

Do not change the agreed due date without advice from another health professional with considerable experience in antenatal care.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

Good practice statement

Ensure ultrasound assessment of gestational age is only performed by a person who has had specific training.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

Good practice statement

Repeated ultrasound assessments should only be used when clinically indicated.

Approved by NHMRC in December 2011; expires December 2016

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7.3 Fetal development and anatomy

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Ultrasound examination between 18 and 20 weeks gestation allows assessment of fetal development and anatomy. It is also used to estimate gestational age when this has not been assessed in the first trimester.

Background

Diagnostic ultrasound is a sophisticated electronic technology that uses pulses of high frequency sound to produce an image. This imaging can enable measurement of the baby, estimation of the gestational age and identification of structural anomalies. Gestational age assessment and testing for chromosomal anomalies in the first trimester are discussed in Section 11. This section discusses the second trimester scan to assess the development and anatomy of the baby and the position of the placenta. This assessment is also known as the morphology scan.

Congenital anomalies in Australia

In Australia in 2010, congenital anomalies (including chromosomal and structural anomalies) was the leading cause of perinatal death in single pregnancies (29%) and accounted for 76.1% of neonatal deaths of babies born at 32–36 weeks gestation and 44.1% of deaths of babies born after 37 weeks gestation *[552]*. Available data on neural tube defects among babies born to Aboriginal and Torres Strait Islander women show a higher overall prevalence than among non-Indigenous women (16.6 vs 7.3 per 10,000 total births in 2006–2008) *[1239]*.

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Offering assessment of fetal development and anatomy

Accuracy and effectiveness of ultrasound assessment of fetal development and anatomy

- *Gestational age:* While gestational age assessment using ultrasound is more accurate in the first trimester *[1252][1243]*, some women may not have access to ultrasound until later in pregnancy. Gestational age has been successfully estimated in the second trimester *[1252][1202]*.
- *Structural anomalies:* Ultrasound has been used in the second trimester to detect anomalies of the heart *[1259][1246][1264][1247]*, renal tract *[1244]* and umbilical artery *[1245]*, neural tube defects *[1258]* and anomalies resulting from exposure to alcohol *[1253]*. The rate of detection of structural anomalies is generally higher in the second than in the first trimester *[1262]*; *[1249]*.
- *"Soft" markers:* While the combination of nuchal thickness and biochemical markers in the first trimester is more effective in identifying chromosomal anomalies (see Section 11), some markers (eg echogenic bowel, short femur, short humerus, thickened nuchal fold, absent nasal bone) identified in the second trimester ultrasound occur more frequently in babies with chromosomal anomalies *[1241]*. A combination of markers is more accurate than a single marker alone; for example, only 5% of babies with identified chromosomal anomalies had echogenic bowel as the only finding *[1250]*.
- *Placenta:* Second trimester ultrasound has effectively identified placental location *[1242]*, overlap of the cervical os *[1261]*, placental length (which may assist in identifying risk of having a small-for-gestational age baby) *[1256]* and placenta praevia (which may resolve in women with [61%] and without [90%] a previous caesarean section) *[1254]*.
- *Type of ultrasonography*: Accurate assessment can be performed using standard 2D ultrasonography. Assessment may be performed more rapidly using 3D ultrasonography *[1240][1260]*.

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Timing of ultrasound assessment of fetal development and anatomy

Recommended timing of the ultrasound scan varies in international guidelines but is generally in the range of 18–20 weeks as:

- sensitivity in detecting structural anomalies increases after 18 weeks gestation *[1242]*
- detection of structural anomalies before 20 weeks gestation gives women the choice of ending the pregnancy, where this is permitted under jurisdictional legislation.

Ultrasound can be used to assess gestational age up to 24 weeks gestation and to detect anomalies throughout the pregnancy.

There is no benefit from repeated diagnostic ultrasound assessments unless clinically indicated. Repeated tests may increase costs for women, be inconvenient and have the potential to increase anxiety (eg through false positives). As well, access for some women is limited as this technology is not available in all settings.

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Other considerations

Benefits and harms

A Cochrane review *[1210]* found a reduced number of inductions for 'prolonged pregnancy' and no significant differences in birth weight, size for gestational age, Apgar scores and rates of admission to neonatal intensive care between babies exposed to ultrasound in early pregnancy (before 24 weeks) and those not exposed. There were no significant differences in growth and development, visual acuity or hearing for children aged 8–9 years *[1210]*. Follow-up at 15–16 years (n=4,458) found no significant effect on overall school performance *[1263]*.

No studies were identified that assessed psychological benefits or harms to the mother. Women may not be fully informed about the purpose of routine ultrasound and may be made anxious, or be inappropriately reassured by scans *[1248][1255]*. A small systematic review found insufficient evidence to support either high or low levels of feedback during ultrasound to reduce maternal anxiety and change maternal health behaviour (smoking, alcohol use) *[1257]*.

Who should conduct the assessment?

Minimum standards for health professionals conducting ultrasound assessments are disseminated by the Australian Society for Ultrasound in Medicine, the Australasian Sonographer Accreditation Registry, the Australian Sonographers Association, the Royal Australian and New Zealand College of Radiologists, and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

The costs associated with ultrasound may limit access for some women, particularly if bulk-billed services are not available in their area.

In remote regions, it may be difficult for women to access ultrasound examination due to limited availability of appropriate equipment, a lack of accredited and trained professionals in some areas and the costs involved in travelling for the assessment. It is noted that there is a lack of consistency in funding across the States and Territories to support travel and accommodation for women from rural and remote areas to access care and services.

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Cost effectiveness

An economic analysis carried out to inform the development of these Guidelines (see separate document on economic analyses) found that screening for congenital anomalies at 18–20 weeks is moderately cost-effective, without generating significant risks, although without driving substantive benefits. This excludes the positive psychological value of the information obtained from the ultrasound (which may be associated with improvements in fetal wellbeing) and benefits from the detection of placental problems and confirmation of gestational age, making these estimates fairly conservative.

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Discussing assessment of fetal development and anatomy

Not all women will want an ultrasound and some may not understand the purpose of the assessment or think that it is being offered because there is something wrong with the pregnancy.

In discussing the ultrasound scan, it is important to explain:

- that it is the woman's decision whether the ultrasound takes place
- where ultrasound services are available if the woman chooses to have one
- that ultrasound does not detect all fetal and maternal anomalies
- any costs involved for the woman and the timeframe for receiving results
- choices if any anomalies are detected (some parents may not want an ultrasound if there is no change in birth outcomes).

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Practice summary: fetal development and anatomy

When: Between 18 and 20 weeks

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the purpose of the ultrasound:** Explain that ultrasound assessment is offered to all women to check the anatomy and growth of the baby and can also be used to estimate gestational age if this has not already been done.
- ☐ **If a woman chooses to have an ultrasound, arrange an appointment or referral:** When arranging referral, ensure that the ultrasound takes place before 20 weeks of pregnancy.
- ☐ **Take a holistic approach:** Provide advice to assist women in accessing services (eg availability of bulk-billed services and interpreters). For women who need to travel for assessment, explain the need to plan early and organise travel and accommodation. Provide information on available funding to assist with these costs.
- ☐ **Arrange follow-up:** Routinely make sure that women are informed of the results of the scan and document these in her antenatal record. If an anomaly is suspected or identified, offer women access to appropriate counselling and ongoing support by trained health professionals.

Weak recommendation

Offer pregnant women ultrasound screening to assess fetal development and anatomy between 18 and 20 weeks gestation.

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Timing of the ultrasound will be guided by the individual situation (eg for women who are obese, visualisation may improve with gestational age).

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Repeated ultrasound assessment may be appropriate for specific indications but should not be used for routine monitoring.

Approved by NHMRC in June 2014; expires June 2019

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Good practice statement

Ensure ultrasound assessment is only performed by a person with appropriate training and qualifications, within the appropriate scope (eg diagnostic or point of care).

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC

Info Box

Resources

Remote Primary Health Care Manuals. (2017). Antenatal screening tests for baby. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

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7.4 Prevention of Miscarriage

New

Info Box

7.5 Fetal growth restriction and well-being

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Antenatal visits provide an opportunity to assess fetal growth, auscultate the fetal heart (although this cannot predict pregnancy outcomes) and encourage women to be aware of the normal pattern of fetal movements for their baby.

Fetal growth restriction[1]

Monitoring growth aims to identify small-for-gestational age babies, who are at increased risk of associated morbidity and mortality.

Background

Perinatal deaths associated with small-for-gestational age in Australia

In Australia in 2014, intrauterine growth restriction was the cause of 5.4% of perinatal deaths among singleton babies *[1124]*. Perinatal deaths associated with intrauterine growth restriction among singleton babies were most common at 28–31 weeks gestation (13.2%).

Risk factors for small-for-gestational age

Major risk factors (OR>2.0) for having a small-for-gestational age fetus or newborn include *[1403]*:

- maternal diabetes with vascular disease (OR 6.0, 95%CI 1.5 to 2.3), renal impairment (aOR 5.3, 95%CI 2.8 to 10) chronic hypertension (ARR 2.5, 95%CI 2.1 to 2.9) or antiphospholipid syndrome (RR 6.22, 95%CI 2.43 to 16.0).
- having a previous small-for-gestational age baby (OR 3.9, 95%CI 2.14 to 7.12) or stillbirth (OR 6.4, 95%CI 0.78 to 52.56)
- vigorous daily exercise (leading to being very out of breath) (aOR 3.3, 95%CI 1.5 to 7.2) (please note that more recent evidence does not suggest any association between vigorous physical activity and small for gestational age; see Section 11.3.2)
- maternal age >40 years (OR 3.2, 95%CI 1.9 to 5.4)
- PAPP-A <0.4 MoM (OR 2.6)
- using cocaine in pregnancy (OR 3.23, 95%CI 2.43 to 4.3)
- smoking 11 or more cigarettes a day in pregnancy (OR 2.21, 95%CI 2.03 to 2.4).
- maternal (OR 2.64, 95%CI 2.28 to 3.05) or paternal (OR 3.47, 95%CI 1.17 to 10.27) history of being a small-for-gestation-age baby is also a significant risk factor but may not be ascertainable.

Other risk factors (OR <2.0) include *[1403]*:

- maternal diet (low fruit intake pre-pregnancy) (aOR 1.9; 95%CI 1.3 to 2.8)
- nulliparity (OR 1.89; 95%CI 1.82 to 1.96)
- in vitro fertilisation (IVF) singleton pregnancy (OR 1.6; 95%CI 1.3 to 2.0)
- BMI ≥30 (RR 1.55; 95%CI 1.3 to 1.7)
- smoking up to 10 cigarettes a day (OR 1.54; 95%CI 1.39 to 1.7)
- history of pre-eclampsia (aOR 1.31; 95%CI 1.19 to 1.44)
- pregnancy interval of <6 months (aOR 1.26; 95%CI 1.18 to 1.33) or ≥60 months (aOR 1.29; 95%CI 1.2 to 1.39).

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Protective and preventive factors

A high green leafy vegetable intake pre–pregnancy has been reported to be protective (aOR 0.44, 95% CI 0.24–0.81) *[1403]*.

Low-dose aspirin for women at risk of pre-eclampsia is likely to reduce intrauterine growth restriction by about 10% (whether taken earlier or later than 16 weeks) *[1395]*.

Assessing fetal growth

Abdominal palpation

Low-level evidence from cohort and case–control studies performed in low-risk populations has consistently shown abdominal palpation to be of limited accuracy in the detection of a small-for-gestational age newborn (sensitivity 19–21%, specificity 98%) and severely small-for-gestational age newborn (<2.3rd centile, sensitivity 28%) *[1388][1374]*. In mixed-risk populations, the sensitivity increases to 32–44% *[1384][1404]*. In high-risk populations sensitivity is reported as 37% for a small-for-gestational

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age newborn and 53% for severely small-for-gestational age newborn *[1374]* (low quality evidence).

Measurement of fundal height

A systematic review highlighted the wide variation of predictive accuracy of fundal height measurement for a small-for-gestational age newborn *[1396]*. Although early studies reported sensitivities of 56–86% and specificities of 80–93% for fundal height detection of small-for-gestational age *[1375][1376][1393]*, a large study (n=2,941) reported fundal height to be less predictive with a sensitivity of 27% and specificity of 88% (LR+ 2.22, 95% CI 1.77 to 2.78; LR– 0.83, 95% CI 0.77 to 0.90) *[1401]*. Maternal obesity, abnormal fetal lie, large fibroids, polyhydramnios and fetal head engagement contribute to the limited predictive accuracy of fundal height measurement. Fundal height is associated with significant intra– and inter–observer variation *[1373][1396]* and serial measurement may improve predictive accuracy *[1399]*.

The impact on perinatal outcome of measuring fundal height is uncertain. A systematic review found only one trial (n=1,639), which showed that fundal height measurement did not improve any of the perinatal outcomes measured (*[1397]*.

Customised chartsSymphysis-

Customised fundal height charts are adjusted for maternal characteristics (eg maternal height, weight). As no RCTs have compared customised with non–customised fundal height charts, the evidence for their effectiveness in improving outcomes such as perinatal morbidity/mortality is lacking *[1403]*.

[1] The information and recommendations in this section have been adapted from *[1403] The Investigation and Management of the Small-For Gestational Age Fetus: Green-Top Guideline 31*. London: Royal College of Obstetricians and Gynaecologists. This involved mapping of clinical questions and rewording of recommendations for consistency within these Guidelines.

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Fetal movements[1]

Fetal movement assessment is widely used to monitor fetal wellbeing *[1380][1398]* and is most commonly undertaken through subjective maternal perception. Fetal movement counting is a more formal method to quantify fetal movements *[1391]*. Maternal perception rather than formal fetal movement counting is recommended in Australia *[1381]* and in the United Kingdom *[869][1402]*. Maternal reporting of decreased fetal movement occurs in 5–15% of pregnancies in the third trimester *[1379][1386][1378]*.

Background

Risks associated with decreased fetal movement

Stillbirth, which affects over 2,700 families in Australia and New Zealand each year *[1387]*, is often preceded by maternal perception of decreased fetal movement *[1379][1377]*. Decreased fetal movement is also strongly linked to other adverse perinatal outcomes such as neurodevelopmental disability, infection, feto-maternal haemorrhage, umbilical cord complications, low birth weight and fetal growth restriction *[1380][1385]*. Decreased fetal movements for some women may be associated with placental dysfunction or insufficiency, which could lead to fetal growth restriction and/or stillbirth *[1410]*.

Information on fetal movements

Antenatal education about fetal movement has been shown to reduce the time from maternal perception of decreased fetal movements to health-seeking behaviour *[1408]*. A reduction in stillbirth rates has been associated with increased awareness of decreased fetal movements among women and health professionals in both the overall study population (OR 0.67, 95% CI: 0.49-0.94) and in women with decreased fetal movements (aOR 0.51, 95% CI: 0.32 to 0.81) *[1408][1407]*.

However, many women do not receive adequate information about fetal movements *[1406] [1400]*. A recent study found that more than one-third of women at 34 weeks gestation or later did not recall receiving information from their healthcare professional about fetal movement *[1394]*. Another study found that information provided by midwives was not always consistent with evidence-based guidelines *[1409]*. Pregnant women preferred to be given as much information as possible about fetal movements and cited health professionals as a trustworthy source *[1394]*.

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Monitoring fetal movements

A Cochrane review assessed the effect of formal fetal movement counting and recording (eg using kick charts) on perinatal death, major morbidity, maternal anxiety and satisfaction, pregnancy intervention and other adverse pregnancy outcomes (5 RCTS; n=71,458) *[1392]*. The review did not find sufficient evidence to inform practice. In particular, no trials compared fetal movement counting with no fetal movement counting. Only two studies compared routine fetal movements with standard antenatal care. Indirect evidence from a large cluster-RCT *[1382]* suggested that more babies at risk of death were identified in the routine fetal monitoring group but this did not translate to reduced perinatal mortality.

Discussing fetal movements

Information given to women should include that:

- most women are aware of fetal movements by 20 weeks of gestation, and although fetal movements tend to plateau at 32 weeks of gestation, there is no reduction in the frequency of fetal movements in the late third trimester
- patterns of movement change as the baby develops, and wake/sleep cycles and other factors (eg maternal weight and position of the placenta) may modify the woman's perception of movements
- taking a short amount of time each day to be aware of the baby's movements is a good way for women to 'check on' the baby
- most women (approximately 70%) who perceive a single episode of decreased fetal movements will have a normal outcome to their pregnancy *[1402]*
- if a woman does report decreased fetal movement, a range of tests can be undertaken to assess the baby's wellbeing.

[1] The information and recommendations in this section have been adapted from Gardener G, Daly L, Bowring V et al (2017) *[1381] Clinical practice guideline for the care of women with decreased fetal movements*. Brisbane: The Centre of Research Excellence in Stillbirth. This involved mapping of clinical questions and rewording of recommendations for consistency within these Guidelines.

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Fetal heart rate assessment

Auscultation of the fetal heart has traditionally formed an integral part of a standard antenatal assessment.

Auscultation

Routine auscultation of the fetal heart rate is not recommended in the United Kingdom *[869]*.

Although successful detection of a fetal heart confirms that the baby is alive, it does not guarantee that the pregnancy will continue without complications *[1405]* and is unlikely to provide detailed information on the fetal heart rate such as decelerations or variability *[869]*.

The sensitivity of Doppler auscultation in detecting the fetal heart is 80% at 12 weeks + 1 day gestation and 90% after 13 weeks *[1405]*. Attempts to auscultate the fetal heart before this time may be unsuccessful, and lead to maternal anxiety and additional investigations (eg ultrasound) in pregnancies that are actually uncomplicated *[1405]*. It is unlikely that a fetal heart rate will be audible before 28 weeks if a Pinard stethoscope is used *[1411]*.

Although there is no evidence on the psychological benefits of auscultation for the mother, it may be enjoyable, reduce anxiety and increase mother–baby attachment.

Cardiotocography

Electronic fetal heart rate monitoring is not recommended as a routine part of antenatal care in the United Kingdom *[869]* or Canada *[1389]*.

A Cochrane review found no clear evidence to support the use of cardiotocography in women at low risk of complications *[1383]*.

Anxiety levels in women who undergo routine cardiotocography are increased. This reaction seems to be influenced by the perception of fetal movement during the examination and is more evident in women whose pregnancies are affected by complications *[1390]*.

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Practice Summary

Fetal growth restriction

When: At all antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal growth:** Early in pregnancy, give all women appropriate written information about the measurement of fetal growth and an opportunity to discuss the procedure with a health professional.
- ☐ **Take a consistent approach to assessment:** When measuring fundal height, use a non-elastic tape with numbers facing downwards so that an objective measurement is taken. Measure from the variable point (the fundus) and continue to the fixed point (the symphysis pubis) or vice versa. Take and document measurements in a consistent manner.
- ☐ **Take a holistic approach:** Abdominal palpation provides a point of engagement between the health professional and mother and baby.

Fetal movements

When: At antenatal visits from 20 weeks

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal movement patterns:** Emphasise the importance of the woman's awareness of the pattern of movement for her baby and factors that might affect her perception of the movements.
- ☐ **Advise early reporting:** Women should report perceived decreased fetal movement on the same day rather than wait until the next day.
- ☐ **Take a holistic approach:** Support information given with appropriate resources (eg written materials suitable to the woman's level of literacy, audio or video) and details of whom the woman should contact if decreased fetal movements are perceived.

Fetal heart rate

When: At antenatal visits between 12 and 26 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss fetal heart rate:** Explain that listening to the fetal heart does not generally provide any information about the health of the baby and that other tests (such as ultrasound) are relied upon for identification of any problems with the pregnancy.
- ☐ **Take a holistic approach:** Some women may be reassured by hearing the fetal heart beat.

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Good practice statement

Early in pregnancy, assess women for risk factors for having a small-for-gestational-age fetus/newborn.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

When women are identified as being at risk of having a small-for-gestational-age fetus/newborn, provide advice about modifiable risk factors.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Refer women with a major risk factor or multiple other factors associated with having a small-for-gestational-age fetus/newborn for ultrasound assessment of fetal size and wellbeing at 28–30 and 34–36 weeks gestation.

Approved by NHMRC in October 2017; expires October 2022

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Consensus recommendation

Do not assess fetal growth based solely on abdominal palpation.

Approved by NHMRC in October 2017; This recommendation is currently considered stable and no update is planned.

Consensus recommendation

At each antenatal visit from 24 weeks, measure fundal height in centimetres.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Refer women after 24 weeks gestation with a fundal height ≥3cm less than expected, a single fundal height which plots below the 10th centile or serial measurements that demonstrate slow or static growth by crossing centiles for ultrasound measurement of fetal size.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Refer women in whom measurement of fundal height is inaccurate (for example: BMI >35, large fibroids, polyhydramnios) for serial assessment of fetal size using ultrasound.

Approved by NHMRC in October 2017; expires October 2022

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Consensus recommendation

Early in pregnancy provide women with verbal and written information about normal fetal movements. This information should include a description of the changing patterns of movement as the fetus develops, normal wake/sleep cycles and factors that may modify the mother's perception of fetal movements

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Advise women with a concern about decreased fetal movements to contact their health professional immediately.

Approved by NHMRC in October 2017; expires October 2022

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Good practice statement

Emphasise the importance of maternal awareness of fetal movements at every antenatal visit.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Do not advise the use of kick charts as part of routine antenatal care.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Maternal concern about decreased fetal movements overrides any definition of decreased fetal movements based on numbers of fetal movements.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Do not routinely use electronic fetal heart rate monitoring (cardiotocography) for fetal assessment in women with an uncomplicated pregnancy.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

If auscultation of the fetal heart rate is performed, a Doppler may be used from 12 weeks and either Doppler or a Pinard stethoscope from 28 weeks.

Approved by NHMRC in October 2017; expires October 2022

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Resources

Fetal growth

KEMH (2016) Clinical Guideline: *Fundal height: measuring with a tape measure*.

RCOG (2014) *The Investigation and Management of the Small-For Gestational Age Fetus: Green-Top Guideline 31*. London: Royal College of Obstetricians and Gynaecologists.

Remote Primary Health Care Manuals. (2017). Checking baby's growth and development. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Fetal movements

Gardener G, Daly L, Bowring V et al (2017) *Clinical practice guideline for the care of women with decreased fetal movements.* Brisbane: The Centre of Research Excellence in Stillbirth.

RCOG (2017) *Reduced fetal movements. Green-top guideline no. 57*: Royal College of Obstetricians and Gynaecologists.

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7.6 Risk of preterm birth

Info Box

While there are many known and unknown causes of preterm birth, women identified as being at risk may benefit from advice about risk and protective factors.

Background

Preterm birth is defined as birth before 37 completed weeks of pregnancy *[1894]*. Sub-categories of preterm birth are based on weeks of gestational age: early preterm (<34 weeks), very preterm (28 to <32 weeks) and extremely preterm (<28 weeks). This section is concerned with spontaneous preterm birth as opposed to planned preterm birth.

Incidence of preterm birth

In Australia in 2014 *[1124]*:

- overall, 8.6% of babies were born preterm, with most of these births occurring at gestational ages between 32 and 36 completed weeks
- the average gestational age for all preterm births was 33.3 weeks
- babies whose mothers smoked during pregnancy were more likely to be born preterm (13%) than those whose mothers did not smoke during pregnancy (8%).
- other characteristics associated with increased likelihood of preterm birth included:
- babies born in multiple births: 63% of twins and all (100%) of other multiples (triplets and higher) were preterm, compared with 7% of singleton babies
- babies born to mothers usually residing in more remote areas: 13% in *very remote* areas compared with 8% in *major cities*
- babies of younger (<20 years) and older (≥40 years) mothers: 11% and 12% were preterm, compared with 8% of babies with mothers aged 20–39 years.

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Nationally in 2014, approximately 14% of babies of Indigenous mothers were born preterm, compared with 8% of babies of non-Indigenous mothers *[1124]*; similar rates were found in an earlier West Australian study (14.8 and 7.6%) *[1859]*. However, a study in a Melbourne hospital found no significant difference in risk of preterm birth between Indigenous and non-Indigenous babies and mothers (Indigenous babies aOR 1.19, 95%CI 0.77 to 1.87, Indigenous mothers aOR 0.97 95%CI 0.52 to 1.80) *[1893]*.

Risks associated with preterm birth

Preterm birth is associated with perinatal mortality, long-term neurological disability (including cerebral palsy), admission to neonatal intensive care, severe morbidity in the first weeks of life, prolonged hospital stay after birth, readmission to hospital in the first year of life and increased risk of chronic lung disease *[1894]*. Preterm birth can have a serious emotional impact on the family. In Australia in 2014 *[1124]*:

- preterm babies were more likely to be admitted to a special care nursery or neonatal intensive care unit (72%) than babies born at term (10%) or post-term (13%)
- spontaneous preterm birth accounted for 14% of all perinatal deaths and one third (33%) of perinatal deaths of babies of Indigenous mothers.

Info Box

Identifying women at increased risk of giving birth preterm

A range of risk and protective factors influence the likelihood of preterm birth. While many risk factors are not modifiable during a woman's current pregnancy, addressing modifiable risk factors may reduce risk of preterm birth. It should also be noted that many women who experience preterm birth have no risk factors.

Significant risk factors

There is a significant association between preterm birth and:

- social disadvantage (OR 1.27, 95%CI: 1.16 to 1.39) *[1866]* and lower levels of maternal education (RR 1.48; 95%CI 1.29 to 1.69) *[1875]*
- previous preterm birth (absolute recurrence rate among women with a singleton pregnancy and previous preterm singleton birth 20%, 95% CI 19.9–20.6) *[1854]*
- pre-existing (p=0.002) *[1857]* or gestational diabetes *[1800]*
- current urogenital infections: eg chlamydia [OR 1.60; 90%CI 1.01 to 2.5] *[1851]*, bacterial vaginosis [OR 1.85; 95%Ci 1.62 to 2.11] *[1031]*
- alcohol consumption (OR 1.34; 95%CI 1.28 to 1.41) *[1801]*, in a dose-response fashion *[1881][1870]*
- smoking at the first antenatal visit (aOR 1.42, 95%CI 1.27 to 1.59) *[1805]* and active smoking during pregnancy (aOR 1.53, 95%CI 1.05 to 2.21) *[1829]*, with risk further increased among women smoking more than 10 cigarettes a day compared to those smoking 1–9 cigarettes per day (aOR 1.69 vs 1.54) *[1829]*.

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Other factors

Systematic reviews of RCTs found:

- women who were overweight and obese who participated in aerobic exercise for 30–60 minutes three to seven times per week had a lower risk of preterm birth <37weeks (RR 0.62, 95% CI 0.41 to 0.95) compared to controls *[1863]*
- no clear difference in risk of preterm birth <37 weeks with treatment of periodontal disease (RR 0.87; 95%CI 0.70 to 1.10; low quality evidence) *[1665]*.

Systematic reviews of observational studies show the following associations with preterm birth:

- *country of origin/ethnicity*: odds of very preterm birth among East African immigrants were higher than among Australian-born women (aOR 1.55, 95%CI 1.27 to 1.90) *[1803]* and higher among African American women than among Caucasian women (pooled OR 2.0; 95%CI 1.8 to 2.2), with no significant association for Asian or Hispanic ethnicity *[1879]*
- *weight*: risk was increased among women who were obese and gained more than the IOM recommendations (aOR 1.54; 95% CI 1.09 to 2.16) *[1830]*
- *emotional health and well-being*: increased risk was associated with low social support compared to high social support (OR 1.22, 95%CI 0.84 to 1.76); stress (OR 1.52, 95%CI 1.18, to 1.97) *[1840]*; untreated depression (OR 1.56; 95%CI 1.25 to 1.94)*[1850]* and anxiety (RR 1.50, 95%CI 1.33 to 1.70) *[1824]*, (OR 1.70, 95%CI 1.33 to 2.18) *[1874]* but not with maternal personality traits *[1814]*
- *exposure to antidepressants*: risk was increased among women exposed to antidepressants during pregnancy compared to women with depression but without antidepressant exposure (OR 1.17, 95%CI 1.10 to 1.25) *[1827]*, (RR 2.85, 95%CI 2.00 to 4.07) *[1843]*; and risk was significantly increased with exposure in the third trimester (aOR 1.96, 95%CI 1.62 to 2.38) but not in the first trimester (aOR 1.16, 95%CI 0.92 to 1.45) *[1847]*
- *environmental factors:* increased risk was associated with high environmental temperature *[1804]*, especially heat stress *[1810]*; exposure to passive smoke in any place (OR 1.20, 95%CI 1.07 to 1.34) or at home (OR 1.16, 95%CI 1.04 to 1.30) *[1820]*; risk associated with exposure to fine particulate matter was unclear due to significant heterogeneity between studies *[1886]*
- *pre-existing conditions*: risk of preterm birth was increased among women with hepatitis C (OR 1.62, 95%CI 1.48 to 1.76, P < 0.001) *[1844]*, human papilloma virus (OR 2.12, 95%CI 1.51 to 2.98, P<0.001) *[1846]*, hypothyroidism (OR 1.19, 95%CI 1.12 to 1.26; P < 0.00001) and hyperthyroidism (OR, 1.24, 95%, CI 1.17-1.31; P < .00001) *[1880]* but not hepatitis B (OR 1.12, 95%CI 0.94 to 1.33) *[1845]*.
- *lifestyle factors:* incidence of preterm birth (4.5% vs 4.4%; RR 1.01, 95%CI 0.68 to 1.50) was similar among women in the normal BMI category undertaking aerobic exercise during pregnancy and controls *[1823]*; risk was increased among women with serum vitamin D levels lower than 50 nmol/L (OR 1.29, 95%CI 1.16 to 1.45) *[1872]*; and there was no clear or statistically significant relationship between preterm birth and shift work *[1890]*, multivitamin use *[1852]* or influenza vaccination during pregnancy *[1831]*
- *history of gynaecological procedures*: risk was increased among women with a history of dilatation and curettage (D&C) (OR 1.29, 95% CI 1.17 to 1.42) or multiple D&Cs (OR 1.74, 95%CI 1.10 to 2.76) *[1861]*; surgically induced termination of pregnancy (OR 1.52, 95%CI 1.08 to 2.16); surgically managed miscarriage (OR 1.19, 95%CI 1.03 to 1.37) *[1877]*; loop electrosurgical excision procedure compared to women with no history of cervical dysplasia (pooled RR 1.61, 95%CI 1.35 to 1.92) but not when compared to women with a history of cervical dysplasia but no cervical excision (pooled RR 1.08, 95%CI 0.88 to 1.33) *[1817]*; and treatment for cervical intraepithelial neoplasia before (OR 1.4, 95%CI 0.85 to 2.3) or during pregnancy (OR 6.5, 95%CI 1.1 to 37) *[1822]*.

Info Box

Prediction and prevention

Cervical length measurement

Cervical length measurement is an evolving area. There is currently uncertainty about the thresholds that identify high risk and the precision of measurement, particularly with transabdominal cervical length measurement.

Factors associated with short cervical length

Factors associated with women being at increased risk of short cervical length at mid trimester include:

- previous spontaneous *[1816]* or induced *[1865]* preterm birth
- previous cervical excisional procedure *[1816][1865]*
- non-Caucasian ethnicity *[1806][1865][1889]*.

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Studies were consistent in finding no significant association between women's short cervical length and maternal height *[1816][1889]* or assisted conception *[1799][1865]*. The evidence on the association between cervical length and maternal weight *[1816][1853][1869]* or age *[1821][1865][1889]* was inconsistent.

Accuracy of transvaginal cervical length measurement

Measuring women's cervical length at the 18-20 week ultrasound using a threshold of 25 mm has the potential to predict preterm birth *[1818][1825][1842]* but is more accurate when combined with assessment of relevant maternal factors (eg nulliparity, previous preterm birth) *[1813]*. No evidence on harms associated with cervical length measurement was identified.

Accuracy of transabdominal cervical length measurement

While transabdominal measurement of cervical length has been used as an initial screen prior to transvaginal ultrasound *[1815][1835][1836][1858][1878]*, the cervix may not be adequately visualised by this method in as many as 60% of women *[1835][1836]*. The evidence on transabdominal ultrasound is inconsistent in terms of gestational age and cut-offs and universal transvaginal ultrasound is more cost-effective than including an initial transabdominal measurement *[1864]*.

Universal versus targeted cervical length screening

In settings where universal transvaginal screening of women's cervical length has been implemented:

- there has been a reduction in preterm births <37 weeks (aOR 0.82; 95% confidence interval [CI] 0.76 to 0.88), <34 weeks (aOR 0.74; 95%CI 0.64 to 0.85) and <32 weeks (aOR 0.74; 95%CI 0.62 to 0.90), with similar effect sizes in nulliparous and multiparous women with previous term births *[1882]*
- in a United States study, women were more likely to decline cervical length screening if they were African American (aOR 2.17; 95%CI 1.93 to 2.44), obese (aOR 1.18; 95%CI 1.06 to 1.31), multiparous (aOR 1.45; 95%CI 1.29 to 1.64), aged <35 years (aOR 1.24; 95%CI 1.08 to 1.43), or smokers (aOR 1.42; 95%CI 1.20 to 1.68) *[1887]*
- after 6 months of implementation, there was no change in rates of acceptance of cervical length screening and rates of spontaneous preterm birth <28 weeks were higher among women who declined screening (aOR 2.01; 95%CI 1.33 to 3.02) *[1887]*.

A study that calculated the number of women needed to screen (NNS) to prevent one early preterm birth found that, with a cut-off of ≤15 mm, the NNS in low-risk women would be 1,075 compared to 344 among nulliparous women and 167 among women with a previous preterm birth. At a cut-off of ≤20 mm, NNSs were 802, 221 and 97, respectively *[1828]*.

Another study found that targeted screening increased specificity compared to universal screening but sensitivity was reduced and nearly 40% of women with a short cervix were not identified *[1865]*.

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Timing of transvaginal cervical length measurement among women at high risk of preterm birth

Evidence from observational studies suggests that cervical length measurement earlier than 20 weeks may predict cervical shortening and risk of early preterm birth in women at high risk of preterm birth *[1802][1884][1888]*. However, a cervical length >25 mm does not preclude preterm birth in these women, with 16% to 21% experiencing preterm birth before 37 weeks *[1808][1809][1868]*.

Implementation of universal transvaginal cervical length measurement

Studies in the United States and the United Kingdom suggest that universal cervical length measurement is cost-effective when women with a short cervix (≤25 mm) at 18-25 weeks receive vaginal progesterone *[1807][1819][1826][1848][1892]*. No Australian cost-effectiveness studies were identified.

Transvaginal measurement of cervical length does not significantly increase the time for completion of ultrasound examination and attitudes regarding discomfort or embarrassment did not differ between women who underwent no cervical length screening or transvaginal or transabdominal screening *[1873]*.

However, a number of barriers may prevent or restrict the implementation of a universal cervical length screening program — cost, availability of vaginal progesterone and other treatment options, women's acceptance of, or willingness to undergo, transvaginal ultrasound and the perceptions and beliefs of health professionals *[1871]*. Issues of access to ultrasound services (eg due to remote location or language barriers) and availability of accredited trained professionals in some areas may also limit the availability of cervical measurement.

Holistic preventive strategies

Systematic reviews that evaluated holistic models of care and their effect on preterm birth found:

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- a significant effect in reducing risk of preterm birth among women receiving midwifery-led care compared to other models of care for childbearing women and their infants (average RR 0.76, 95%CI 0.64 to 0.91; n=13,238; 8 studies; high quality) *[95]*
- no significant difference among:
  - women receiving group antenatal care compared to those receiving standard care (RR 0.87, 95%CI 0.70 to 1.09; 11 studies) *[1811]* and (RR 0.75, 95%CI 0.57 to 1.00; 3 3 studies; n=1,888, moderate quality) *[88]*
  - women randomised to specialist preterm birth programs compared to those receiving standard care (RR 0.92, 95%CI 0.76 to 1.12; 15 RCTs) *[1832]*
  - low risk women receiving a reduced number of antenatal visits (RR 1.02, 95%CI 0.94 to 1.11; 7 studies, n=53,661, moderate quality) *[98]*
  - women receiving additional social support compared to those receiving standard care (RR 0.92, 95%CI 0.83 to 1.01; 11 RCTs; n=10,429) *[1841]*, including adolescent women (RR 0.67; 95%CI 0.42 to 1.05; 4 studies; n=684) *[1885]*
  - women receiving telephone support during pregnancy compared to women receiving routine care or other support (RR 0.91, 95%CI 0.77 to 1.08, 4 RCTs; n=3,992) *[1860]*
  - women in preterm labour using relaxation techniques compared to those not using relaxation techniques (RR 0.95; 95%CI 0.57 to 1.59; 11 RCTs; n=833) *[1855]*
- successful approaches to increasing access to antenatal care and reducing preterm birth among Aboriginal and Torres Strait Islander women include community-based collaborative antenatal care and community-based support *[1876]* and partnership between Aboriginal grandmothers, Aboriginal Health Officers, midwives and existing antenatal care services *[28]*.

Progesterone treatment for women with a short cervix

A systematic review analysed the effectiveness of progesterone compared to placebo in women with short cervical length (without other risk factors for preterm birth or premature onset of labour). It found that, while preterm birth <34 weeks, <37 weeks and neonatal deaths were reduced in women overall, there was only a reduction of preterm birth <34 weeks in women with a short cervix *[1849]*.

When studies specific to vaginal progesterone treatment in women with a short cervix were analysed separately, there were statistically significant effects on preterm birth <35 weeks (risk ratio [RR] 0.62; 95%CI 0.42 to 0.92; 1 RCT, n=458, moderate certainty) *[1838]*, preterm birth <34 weeks (RR 0.60; 95%CI 0.41 to 0.89; 2 RCTs, n=330, moderate certainty) *[1833][1891]*, preterm birth <28 weeks (RR 0.55; 95%CI 0.25 to 0.97; 1 RCT, n=458, moderate certainty) *[1838]*and respiratory distress syndrome (RR 0.51; 95%CI 0.31 to 0.86; 3 RCTs; n=788, moderate certainty) *[1833][1838][1891]*. Definitions of short cervix ranged from 10–20 mm to ≤30 mm. Treatment was commenced at 20 to 24 weeks gestation and was continued until 34–37 weeks.

There were no statistically significant effects on preterm birth associated with intramuscular progesterone compared with placebo in women with a short cervix (1 RCT; n=657, low certainty) *[1837]*.

A modelling study in the United Kingdom found universal cervical length screening and vaginal progesterone for women with a cervical length of ≤15 mm was cost-effective *[1819]*.

Info Box

Discussing risk of giving birth preterm

When risk of preterm birth is increased, modifiable risk factors should be addressed *[1834][1856][1812]*. Based on the evidence discussed in Section 23.2, discussion with women at risk of preterm birth can include the benefits of:

- having adequate social and emotional support
- quitting tobacco smoking and avoiding exposure to passive smoke
- not drinking alcohol during pregnancy
- having tests for urogenital infections
- participating in regular exercise, particularly if they are overweight or obese.

Women can also be advised that risk is not reduced by supplementing with Vitamins C or E *[377][378]* or probiotics *[1867][1839]*.

A Cochrane review found no evidence to support or refute bed rest for prevention of preterm birth *[1883]*. A subsequent cohort study found that, among women at high risk of preterm birth, activity restriction was associated with increased risk of preterm birth *[1862]*.

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Practice summary: risk of preterm birth

When: A woman has identified risk factors for giving birth preterm

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

Discuss lifestyle factors associated with preterm birth

- ☐ Explain that smoking during pregnancy makes it more likely that the baby will be born preterm and also causes other serious risks to the pregnancy.
- ☐ Explain that not drinking alcohol during pregnancy is the safest option.
- ☐ Offer testing for urogenital infection if the woman has risk factors for preterm birth. If results are positive, consider counselling, contact tracing, partner testing and treatment, and repeat testing.

Discuss protective factors

- ☐ Explain that moderate physical activity during pregnancy has a range of health benefits, particularly for women who are overweight or obese.

Take a holistic approach

- ☐ Provide information on relevant community supports (eg smoking cessation programs, drug and alcohol services, physical activity groups).
- ☐ Consider whether a woman may be at increased risk if she has recently arrived from a country with a high prevalence of preterm birth.
- ☐ Provide social and emotional support and access to continuity of carer, where possible

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Consensus recommendation

When women are identified as being at risk of giving birth preterm based on the presence of risk factors, provide advice about modifiable risk factors.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

If a woman's cervical length is measured at the 18–20 week ultrasound and is <25 mm, assess other risk factors for preterm birth and seek expert advice if her risk of preterm birth appears to be high.

Approved by NHMRC in April 2019; expires April 2024

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New

New

7.7 Blood pressure

Info Box

Measuring blood pressure at the first antenatal visit aims to identify women with chronic hypertension (high blood pressure), which may be related to existing kidney disease. After 20 weeks, high blood pressure and/or proteinuria may indicate pre-eclampsia.

Background

Healthy pregnancy is characterised by a fall in blood pressure, detectable in the first trimester, usually reaching its lowest point in the second trimester and rising to pre-conception levels towards the end of the third trimester *[627]*. Hypertensive disorders during pregnancy include *[627]*:

- *chronic hypertension*: blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic confirmed before pregnancy or before 20 completed weeks pregnancy, without a known cause (*essential hypertension*), associated with a secondary cause such as existing kidney disease (*secondary hypertension*) or associated with measurement in a healthcare setting (*white coat hypertension*)
- *gestational hypertension*: new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mm diastolic) after 20 weeks pregnancy without any maternal or fetal features of pre-eclampsia, followed by return of blood pressure to normal within 3 months after the birth
- *pre-eclampsia*: a multi-system disorder characterised by hypertension and involvement of one or more other organ systems and/or the fetus, with raised blood pressure after 20 weeks pregnancy commonly the first manifestation and proteinuria a common additional feature (although not required to make a clinical diagnosis) (see Section 7)
- *superimposed pre-eclampsia*: development of one or more of the systemic features of pre-eclampsia after 20 weeks pregnancy in a woman with chronic hypertension.

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Prevalence of high blood pressure

- In Australia in 2014–15 *[25]*, 22% of adult women had measured high blood pressure, excluding those taking medication.
- Among Indigenous adults, 18% of women had measured high blood pressure*[25]*.
- A substantial number of pregnancies (0.2–5%) are complicated by pre-existing hypertension *[627]*.
- Pre-eclampsia in the second half of pregnancy occurs in about 22% of women with chronic hypertension *[627]*.

Risks associated with high blood pressure during pregnancy

Women with chronic hypertension are at greater risk of pregnancy complications, such as placental abruption, superimposed pre-eclampsia, fetal loss, preterm labour, low birth weight, perinatal death *[626][630]* and gestational diabetes *[625]*. Other risk factors for pre-eclampsia are discussed in Section 26.2.

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Measuring blood pressure

Routine measurement of women's blood pressure at the first antenatal visit and throughout pregnancy is recommended in the United Kingdom *[628][629]* and Canada *[631]*. This advice reflects the importance of predicting the risk of pre-eclampsia to allow monitoring and preventive treatment. Any woman presenting with new hypertension after 20 weeks pregnancy should be assessed for signs and symptoms of pre-eclampsia (see Section 26.2).

Measuring blood pressure

Blood pressure should be measured as outlined below *[628]*:

- using the woman's right arm *[627]*, remove tight clothing and ensure arm is relaxed and supported at heart level
- use cuff of appropriate size (eg use a large cuff if arm circumference is >33cm and a thigh cuff if it is >42cm)
- inflate cuff to 20–30 mmHg above palpated systolic blood pressure
- lower column slowly, by 2 mmHg per second or per beat
- read blood pressure to the nearest 2 mmHg
- measure diastolic blood pressure as disappearance of sounds (phase V; or IV if phase V is absent).

Women with a single diastolic blood pressure reading of 110 mmHg or more, or two consecutive readings of 90 mmHg or more at least 4 hours apart and/or significant proteinuria (1+) require increased monitoring and treatment should be considered. Women with a systolic blood pressure equal to or above 140 mmHg on two consecutive readings at least 4 hours apart require further assessment and treatment should be considered.

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Automated blood pressure measuring devices

Although mercury sphygmomanometry remains the gold standard for measuring blood pressure, due to environmental and safety concerns its use is declining and automated devices are increasingly being used in the general hypertensive population *[622]*. Few studies have compared these devices with sphygmomanometry in pregnant women *[627]*. While they may give similar mean blood pressure values to those obtained with sphygmomanometry, there is wide intra-individual error and their accuracy may be further compromised in pre-eclamptic women *[624][621]*.

The potential errors of automated devices may be offset by comparing blood pressure recordings by routine mercury sphygmomanometry *[622]*. Considerations with automated devices include:

- using only devices that have been validated for use in pregnancy by the British Hypertensive Society, the Association for the Advancement of Medical Instruments or other accepted and published criteria
- maintaining some mercury sphygmomanometers to allow regular calibration of all devices
- when a pregnant woman uses an automated device for home blood pressure measurements, checking the device against mercury sphygmomanometry to ensure accuracy of readings.

White coat hypertension

White coat or "office" hypertension occurs in early pregnancy with the same frequency as it does in non-pregnant women *[620]*. A prospective study (n=241) *[620]* found that 32% of women early in pregnancy who were given an initial diagnosis of essential hypertension had white coat hypertension. Half of these women retained this phenomenon throughout pregnancy and had good pregnancy outcomes, 40% developed (benign) gestational hypertension and also had good pregnancy outcomes and 8% developed proteinuric pre-eclampsia, which was significantly fewer than in women with confirmed essential hypertension (22%).

Women with pre-existing hypertension

Women presenting for antenatal care currently on medication for hypertension should have their medicines reviewed to ensure their safety in pregnancy.

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Practice summary

When: At first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the risks associated with high blood pressure in pregnancy:** Discuss the importance of identifying high blood pressure early in pregnancy.
- ☐ **Offer lifestyle advice:** Highlight to women who experience raised blood pressure in pregnancy the benefits of not smoking, maintaining a healthy weight, regular physical activity and a healthy diet.
- ☐ **Arrange treatment or referral if required:** For women with chronic hypertension, further testing may be required to exclude white coat hypertension or kidney disease and treatment may be needed.

Weak recommendation

Measure blood pressure at a woman's first antenatal visit to identify existing high blood pressure.

Approved by NHMRC in December 2011; expires December 2016

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Info Box

Resources

British Hypertensive Society *Automatic Digital Blood Pressure Devices for Clinical Use* *[URL link non-functional]*

Lowe SA, Bowyer L, KLust K et al (2015) *The SOMANZ Guidelines for the Management of Hypertensive Disorders of Pregnancy. Aust N Z J Obstet Gynaecol* 55(1): 11–16.

NICE (2010) *Hypertension in Pregnancy: the Management of Hypertensive Disorders during Pregnancy*. National Collaborating Centre for Women's and Children's Health. Commissioned by the National Institute for Health and Clinical Excellence. London: RCOG Press.

SOGC (2014) *Diagnosis, Evaluation, and Management of the Hypertensive Disorders of Pregnancy. Clinical Practice Guideline No. 206*. Toronto: Society of Obstetricians and Gynaecologists of Canada. *[URL link non-functional]*

7.8 Proteinuria

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Info Box

Detection of proteinuria does not predict pre-eclampsia but may lead to identification and treatment of kidney disease or urinary tract infection.

Background

High amounts of protein in the urine (proteinuria) can be caused by a range of conditions. Proteinuria in the first trimester may suggest underlying kidney disease or the presence of urinary tract infection (see Section 7). After 20 weeks pregnancy, proteinuria is associated with pre-eclampsia.

Kidney disease in Australia

- In 2011–12, an estimated 1 in 10 Australians aged 18 and over had biomedical signs of chronic kidney disease *[1212]*. Of these, only 10% were aware they had the condition based on self-reported data, reflecting that this is a highly under-diagnosed condition.
- Indigenous Australians were 2.1 times as likely as non-Indigenous Australians to have biomedical signs of chronic kidney disease *[1212]*.
- Compared with those living in the highest socioeconomic areas, people living in the lowest socioeconomic areas were 1.6 times as likely to have biomedical signs of chronic kidney disease *[1212]*.

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Risks associated with proteinuria in pregnancy

- Maternal proteinuria has been strongly associated with preterm birth *[1221]*.
- Chronic kidney disease in pregnancy has been associated with pre-eclampsia, preterm labour, small-for-gestational age babies and perinatal death *[1215]*.

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Testing for proteinuria

Accuracy of tests for detecting proteinuria

The 24-hour urine collection test is considered 'the gold standard' for testing for proteinuria in women during pregnancy, although it is often inconvenient for pregnant women to undertake a 24-hour urine collection. The test is frequently used as a reference point when evaluating the accuracy of other tests such as urine dipstick visual check, urine automated analyser, 2-hour and 12-hour tests, spot protein:creatinine ratio or microalbumin:creatinine ratio *[1230][1229][1238][1233][1231][1211][1216][1219][1225][1223][1224]*. One study has questioned the accuracy of the 24-hour urine test *[1217]*.

Studies evaluating other test types have found that:

- *dipstick testing:* is inaccurate in predicting significant proteinuria *[1237][1222]* and has a high incidence of false positives *[1218][1228]*
- *2-hour and 12-hour collections*: correlate with 24-hour collections in quantifying proteinuria, with the 12-hour collection having higher sensitivity (89% vs 86%), specificity (93% vs 82%) and positive predictive value (84% vs 77%) and lower false positive (12% vs 18%) and false negative (11% vs 14%) rates than 2-hour collection *[1211]*
- *protein:creatinine ratio:* is a better screening test than automated dipstick urinalysis to detect significant proteinuria *[1230][1219]*, may be useful to rule out clinically significant proteinuria *[1237][1229][1216][1226][1223]* and has the advantage of results being available immediately *[1225]*.

Automated analysis of dipsticks

Due to considerable observer errors involved in dipstick urinalysis, an RCOG Study Group recommended that automated dipstick readers be employed *[1234]*. This can significantly improve false positive and false negative rates. An initial result of 1+ or greater of protein should be confirmed by a 24-hour urinary protein measurement or a protein:creatinine ratio *[1232]*.

Repeat testing r

Repeat testing for proteinuria is of little or no benefit in predicting pre-eclampsia and should be confined to women with other risk factors such as existing or newly diagnosed high blood pressure and new or pre-existing kidney disease *[1214][1213][1235]*. See also Section 26.2.3.

Testing in rural and remote areas

Considerations in urine testing in rural and remote areas include *[888]*:

- the availability of appropriate storage facilities for dipstick tests and for urine collections for women with abnormal dipstick results (see below)
- if a woman has an abnormal dipstick result, whether specimens can be provided to pathology services within the timeframe in which they can still be cultured (ideally within 24 hours).

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Responding to test results

A finding of 300 mg/24 hours or more or a protein:creatinine ratio of 30 mg/mmol of creatinine is customarily regarded as significant *[1220][1236]*. However, a proteinuria threshold of 500 mg/24 hours has been suggested to be more predictive in relation to the likelihood of adverse outcome *[1234]*.

- Women with abnormal dipstick urine test results (including the presence of leukocytes, nitrites or blood) should have a midstream urine sample sent for microscopic examination, culture and sensitivity testing. If the result is asymptomatic bacteriuria, this should be treated appropriately *[1227]*.
- Women found to have true proteinuria and/or haematuria at their first antenatal visit may have underlying kidney disease, which should be investigated *[1227]*.

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Practice summary: testing for proteinuria

When: At first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Explain the risks associated with proteinuria in pregnancy:** Discuss the importance of identifying kidney disease or urinary tract infection early in pregnancy.
- ☐ **Arrange treatment or referral if required:** For women with proteinuria, further testing may be required to exclude urinary tract infection or kidney disease and monitoring for pre-eclampsia may be needed.

Consensus recommendation

Routinely offer testing for proteinuria at the first antenatal visit, regardless of stage of pregnancy.

Approved by NHMRC in December 2011; expires December 2016

Weak recommendation

For point-of-care testing, use an automated analyser if available, as visual inspection of a urinary dipstick is the least accurate method to detect true proteinuria.

Approved by NHMRC in December 2011; expires December 2016

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Resources

Lowe SA, Bowyer L, KLust K et al (2015) *The SOMANZ Guidelines for the Management of Hypertensive Disorders of Pregnancy. Aust N Z J Obstet Gynaecol* 55(1): 11–16.

NICE (2010) *Hypertension in Pregnancy: the Management of Hypertensive Disorders during Pregnancy.* National Collaborating Centre for Women's and Children's Health. Commissioned by the National Institute for Health and Clinical Excellence. London: RCOG Press.

SOGC (2014) *Diagnosis, Evaluation, and Management of the Hypertensive Disorders of Pregnancy. Clinical Practice Guideline No. 307*. Toronto: Society of Obstetricians and Gynaecologists of Canada.

7.9 Risk of pre-eclampsia

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Info Box

Identifying women with risk factors for or clinical signs of pre-eclampsia allows timely provision of advice on prevention and symptoms that may indicate a need for additional care. Antenatal care also provides an opportunity to discuss long-term preventive strategies with women who develop pre-eclampsia.

Background

Features of pre-eclampsia

Hypertensive disorders during pregnancy are described in Section 24.1. In pre-eclampsia, hypertension is accompanied by one or more of the following features *[627]*:

- impaired kidney or liver function
- haematological involvement
- neurological symptoms (persistent headache, visual disturbances, stroke, convulsions)
- pulmonary oedema
- fetal growth restriction and/or
- placental abruption.

Pre-eclampsia is a progressive disorder that worsens if pregnancy continues *[627]*. Birth of the baby is the definitive treatment and is followed by resolution, generally over a few days but sometimes much longer *[627]*. Decisions about management (eg induction/caesarean section or continuation of the pregnancy) are based on maternal and fetal factors (eg gestational age).

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Prevalence of pre-eclampsia

Australian studies in a range of settings estimated the incidence of any pre-eclampsia as 3.0–3.3% *[1691][1692]*, early onset (<34 weeks) pre-eclampsia as 0.4% *[1678][1679]* and late-onset (≥34 weeks) pre-eclampsia as 2.4% *[1679]*. Studies were consistent in noting a decrease in prevalence and incidence of pre-eclampsia in Western Australia *[1658][1652]* and New South Wales *[1691][1683]* (no studies from the other states and territories were identified).

The prevalence of pre-eclampsia among specific population groups was influenced by:

- *mental health*: a diagnosis of schizophrenia or bipolar disorder conferred a five-fold increased likelihood of having pre-eclampsia (OR 5.28; 95%CI 2.79 to 9.98; p<0.001) *[1667]* in one study and a three-fold increase in another (9% v 3%; P < 0.0001) *[75]*
- *body mass index*: prevalence was increased among women with BMI >25 (OR 1.97; 95%CI 0.93 to 4.16) *[1696]*, BMI >30 (OR 2.86; 95%CI 2.54 to 3.22; p=0.001) *[1651]*, BMI 30–34.9 (OR 2.01; 95%CI 1.48 to 2.73; p<0.001), BMI 35–39.9 (OR 2.41; 95%CI 1.68 to 3.47; p<0.001), BMI 40–44.9 (OR 3.32; 95%CI 2.18 to 5.08; p<0.001), BMI ³45 (OR 3.98; 95%CI 2.56 to 6.19; p<0.001) *[1671]* or BMI >50 (aOR 3.43; 95%CI 1.72 to 6.84) *[1690]*
- *country of birth:* compared with women born in Australia prevalence was lower among women from Western Europe (OR 0.91; 95%CI 0.85 to 0.97), Eastern Europe (OR 0.79; 95%CI 0.67 to 0.94), South Asia (OR 0.58; 95%CI 0.55 to 0.62), East-Southeast Asia (OR 0.64; 95%CI 0.58 to 0.71), North Africa and Middle East (OR 0.69; 95%CI 0.63 to 0.77) and similar among those from Sub-Saharan Africa (OR 0.95; 95%CI 0.85 to 1.07) and Latin America and the Caribbean (OR1.06; 95%CI 0.90 to 1.26) *[1695]*.

Prevalence did not appear to be influenced by:

- *maternal age >45 years:* there was no significant difference in prevalence between women aged >45 years and <45 years though some suggestion of increase with age (OR 1.86; 95% 0.9 to 3.6; p=0.052) (Carolan et al 2013)
- *refugee background:* there was no clear difference in prevalence between refugee background and migration for non-humanitarian reasons among women from North Africa (age-adjusted OR 1.4; 95%CI 0.4 to 4.6; p=0.79), Middle and East Africa (OR 1.1; 95%CI 0.2 to 4.9; p=0.71) and West Africa (4.9% vs 0%) *[1430]*
- *conception by assisted reproductive technology:* after stratification by plurality, the difference in gestational hypertension/ pre-eclampsia rates between ART and non-ART mothers was not statistically significant, with aOR 1.05 (95% CI, 0.98-1.12) for mothers of singletons *[1697]*
- *vaginal bleeding in pregnancy:* prevalence of pre-eclampsia was not associated with the presence or absence of bleeding (aOR 0.96; 95% CI 0.67 to 1.38) *[1687]*.

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Risks associated with pre-eclampsia

- Significant pre-eclampsia is associated with serious maternal morbidity and, very rarely, with death. There were nine maternal deaths related to hypertensive disorders of pregnancy between 2008 and 2012 in Australia *[1663]*, all of which were due to pre-eclampsia and its complications.
- Women with complicated pre-eclampsia are more likely to have a caesarean section, stillbirth or neonatal death *[1643]*. In 2012, hypertension or pre-eclampsia were the reasons for 9.0–13.2% of labour inductions in New South Wales, Queensland, South Australia, Tasmania and the Northern Territory and 1.3–2.4% of caesarean sections in Queensland, South Australia, Tasmania and the Northern Territory. Data collection methods varied and, for other states and territories, were unavailable or unpublished *[1387]*.
- Neonatal complications associated with pre-eclampsia in a large cross-sectional study (n=647,392) *[1685]* were small for gestational age, low Apgar scores, acute respiratory distress syndrome and postpartum neonatal hypoglycaemia.
- Women who have had pre-eclampsia are at increased long-term risk of chronic hypertension, ischaemic heart disease, cerebrovascular disease, kidney disease, diabetes mellitus, thromboembolism, hypothyroidism and impaired memory *[1702]*.

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Assessing risk of pre-eclampsia

Whether a woman will require additional care (eg more frequent antenatal visits) is based on the presence of risk factors for and clinical features of pre-eclampsia.

Identifying women with risk factors for pre-eclampsia

Factors with an established association with a high risk of pre-eclampsia include *[1641]* (low to high quality evidence):

- a history of pre-eclampsia (RR 8.4, 95%CI 7.1 to 9.9) (high quality evidence)
- chronic hypertension (RR 5.1, 95%CI 4.0 to 6.5) (high quality evidence)
- pre-existing diabetes (RR 3.7; 95%CI 3.1 to 4.3) (moderate quality evidence)
- autoimmune disease such as systemic lupus erythematosus (RR 2.5; 95%CI 1.00 to 6.3) or antiphospholipid syndrome (RR 2.8; 95%CI 1.8 to 4.3) (moderate quality evidence)
- nulliparity (RR 2.1; 95%CI 1.9 to 2.4) (low quality evidence)
- BMI >30 (RR 2.8; 95% 2.6 to 3.6) (low quality evidence)
- pre-existing kidney disease (RR 1.8; 95%CI 1.5 to 2.1) (low quality evidence).

Other factors that are associated with increased risk of pre-eclampsia are maternal family history of pre-eclampsia (eg among mother and sisters) (115% increase in risk) *[1645]* and increasing maternal glucose levels (aOR for 1 SD increase 1.19; 95% CI 1.11 to 1.28 for 1-hour plasma glucose; 1.21; 95%CI 1.13 to 1.30 for 2-hour plasma glucose)*[1659]*.

Findings from systematic reviews provided information on associations with additional factors:

- *cardiovascular factors:* women with pre-eclampsia had higher levels of total cholesterol (MD 20.20 mg/dL; 95%CI 8.70 to 31.70; p=0.001), non-HDL-C (MD 29.59 mg/dL; 95%CI 12.13 to 47.06; p=0.001) and triglycerides (MD 80.29 mg/dL; 95%CI 51.45 to 109.13; p<0.0001) in the third trimester *[1656][1689]*, lower levels of HDL-C in the third trimester (MD –8.86 mg/dL; 95%CI –11.50 to –6.21; p<0.0001)*[1689]* and were more likely to have arterial stiffness (SMD 1.62; 95%CI 0.73 to 2.50) *[1660]* than women without pre-eclampsia
- *body mass index*: there was a clear association between overweight (aRR 1.70; 95%CI 1.60 to 1.81, P<0.001), obesity (aRR 2.93; 95%CI 2.58 to 3.33, P<0.001) and severe obesity (aRR 4.14; 95%CI 3.61 to 4.75, P<0.001) and risk of pre-eclampsia *[1698]*
- *mental health*: there were significant associations between pre-eclampsia and mental stress (OR 1.49; 95%CI 1.27 to 1.74; P<0.001), work stress (OR 1.50; 95%CI 1.15 to 1.97; P=0.003), anxiety or depression (OR 1.88; 95%CI 1.08 to 3.25; P=0.02) *[1708]* and depression symptoms alone (OR 1.63; 95%CI 1.32 to 2.02) *[1661]*
- *blood group*: AB versus non-AB blood group increased risk in women overall (OR 2.42; 95%CI 1.63 to 3.58) and in primigravid women (OR 2.44; 95%CI 1.46 to 4.07) *[1639]*
- *assisted reproductive technology*: in contrast to the findings on prevalence above, systematic reviews suggested that risk was increased in women receiving donor oocytes (OR 4.34; 95%CI 3.10 to 6.06; P<0.0001)*[1644][1672]* or donor sperm (OR 1.63; 95%CI 1.36 to 1.95)*[1657]*
- *immunological factors:* interferon-gamma levels were higher in women with pre-eclampsia than in controls (SMD 0.93; 95%CI 0.07 to 1.79) *[1704]*
- *micronutrient levels:* levels of vitamin C and E were lower in women with pre-eclampsia than in controls but not when levels in mild and severe subtypes were analysed *[1648]*; risk was lower among women with vitamin D level >50 nmol/L vs <50 nmol/L (OR 0.58; 95%CI 0.32 to 1.07)*[1664]*; and levels of copper were higher *[1655]* and levels of zinc (SMD –0.587; 95%CI –0.963 to –0.212) *[1670]* and selenium (MD –6.47 mug/l; 95%CI –11.24 to –1.7; p = 0.008) *[1703]* lower among women with pre-eclampsia than among controls
- *gynaecological and obstetric factors*: there was no significant association between risk of pre-eclampsia and fetal sex (RR 1.01; 95%CI 0.97 to 1.05) *[1666]* or interpregnancy interval 2–4 vs <2 years (aOR 1.01; 95%CI 0.95 to 1.07) or 2–4 vs >2 years (aOR 1.10; 95%CI 1.02 to 1.19)*[1650]* but a higher risk following chorionic villus sampling compared to amniocentesis (OR 2.47; 95%CI 1.14 to 5.33)*[1642]*
- *periodontal disease:* while reviews of observational studies showed an effect on risk *[1686][1699][1662]*, a review of RCTs found no significant effect (OR 1.00; 95%CI 0.78 to 1.28) *[1669]*. A recent Cochrane review found no clear effect of treatment for periodontal disease on risk of pre-eclampsia (RR 1.10; 95%CI 0.74 to 1.62; 3 studies; very low-quality evidence) *[1665]*.

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Smoking (RR 0.67; 95%CI 0.60 to 0.75)(Wei et al 2015) and exposure to environmental carbon monoxide (aOR 0.63; 95%CI 0.55 to 0.71)*[1707]* appeared to reduce risk of pre-eclampsia but are associated with other negative health effects. There was insufficient evidence to assess the relationship between pre-eclampsia and shift work *[1677]*.

Preventive measures

Preventive treatment with low-dose aspirin in women at high risk and calcium supplementation in women with low dietary intake is recommended in the United Kingdom *[629]*, Canada *[631][1688]* and Australia *[627]* and by the WHO *[1701]*.

Calcium

There is strong evidence that calcium supplementation is of benefit for women at risk of pre-eclampsia if dietary intake is low *[1680][276]*. The WHO defines low dietary intake as <900 mg per day and the Australian and New Zealand Nutrient Reference Values recommend an intake of 1,000 mg per day in pregnant women, 1,300 mg if they are younger than 18 years *[344]*. In Australia, calcium intake is low in relation to recommendations for some girls and women of reproductive age *[1674]*. The sources and recommended number of serves of calcium-rich foods during pregnancy are discussed in Section 6.

Effectiveness of aspirin in preventing pre-eclampsia

Systematic reviews and meta-analyses have found that:

- low-dose aspirin (defined as <75 mg/day) has moderate benefits when used for prevention of pre-eclampsia (RR 0.83; 95%CI: 0.77 to 0.89); higher doses (>75 mg/day) may be more effective but adverse effects may also increase *[1653]*;
- there was a reduction in risk among women at high risk (ie with previous pre-eclampsia) (RR 0.79; 95%CI: 0.65 to 0.97) but not those at low risk with use of low-dose aspirin (defined as 40–160 mg/day) *[1694]*;
- the effect of low-dose aspirin (defined as 50–150 mg/day) was only significant for preterm pre-eclampsia (RR 0.11 95%CI 0.04 to 0.33) *[1682]*.

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Vitamins

There is insufficient evidence that the risk of pre-eclampsia is reduced by supplementing vitamin B_2 *[1673]* or vitamins C and E *[1684]*. A meta-analysis found associations between supplementation with vitamins C (1,000 mg) and E (400 IU) in women at risk of pre-eclampsia and some adverse effects: gestational hypertension (RR 1.11; 95%Ci 1.05 to 1.17) and premature rupture of the membranes (RR 1.73; 95%CI 1.34 to 2.23) *[1649]*.

Physical activity

Systematic reviews found a trend towards a protective effect from leisure time or recreational physical activity during pregnancy in case-control studies (RR 0.65, 95%CI 0.47 to 0.89 or OR 0.77, 0.64 to 0.91, p < 0.01) *[1668][1640]* but not in cohort studies (OR 0.99, 0.93 to 1.05, p= 0.81) *[1668]*. Physical activity during pregnancy has general health benefits (see Section 11.3).

Salt intake

Reducing salt intake is unlikely to reduce the risk of pre-eclampsia *[1654]*. However, avoiding foods with added salt has other health benefits *[1498]*.

Identifying women with clinical signs of pre-eclampsia

Routine measurement of blood pressure and testing for proteinuria at each antenatal visit are recommended in the United Kingdom (*[745]*. However, routine testing for proteinuria is not recommended internationally *[1693]*, in the United States *[1638]* or Australia *[627] [1681]*.

- *Hypertension*: Women with new onset hypertension (defined as a blood pressure ≥140 mmHg systolic and/or ≥90 mmHg diastolic) that occurs after 20 weeks pregnancy should be assessed for signs and symptoms of pre-eclampsia *[627]*.
- *Proteinuria*: Routine testing for proteinuria is not helpful in predicting pre-eclampsia and should be confined to women with increased blood pressure or sudden weight gain. Proteinuria should not be considered mandatory in making a diagnosis of pre-eclampsia *[627]*.

Measurement of blood pressure and testing for proteinuria are discussed in Sections 7.6 and 7.7.

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Where possible, women with clinical signs of pre-eclampsia (hypertension, proteinuria, fetal growth restriction) should be referred for specialist assessment and management. Section 7.6 also includes resources on the management of hypertensive disorders in pregnancy.

Predicting pre-eclampsia

Predicting which women will develop pre-eclampsia is an area that is rapidly changing. A range of measures has been used to further predict risk of pre-eclampsia, including biophysical (eg mean arterial pressure, uterine artery pulsatlity) and biochemical (eg pregnancy-associated placental protein-A [PAPP-A], free beta-human chorionic gonadotrophin [b-hCG], placental growth hormone [PlGF] and soluble fms-like tyrosine kinase-1 [sFlt-1]:PlGF ratio) markers, both individually and in combination with maternal characteristics. The sFlt:PlGF ratio showed high sensitivity and specificity for onset of pre-eclampsia within 4 weeks at 19–25 weeks (100; 100%), 26–31 weeks (83; 99%) *[1675]* and 24–36 weeks (66.2; 83.1%)*[1706]*.

While it is clear that maternal characteristics combined with biochemical and biophysical markers are more sensitive in predicting pre-eclampsia than maternal characteristics alone, there is currently insufficient evidence to support a recommendation on any particular approach. Existing algorithms are more effective in predicting early onset pre-eclampsia (which has very low prevalence), have low sensitivity in predicting late onset pre-eclampsia and have a false positive rate of 5–10%. A systematic review noted that the reliability and validity of models may be limited by methodological deficiencies *[1646]* and an external validation study found lower performance than was reported *[1676]*. An analysis of the cost-effectiveness of screening for and diagnosing pre-eclampsia found that routine use of biomarkers will be feasible only when accuracy is significantly increased *[1705]*.

Info Box

Discussing risk of pre-eclampsia

It is important that women are given information about the symptoms of pre-eclampsia from early pregnancy.

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Info Box

Practice summary: pre-eclampsia

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss risk factors for pre-eclampsia early in pregnancy:** Explain that the likelihood of pre-eclampsia is increased if a woman has certain risk factors.
- ☐ **Discuss pre-eclampsia screening:** Explain that if a woman has high blood pressure and/or proteinuria, she will require additional care during the rest of her pregnancy.
- ☐ **Discuss symptoms of pre-eclampsia with women at high risk:** Explain the importance of seeking medical advice immediately if symptoms occur.
- ☐ **Take a holistic approach:** Ask women at risk of pre-eclampsia about how many serves of calcium-rich foods they eat each day (see Chapter 11). Discuss low cost and culturally appropriate strategies for increasing calcium intake. Advise women who develop pre-eclampsia of the need for ongoing surveillance due to their increased risk of developing hypertension.
- ☐ **Consider referral:** Women at risk of pre-eclampsia who have a low dietary calcium intake may benefit from referral to an accredited practising dietitian.
- ☐ **Document and follow-up:** Note risk factors and the results of blood pressure measurement and proteinuria testing in the woman's antenatal record. Further investigations may be warranted if increases in blood pressure or new proteinuria are identified at subsequent visits.

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Early in pregnancy, assess all women for clinical risk factors for pre-eclampsia.

Approved by NHMRC in October 2017; expires October 2022

Advise women at high risk of developing pre-eclampsia that calcium supplementation is beneficial if dietary intake is low.

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

If a woman has a low dietary calcium intake, advise her to increase her intake of calcium-rich foods.

~~*Approved by NHMRC in June 2014; expires June 2019*~~

Advise women at moderate–high risk of pre-eclampsia that low-dose aspirin from early pregnancy may be of benefit in its prevention.

Advise women that vitamins C and E are not of benefit in preventing pre-eclampsia.

Consensus recommendation

Routinely measure blood pressure to identify new onset hypertension.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Recommend testing for proteinuria at each antenatal visit if a woman has risk factors for or clinical indications of pre-eclampsia, in particular, raised blood pressure.

Approved by NHMRC in October 2017; expires October 2022

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Good practice statement

Give women information about the urgency of seeking advice from a health professional if they experience: headache, visual disturbance (such as blurring or flashing before the eyes), epigastric pain (just below the ribs), vomiting and/or rapid swelling of the face, hands or feet.

Approved by NHMRC in June 2014; expires June 2019

Info Box

Resources

ACOG (2013) *Hypertension in Pregnancy*. Washington DC: American College of Obstetricians and Gynecologists. *[URL link non-functional]*

Lowe SA, Bowyer L, KLust K et al (2015) *The SOMANZ Guidelines for the Management of Hypertensive Disorders of Pregnancy*. *Aust N Z J Obstet Gynaecol* 55(1): 11–16.

NICE (updated 2011) *Hypertension in Pregnancy: the Management of Hypertensive Disorders during Pregnancy*. London: National Institute of Health and Clinical Excellence. Available at:

RANZCOG (2015) *Screening in Early Pregnancy for Adverse Perinatal Outcomes*. Melbourne: Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Remote Primary Health Care Manuals. (2017). High BP (hypertension) in pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

SOGC (2014) *Diagnosis, evaluation, and management of the hypertensive disorders of pregnancy. Clinical Practice Guideline No. 307*. *J Obstet Gynaecol Can* 36(5): 416–38. *[URL link non-functional]*

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8. Social and emotional screening

New

Info Box

Download Health Professional Summary Sheet for this section *here*

Info Box

This section describes screening for depression and anxiety, assessment of psychosocial risk factors and screening for family violence.

Table E1: Summary of advice for women about social and emotional assessments during pregnancy

Assessment	Advice about assessment	Chapter
Depression	Detecting symptoms of depression enables appropriate follow-up	27
Anxiety	Anxiety, either alone or with depression, is common in pregnancy	
Psychosocial risk factors	Assessment of psychosocial factors aims to identify women who are more vulnerable to mental health conditions during pregnancy	28
Family violence	All women are asked about domestic violence during pregnancy to enable access to additional support and care	29

Key considerations for service provision are outlined below.

- *Systems for follow-up and support*: Before screening and assessment is carried out, systems need to be in place to ensure that appropriate health professionals are available to provide follow-up care if required and to assist if there are concerns for the safety of the woman, the fetus or infant or other children in the woman's care. Health professionals will greatly benefit from identifying other professionals from whom they can seek advice, clinical supervision or support regarding mental health care in the perinatal period.
- *Who attends assessment:* Women need to feel safe during screening and assessment, so consideration should be given to other people who may be present. While the presence of significant others is often helpful, sensitivity is required about whether it is appropriate to continue with psychosocial assessment while they are in the room. Screening for family violence should only be conducted when alone with the woman.
- *Informed consent:* An explanation of the purpose of screening and assessment should be given before they take place. It is important to stress that this is part of usual care and results will generally remain confidential. If a woman does not consent to assessment and/or screening, this should be explored and documented and assessment and screening offered at subsequent consultations.
- *Confidentiality*: It should also be explained that confidentiality may not be kept if there is a perceived risk of harm to the woman or her baby as there is a duty of care for this to be communicated to key others. However, in this situation, only information relevant to the risk will be shared.

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New

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Considerations before screening and psychosocial assessment

When conducting screening and psychosocial assessment, it is important to ensure that the purpose of the screening is understood along with the potential outcomes following the assessment. Key considerations for effective assessments include promoting acceptability, ensuring adequate follow-up and support, and individual consideration for the presence of others during the assessment. Additionally, informed consent should be gained including clarification on the limits to confidentiality in the context risks to the woman or baby. A trusting relationship with health professionals and non-judgmental and compassionate care improve access and engagement with mental health care. Healthcare providers conducting psychosocial screenings should possess the requisite skills and knowledge to provide culturally safe services to the women.

Consensus recommendation

Consider the administration of a screening tool as part of a multicomponent approach that must involve clinical judgement, clear protocols for further assessment of women who screen positive and appropriate care pathways

Seek training in parent-centred communication skills, psychosocial assessment and culturally safe care.

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8.1 Screening for depressive and anxiety disorders

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Info Box

Screening for depressive and anxiety disorders [16]

Accurately identifying women experiencing symptoms of depression and anxiety enables referral for more formal mental health assessment and suitable follow-up.

Background

Depressive disorders in the antenatal period are symptomatically the same as those at other times and range from mild to severe. Anxiety disorders at this time include generalised anxiety disorder, obsessive compulsive disorder, panic disorder, social phobia, specific phobia and post-traumatic stress disorder and are often reported as equally prevalent as depressive disorder at this time *[682]*.

Prevalence of depressive and anxiety disorders

Australian and other studies have reported the 4-year period prevalence [17] of antenatal depression as up to one in ten women *[680]*. Primary anxiety disorders are prevalent and their comorbidity with depression is very high *[694]*. Point prevalence of anxiety disorder of one in five in the third trimester of pregnancy has been reported *[685]*.

Depression may arise in pregnancy or pre-date the pregnancy. In a subset of women in a large US study of women assessed at 6 weeks postnatally, two in five episodes of depression began postnatally, one in three during pregnancy and one in four before pregnancy *[694]*. Australian studies have reported persistence of maternal depressive symptoms beyond the first year postpartum, with more mothers reporting depressive symptoms at 4 years follow-up than in the first 12 months postpartum *[695]*, symptoms persisting from pregnancy to 4 years postpartum in one in eleven women *[684]* and symptoms persisting from the first year to 6–7 years postpartum in one in six women *[683]*.

Impact of depressive and anxiety disorders

Obstetric complications in women with depression (independent of antidepressant use) are slightly increased risk of preterm birth, low birth weight, gestational hypertension and perinatal death *[686]*.

Anxiety disorders during pregnancy may have a negative influence on obstetric, fetal and perinatal outcomes, including more pregnancy symptoms (nausea and vomiting); more medical visits; increased alcohol or tobacco consumption or unhealthy eating habits; pre-eclampsia and preterm birth; and postnatal depression and mood disorders*[688]*. High levels of maternal anxiety during pregnancy is associated with increased exposure of the fetus to maternal cortisol and risk of adverse neurodevelopmental outcomes *[693]*.

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[16] The information in this section is based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline.* Melbourne: Centre of Perinatal Excellence. NHMRC approval of recommendations was for that Guideline.

[17] Period prevalence is the prevalence over a specific time period (eg from a longitudinal study) and point prevalence is that a specific point of time (eg from a cross-sectional study).

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8.1.1. Screening for depression

Effectiveness of screening tools

Review of evidence on four screening tools for depression in the antenatal period (the Edinburgh Postnatal Depression Scale [EPDS], the depression module of the Patient Health Questionnaire [PHQ-9], the Whooley Questions and the Kessler Psychological Distress Scale [K-10]) found that:

- a score of 13 or more on the EPDS has moderate sensitivity and high specificity for detecting possible depression in pregnant women and a score of 10 or more has moderate sensitivity and specificity (high quality) (NICE 2015)
- it is uncertain whether the other tools (at relevant cut-offs) have adequate sensitivity or specificity to detect possible depressive disorders in pregnant women (very low to low quality) (NICE 2015).

Assessment of the non-technical characteristics of the tools found that ease of administration and implementability were high for all tools, acceptability was high for the EPDS and unknown but likely to be good for the other tools. The EPDS is the only one of the tools for which effectiveness (defined as positive impact on depressive symptoms, services referred or utilised and impact on a woman's mental health) is rated 'good' and that has been validated in other languages.

Other considerations in screening for depression

Timing of screening
The timing of screening should reflect available resources and existing contacts between the woman and the health professionals caring for her. An obvious contact point is the first antenatal visit. However, it is acknowledged that the time available at this visit and the number of other assessments undertaken may limit opportunities for assessment of mental health. Timing of repeat screening is based on results of the initial screen and clinical indications.

Mode of assessment
As a self-report tool, the EPDS is usually completed by the woman, preferably without consultation with others. At times it may be appropriate for a health professional to verbally administer the questionnaire (face-to-face or by phone). Electronic screening is an emerging practice.

Risk of harm
Regardless of the total EPDS score, perinatal women who score positive on Question 10 may be at risk of harming themselves and/or their children and further assessment is necessary.

Culturally appropriate screening for depression

Aboriginal and Torres Strait Islander women
For Aboriginal and Torres Strait Islander women, EPDS score may be influenced by the woman's understanding of the language used, mistrust of mainstream services or fear of consequences of depression being identified (ie involvement of child protections services). Translations of the EPDS developed in consultation with women from Aboriginal communities have been found to identify a slightly higher number of women experiencing symptoms of depression (Hayes et al 2006; Campbell et al 2008). A recent adaptation of the EPDS assessed in the Kimberley region of Western Australia includes an additional component of psychosocial assessment, acknowledging the contribution that stressful events and social health issues play in mental health (Marley et al 2017). Many elements of the approach taken to adapting this instrument (ie the way in which questions are asked, implementation by Aboriginal health workers) are likely to have broader relevance to urban as well as remote and regional Aboriginal and Torres Strait Islander communities.

If use of the EPDS is considered inappropriate, involvement of an Aboriginal health worker may facilitate assessment of symptoms.

Migrant and refugee women
Scores used to identify possible depression in migrant and refugee women are generally lower than those used in the general Australian population. Specific scores are given in translated versions of the tool.

Cultural practices (such as attending the consultation with a family member) and the perceived degree of stigma associated with depression may also influence the performance of the EPDS.

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Screening for anxiety

The evidence on screening for anxiety is heterogeneous in terms of study characteristics and cut-off values used and firm conclusions cannot be drawn.

In the absence of a freely available practical screening tool for anxiety disorders with adequate evidence in the antenatal period, clinical judgment must be used. This may include consideration of items 3, 4 and 5 of the EPDS (Matthey et al 2013a; Matthey et al 2013b) and relevant items from the Depression Anxiety Stress Scale (DASS), the K-10 and the Antenatal Risk Questionnaire (ANRQ).

Info Box

Practice summary: depression and anxiety

When: As early as practical in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Establish referral pathways:** Identify appropriate health professionals available to provide follow-up care and to assist if there are concerns for the safety of the woman or fetus. Identify other professionals from whom you can seek advice, clinical supervision or support regarding mental health care in the antenatal period.
- ☐ **Seek informed consent:** Explain the purpose of screening for depression and anxiety and emphasise that this is part of usual care and results will generally remain confidential.
- ☐ **Identify level of support needed:** Base decisions on follow-up on clinical judgement and the woman's preferences, taking into consideration that not all women with a score of 13 or more will benefit from follow-up, and that low or high scores may reflect other factors.
- ☐ **Consider safety:** If concerned about the woman's mental health and safety, contact mental health services.

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Strong recommendation

Use the Edinburgh Postnatal Depression Scale (EPDS) to screen women for a possible depressive disorder.

Approved by NHMRC in October 2017; expires October 2022

Strong recommendation

Arrange further assessment of woman with an EPDS score of 13 or more.

Approved by NHMRC in October 2017; expires October 2022

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Consensus recommendation

Conduct screening as early as practical in pregnancy and repeat at least once later in pregnancy.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

For a woman with an EPDS score between 10 and 12, monitor and repeat the EPDS in 4–6 weeks as her score may increase subsequently.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Repeat the EPDS at any time in pregnancy if clinically indicated.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

For a woman with a positive score on Question 10 on the EPDS, undertake or arrange immediate further assessment and, if there is any disclosure of suicidal ideation, take urgent action in accordance with local protocol/policy.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

When screening Aboriginal and Torres Strait Islander women, consider language and cultural appropriateness of the tool.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Use appropriately translated versions of the EPDS with culturally relevant cut-off scores.

Approved by NHMRC in October 2017; expires October 2022

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Consensus recommendation

Be aware that an anxiety disorder is very common in the perinatal period and should be considered in the broader clinical assessment.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

As part of the clinical assessment, use anxiety items from other screening tools (eg EPDS items 3, 4 and 5; Depression Anxiety Stress Scale anxiety items; and Kessler Psychological Distress Scale items 2, 3, 5 and 6) and relevant items in structured psychosocial assessment tools (eg the Antenatal Risk Questionnaire [ANRQ]).

Approved by NHMRC in October 2017; expires October 2022

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Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline.* Melbourne: Centre of Perinatal Excellence.

COPE online training program

COPE fact sheets for health professionals

References

See full reference list

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8.2 Assessing psycho-social factors that affect mental health

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Info Box

Assessing psychological factors that affect mental health [18]

Psychosocial assessment allows identification of circumstances (past and present) that affect a woman's mental health. The number and type of factors identified influences the care pathway.

Background

The experience of pregnancy and parenthood differs for each woman and is influenced by the stability of her relationships and social network. While the biggest risk factor for developing perinatal mental health conditions is a past mental health history, the presence of psychosocial risk factors may be associated with greater risk of onset, relapse or exacerbation of mental health conditions. Women who feel isolated either by distance, culture, or both, are more likely to develop distress or mental health conditions in the perinatal period (Austin et al 2015). The likelihood is also greater for women who have experienced life stressors (eg family problems, loss, family violence or disability) or multiple trauma (Austin et al 2015).

[18] The information in this chapter is based on Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline.* Melbourne: Centre of Perinatal Excellence. NHMRC approval of recommendations was for that Guideline.

Info Box

Psychosocial assessment

Psychosocial assessment can be undertaken as part of the clinical interview and/or using a structured psychosocial assessment tool. Different approaches can be taken to suit the setting, health professional confidence and skills, as well as time constraints. Structured questionnaires are useful in providing a comprehensive, time-efficient overview of the woman's circumstances, especially when the health professional is not experienced in undertaking a detailed psychosocial assessment as part of the broader clinical evaluation.

Psychosocial assessment tools

Tools developed with the aim of identifying psychosocial factors in the antenatal period for which there is moderate to high quality evidence include the Antenatal Risk Questionnaire (ANRQ), the Antenatal Psychosocial Health Assessment (ALPHA) and the Pregnancy Risk Questionnaire (PRQ). Evaluation of these tools for their technical performance and acceptability found the following.

- The ANRQ has acceptable technical performance in identifying women at increased risk of depression or anxiety disorder (OR 6.3 [95% CI 3.5 to 11.5]) and has a positive effect on the rates of referral for mental health assessment (moderate quality) *[675][678]*. Ease of administration and acceptability among women are high.
- In contrast, the ALPHA has limited psychometric properties, is moderately acceptable to users and is effective in identifying family violence (OR 2.7; 95%CI 1.1 to 6.9) and 'high level of psychosocial concern' on the health professional's part (OR 2.8; 95%CI 0.7 to 11.7) but does not have adequate capacity to identify women at increased risk of postnatal depression (moderate quality) *[677]*.
- The PRQ has acceptable psychometric properties and is effective in predicting cases of postnatal depression and anxiety (OR 9.18; p <0.001) (moderate quality) but is considered too lengthy for routine use in the public health setting *[674]*.

Using the ANRQ

The ANRQ is a 13-item structured questionnaire that generates a total psychosocial risk score (cumulative risk) and identifies specific factors that independently put the woman at greater psychosocial risk (past history of trauma or significant mental health condition) *[675][678]*. It covers the relationship with her partner, social support, recent stressful life events, anxiety or perfectionism, history (and treatment) of depression or other mental health conditions, experience of abuse as a child or as an adult, and quality of relationship with her mother in childhood. A cut-off score of 23 or more is recommended but women with a significant mental health history or history of abuse are at increased risk of poor psychosocial outcome irrespective of the total ANRQ score.

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Other considerations in psychological screening

As a clinically useful psychosocial assessment tool needs to be brief and to cover the key risk domains, it cannot be fully comprehensive and should be used to 'start the conversation'.

Further exploration and interpretation of psychosocial assessment

Psychosocial risk items endorsed by the woman need to be further explored and documented. The results of the evaluation need to be conveyed to the woman and then (in consultation with the woman) be translated into an approach to referral or monitoring. This will be reliant on the availability of referral pathways.

Education about psychosocial risk factors

Given the potential impact that psychosocial risk factors may have on a woman's mental health, it is important that all women are provided with information about the nature of the different risk factors that may increase her likelihood of experiencing a mental health condition. In turn this provides an opportunity to identify supports (protective factors) to assist in the prevention of mental health conditions, and/or raise awareness of the importance of early symptom recognition to facilitate early detection and intervention.

Culturally appropriate assessment of psychosocial risk

The psychosocial assessment tools described above are only available in English and no published evidence has been identified describing their use in Aboriginal and Torres Strait Islander or migrant and refugee women. A more conversational approach to psychosocial assessment may be needed in these groups, with a focus on developing rapport and trust.

A South Australian study (of Aboriginal women) found that women were happy to be asked about social health issues, including family and community violence, when questions were asked by Aboriginal women from the community in an interview or when women were given the option to self-complete a questionnaire *[679]*. Similarly, involvement of multicultural health workers may be a consideration in the assessment of migrant and refugee women.

Consideration should also be given to psychosocial risk factors that are not covered in the tools but may be relevant to specific groups (eg lack of secure housing, experience of trauma).

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Info Box

Practice summary: psychosocial assessment

When: As early as practical in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Provide information:** Explain that pregnancy can be challenging and that some life factors make it more likely that a woman will experience symptoms of depression or anxiety.
- ☐ **Seek informed consent:** Explain that asking about psychosocial factors is a part of usual care during pregnancy and ask the woman for her consent.
- ☐ **Offer support:** If a woman has psychosocial risk factors ask if she would like help with any issues.

Good practice statement

Assess psychosocial risk factors as early as practical in pregnancy.

Approved by NHMRC in October 2017; expires October 2022

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Strong recommendation

If using a tool to assess psychosocial risk, administer the ANRQ.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Undertake psychosocial assessment in conjunction with a tool that screens for current symptoms of depression/anxiety (eg the EPDS).

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Ensure that health professionals receive training in the importance of psychosocial assessment and the use of a psychosocial assessment tool.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Ensure that there are clear guidelines around the use and interpretation of the psychosocial tool/interview in terms of threshold for referral for psychosocial care and/or ongoing monitoring.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Discuss with the woman the possible impact of psychosocial risk factors (she has endorsed) on her mental health and provide information about available assistance.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Consider language and cultural appropriateness of any tool used to assess psychosocial risk.

Approved by NHMRC in October 2017; expires October 2022

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Resources

Austin M-P, Highet N and the Expert Working Group (2017) *Mental Health Care in the Perinatal Period: Australian Clinical Practice Guideline*. Melbourne: Centre of Perinatal Excellence.

COPE online training program

COPE fact sheets for health professionals

References

See full reference list

8.3 Family violence

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Family violence

Antenatal care provides an opportunity to ask women about exposure to violence. Asking questions may assist women to disclose their experiences of violence to health professionals and enable access to additional support and care, including community, legal and police support services.

Background

'Family violence' may involve partners, siblings, parents, children and people who are related in other ways. It includes violence in many family contexts, including violence by a same sex partner, violence by young people against parents or siblings, elder abuse, and violence by carers in a domestic setting against those for whom they are responsible *[1619]*. It is also referred to as domestic violence.

'Intimate partner violence' includes any behaviour within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship, including physical aggression, psychological abuse, forced intercourse & other forms of sexual coercion, various controlling behaviours *[1634]*.

In the context of these Guidelines, family violence is used as the overarching term and intimate partner violence is referred to when this was specified in studies.

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Violence against women in Australia

- *Women in the general population*: The Australian Bureau of Statistics (ABS) estimates that 17% of all women aged 18 and over have experienced intimate partner violence (from either a current or previous partner) since the age of 15 *[1578]*. Among women who were pregnant at some time during a relationship and experienced violence with their most recent violent partner or their current partner, 54% and 22% respectively reported that they were pregnant at the time of the violence and 25% and 13% reported that violence occurred for the first time during pregnancy *[1578]*.
- *Aboriginal and Torres Strait Islander women*: The full extent of violence against women in Aboriginal and Torres Strait Islander communities is difficult to determine due to under-reporting, lack of screening by service providers, incomplete identification of gender and Indigenous status in many datasets, and the lack of nationally comparable data on family violence available from police, courts, health or welfare sources *[1612]*. Despite under-reporting, surveys show that Aboriginal and Torres Strait Islander women report higher levels of violence and suffer higher levels of injury and death as a result of family violence than non-Indigenous women *[1612]*.

Risks associated with violence in pregnancy

Violence in pregnancy poses significant risks for women. The risk of being a victim of attempted/ completed murder is three-fold higher (aOR 3.08; 95%CI 1.86 to 5.10) among women abused during pregnancy than among those who are not *[1606]*.

Intimate partner violence is associated with adverse reproductive outcomes, including multiple unintended pregnancies and/or terminations and delayed pregnancy care *[1634]*. Women who experience intimate partner violence during pregnancy are 4 times more likely to report depressive symptoms and 10 times more likely to report anxiety symptoms during pregnancy (Brown et al 2008). These symptoms frequently persist in the postnatal period *[1635]* and affect a woman's ability to form secure infant attachment *[1577]*.

Women who experience violence during pregnancy are at increased risk of miscarriage *[1607]*, pre-term labour and birth *[1622]* and having low birthweight infants *[1591][1636][1625][1622]*. Women physically assaulted during pregnancy also have higher risks of placental abruption, caesarean section, haemorrhage and infection than women without a history of being assaulted *[1591]*. In addition, violence before pregnancy is a major independent risk factor for hypertension, oedema, vaginal bleeding, placental problems, severe nausea and vomiting, dehydration, diabetes, kidney infection and/or urinary tract infection, as well as premature rupture of membranes *[1625]*.

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Assessing for family violence

Recent guidelines in New Zealand *[1609]* and the United States *[1632]* recommend routine enquiry about intimate partner violence among women of childbearing age (the latter noting a need for further research). However, guidelines in Canada *[1586]* and the United Kingdom *[1592]* do not recommend routine screening for family violence.

Some Australian states and territories have policies in place to support routine (New South Wales, Northern Territory) or targeted (Victoria) screening for family violence. While most states/territories do not have a dedicated screening tool for family violence in pregnancy, these are in development (Queensland), a tool that is used in other settings is recommended for use (Western Australia) or there are other mechanisms that prompt questioning (eg hand-held pregnancy records in South Australia, public hospital computerised recording system in Tasmania) *[1579]*.

While the screening approaches vary considerably between jurisdictions, there are some common questions in use across the tools. Questions used in at least four jurisdictions are listed in Table E2.

Table E2: Questions used in assessment of family violence

Within the last year, have you (ever) been hit, slapped or hurt in other ways by your partner or ex-partner? OR (In the last year,) has (your partner or) someone in your family or household ever pushed, hit, kicked, punched or otherwise hurt you?
Are you (ever) afraid of your partner or ex-partner (or someone in your family)?
(In the last year) has (your partner or) someone in your family or household ever (often) put you down, humiliated you or tried to control what you can or cannot do?
(In the last year), has your partner or ex-partner (ever hurt or) threatened to hurt you (in any way)?
Would you like help with any of this now?
Are you safe to go home when you leave here?

Source: (AIHW 2015)

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A review of validated screening tools that have been tested within a health-care setting and used in a antenatal context (either in part or full) found that Hurt, Insult, Threaten, Scream (HITS) and Humiliation, Afraid, Rape, Kick (HARK) tools were both considered potentially useful to recommend for national use in the antenatal context *[1579]*. Both have been recommended for routine screening of women of childbearing age by the United States Preventative Services Task Force and cover a number of domains of family violence. However, a systematic review of ten screening tools found that three (Women Abuse Screen Tool (WAST), Abuse Assessment Screen (AAS) and HARK had strong psychometric properties but that further testing and validation are critically needed, particularly in relation to cultural and gender sensitivities *[1580]*.

Effectiveness of screening

A Cochrane review *[1610]* found that screening by health professionals increased identification of women experiencing intimate partner violence (OR 2.95, 95% CI 1.79 to 4.87, moderate quality evidence) but did not have a clear effect on increasing referrals (low quality evidence). Face-to-face screening was not clearly more effective in women disclosing than written/computer-based techniques (OR 1.12, 95% CI 0.53 to 2.36, moderate quality evidence). Another systematic review *[1595]* also found that face-to-face screening was not clearly more effective than either computer-based screening or self-administered written screening (with some overlap in included studies).

Acceptability to women

Studies found that women were largely supportive of routine enquiry:

- being asked was considered acceptable *[1616][1617][1637][1581][1630][1621]*
- family violence was considered an important domain of enquiry *[1614][1583] [1621]*
- women would be willing to disclose if asked *[1589]*.

However, women may not always feel able to disclose immediately *[1621]*. Reasons for not disclosing include not considering the violence serious enough, fear of the offender finding out and not feeling comfortable with the health professional *[1628]*. Beneficial encounters are characterised by familiarity with the health professional, acknowledgement of the violence, respect and relevant referrals *[1601]* and direct asking and care (defined as showing interest and a non-judgemental attitude) *[1629]*. Multiple assessments for family violence during pregnancy increase reporting *[1611]*.

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As women should be assessed for family violence without the partner present, strategies need to be developed so that a woman's partner can be involved in other domains of enquiry when assessment for psychosocial risk factors that affect mental health is conducted *[1618]*.

Acceptability to health professionals

While many health professionals think screening is important *[1588]*, some are reluctant to enquire about family violence *[1617][1583][1623]*. Factors increasing a health professional's likelihood of screening women included having previously screened women *[1583]*, having a therapeutic relationship with the woman *[1602]*, knowledge of prior abuse *[1603]*, recognising silent cues *[1602]*, having scripted questions *[1626]*, interdisciplinary collaboration *[1587][1598][1605]* and access to resources *[1587]* and referral services *[1626]*.

Barriers to screening

The most commonly recognised barrier to screening was lack of training *[1594][1587][1600][1603][1617][1598] [1626][1588][1623][1620][1582][1596][1605]*. Other barriers identified included:

- variations in timing and the manner in which screening takes place *[1602]*
- lack of peer support *[1594]*, confidence *[1600]* or continuity of care *[1599]*
- presence of the woman's partner *[1602]*
- women's unwillingness to disclose *[1605]*
- time constraints *[1587][1603][1617]*
- cultural taboos *[1605]*
- health professionals' attitudes to violence *[1583][1620]*
- concerns about privacy and confidentiality *[1599]*
- uncertainty regarding management and referral options *[1603][1602]*
- need for debriefing *[1599]*, guidelines and employer support *[1593]*.

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The WHO recommends that all health professionals be trained in first-line response to family violence. The steps are to: listen, believe, inquire about needs, validate the person's experience, enhance safety and offer ongoing support.

Health service support for health professionals includes provision of regular training, support and debriefing, provision of private screening spaces, documentation, policies and protocols, quality assurance and funding.

Interventions

There is insufficient evidence to assess the effectiveness of interventions for family violence on pregnancy outcomes *[1597]*. However, brief advocacy interventions (providing information and support to access community resources, including legal, police, housing and financial services) may provide small short-term mental health benefits and reduce physical abuse *[1615]*. Home visits from nurses or community health workers may also reduce episodes of physical abuse *[1613][1624]*. In the context of antenatal care in Australia, safety assessment (see Section 29.4), referral to relevant support services (eg women's resource centres or refuges) is an appropriate response to disclosure of family violence.

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Discussing and responding to family violence

Discussion of family violence requires rapport between the health professional and the woman. Women experiencing abuse may not speak up when the subject is first raised but may choose to open up later when they feel sufficient trust and confidence in the health professional, possibly at a subsequent visit with the same person. It is important for health professionals to enquire about family violence in private and in a sensitive manner and provide a response that takes into consideration the complexity of women's needs.

If a woman discloses that she is experiencing family violence, an immediate response is needed, with the woman's safety a primary consideration.

Table E3: Key considerations in discussing and responding to family violence

Enquire about family violence when alone with the woman
Explain that the woman's responses will be kept confidential (subject to legal requirements)
Actively listen to what the woman tells you
Do not blame or judge the woman or her partner
Inform the woman that she is not alone, there are other women experiencing family violence
Affirm that the woman has made an important step by discussing her experiences
Reinforce that family violence is against the law
Reinforce that the woman should not self-blame
Affirm that the decision to discuss family violence is a major step to enhance her safety
Assist the woman to assess her safety and that of children in her care
Discuss options for safe temporary accommodation if needed and available (eg safe house, family or friends, hospital, women's refuge)
Encourage the woman to access specialist support services (eg woman's health centre, social worker, counsellor, mental health service, family violence and sexual assault service)
Inform the woman of her legal right to protection and provide information on legal support services
Inform the woman that disclosure of family violence may require further discussion and possible reporting in relation to child protection issues[19]
Be aware of security supports that can be used to protect the woman and yourself if needed
Document a woman's responses (ensuring that records are kept confidential and secure)
Report any incidents of violence according to organisational policy and jurisdictional legislation

Sources: Adapted from (Eastern Perth Public and Community Health Unit 2001) and (NHMRC 2002).

[1590][1608]

Health professionals with limited experience in responding to family violence can enhance their practice by:

- seeking training and support (eg clinical supervision) where available (see Section 29.4)
- planning a response to disclosure of violence, including considerations of safety, confidentiality, sensitivity and informed support
- being familiar with specialised counselling services, emergency housing agencies and legal support services in the local area.

Considerations in Aboriginal and Torres Strait Islander communities

In Indigenous communities, violence against women is conceptualised within extended families and the wider community *[1612]*. Family violence is understood to be the result of, and perpetuated by, a range of community and family factors, rather than one individual's problematic behaviour within an intimate partnership.

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No one causal factor can explain violence against Aboriginal and Torres Strait Islander women *[1612]*. Instead, a number of interrelated factors have been identified, highlighting the complex and cumulative nature of violence and victimisation including colonisation and the breakdown of culture, intergenerational patterns of violence, alcohol and other drugs, and socioeconomic stressors *[1612]*. These factors also influence responses to disclosure of family violence by Aboriginal and Torres Strait Islander women. Confidentiality and privacy are important considerations. Women should be asked about who they would like to be involved in their care and offered a clear choice about referral options, including both Aboriginal-specific services and mainstream services.

It is important to respect and understand that, despite the disproportionate burden of violence against Aboriginal and Torres Strait Islander women, violence is not normal or customary in these communities *[1612]*. Indigenous Australians are diverse peoples who, while having a number of areas of commonality, differ in their languages, culture and history. Not all Aboriginal and Torres Strait Islander women are subjected to violence and not all communities have high rates of violence.

Approaches to addressing factors underlying family violence in Aboriginal and Torres Strait Islander communities are beyond the scope of these Guidelines. Some relevant resources are identified in Section 29.4.

Considerations among migrant and refugee women

Women from migrant and refugee backgrounds who are experiencing violence may be disadvantaged by a lack of knowledge about their rights, lack of good support systems, and social isolation *[1631]*. They may be experiencing abuse by multiple people, including in-laws and intimate partners.

Small studies have noted the need to focus on the individual woman beyond ethnicity and cultural differences *[1585]* and to consider different definitions of violence *[1585]*, cultural factors influencing disclosure *[1633]*, and the need for involvement of independent interpreters *[1633]* or bicultural health workers.

Cultural taboos may surround the issue of violence in families and this may make it difficult for women to disclose without additional encouragement, support and sensitivity *[1631]*. The building of a trusting therapeutic relationship is essential to facilitate this disclosure. Cultural sensitivity but, equally importantly, non-judgemental and supportive practice will make it 'culturally safe' for women to find the appropriate moment to speak about their concerns with a health professional.

Considerations in rural and remote areas

Assisting women experiencing family violence in rural and remote areas may be complex due to:

- limited resources to call on for advice or an immediate response
- limited specialised services to assist in the woman's ongoing care
- difficulties ensuring confidentiality in smaller towns and communities
- difficulties when the health professional has a relationship with the woman (eg through family, kinship or friendship), particularly if mandatory reporting is required.

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[19] Legislation around mandatory reporting to police and child protection in relation to disclosure of domestic violence varies. Health professionals need to be aware of the relevant laws and requirements in their jurisdiction.

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Practice summary: assessing for family violence

When: As early as practical and at subsequent antenatal visits

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss assessment for family violence:** Explain that enquiry about family violence is a routine part of antenatal care and that it aims to identify women who would like assistance. Explain confidentiality and provide opportunities for the woman to discuss family violence in privacy (eg without her partner present).
- ☐ **Take a holistic approach:** If a woman affirms that she is experiencing family violence, other considerations include counselling and ongoing support. The safety of the woman and children in her care should be assessed and referral to other services (eg police, emergency housing, community services) made as required.
- ☐ **Learn about locally available support services:** Available support services for women who are experiencing family violence will vary by location.
- ☐ **Document the discussion:** Document in the medical record any evidence of injuries, treatment provided because of injuries, referrals made and any information the woman provides. If woman-held records are used, the information included in these should be limited and more detailed records kept at the health service.
- ☐ **Seek support:** Depending on your skills and experience in discussing family violence with women and assisting them if they are experiencing family violence, seek advice and support through training programs, clinical supervision, mentoring and/or helplines.
- ☐ **Be aware of relevant legislation:** Each state and territory has requirements about reporting violence as set out in its legislation.

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Explain to all women that asking about family violence is a routine part of antenatal care and enquire about each woman's exposure to family violence.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Ask about family violence only when alone with the woman, using specific questions or the tool used in your state/territory.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Undertake and encourage regular and repeat training of health professionals, as training programs improve confidence and competence in identifying and caring for women experiencing family violence.

Approved by NHMRC in October 2017; expires October 2022

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Good practice statement

Be aware of family and community structures and support, and of community family violence and sexual assault services that can be called for urgent and ongoing support.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

Responses to assisting Aboriginal and Torres Strait Islander women who are experiencing family violence need to be appropriate to the woman and her community.

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Resources

Training

DV-Alert Lifeline offers nationally recognised training and non-accredited training across all states and territories in Australia. DV-alert is funded by the Department of Social Services and is free for front-line community and health workers.

Guidance

Family Violence Risk Assessment and Risk Management. Identifying Family Violence. Maternal and Child Nurses' Training Handbook. An initiative of the Victorian Government Family Violence Reform program developed by Domestic Violence Resource Centre (Victoria) Swinburne University of Technology.

Futures without Violence: online tools

NHMRC (2002) *When It's Right in Front of You. Assisting Health Care Workers to Manage the Effects of Violence in Rural and Remote Australia*. Canberra: National Health and Medical Research Council. *[The URL link non-functional]*

RACGP (2014) *Abuse and Violence. Working with our Patients in General Practice.*

Strengthening Hospital Responses to Family Violence

WHO (2014) *Health care for women subjected to intimate partner violence or sexual violence. A Clinical Handbook. [The URL link non-functional]*

Safety assessment

Danger Assessment helps to determine the level of danger to a woman experiencing abuse.

Indigenous communities

Olsen A & Lovett R (2016) Existing knowledge, practice and responses to violence against women in Australian Indigenous communities: Key findings and future directions. Sydney: Australia's National Research Organisation for Women's Safety Limited Available at: anrows.org.au.

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9. Routine maternal health tests

New

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Download Health Professional Summary Sheet for this section *here*

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Routine maternal health tests

This section discusses the evidence for offering women a range of tests as part of usual care (see Table F1).

Recommendations are based on evidence about the diagnostic accuracy of available tests, the effectiveness of interventions to prevent mother-to-child transmission of infection or other effects on the unborn baby, and the availability of treatments.

For notifiable infections (HIV, hepatitis B, hepatitis C, rubella, syphilis), diagnoses are required to be reported to the National Notifiable Diseases Surveillance System. This allows analysis of trends in jurisdictions and groups at risk, although data quality varies for the different conditions and reporting of Indigenous status is incomplete in some States and for some conditions. Evidence on the prevalence and incidence of other conditions is generally from observational studies and may not be representative of the Australian population or groups within the population. While incidence or prevalence data are not always available, each section includes a brief discussion that aims to give health professionals an indication of the likelihood that women in their community will be affected.

Table F1: Summary of advice on tests offered to all women during pregnancy[20]

Condition	Test(s)	Follow-up/rationale	Chapter
Anaemia	Haemoglobin concentration	Full blood count and consideration of possible nutrient deficiencies for women with low haemoglobin concentrations	30
Haemoglobin disorders	Full blood count	Further investigations for women with abnormal red cell indices, family history or origin in a high-risk country	31
Gestational diabetes	Plasma glucose (fasting or following 75 g glucose loading)	Treatment of gestational diabetes reduces the risk of perinatal complications	32
HIV**	EIA and Western blot	Antiretroviral treatment in pregnancy reduces risk of transmission	33
Hepatitis B**	Blood test for HbsAg#	Vaccination of newborn reduces risk of infection	34
Hepatitis C**	Blood test for hepatitis antibody RNA if antibodies detected	Avoiding certain interventions among women who test positive reduces risk of mother-to-child transmission and direct-acting antiviral therapy used postpartum (or post breastfeeding) is highly curative protecting future pregnancies	35
Syphilis#	Treponemal assay confirmed with an alternative treponemal assay	Treatment benefits mother and prevents congenital syphilis	36
Rubella	Blood test for rubella antibody	Vaccination after birth protects future pregnancies. Inadvertent vaccination in early pregnancy is highly unlikely to harm the baby	37
Asymptomatic bacteriuria	Midstream urine culture	Treatment reduces risk of pyelonephritis	38
Group B streptococcus*	Self-collected vaginal-rectal swab culture	Identification of colonisation allows treatment during labour to reduce transmission to the baby	39

* According to organisational policy.
** Specialist care and psychosocial support are required for women with HIV, hepatitis B or hepatitis C.
# Psychosocial support, partner testing and contact tracing needed for women with sexually transmitted infections.
EIA=enzyme immunoassay; HbsAg=hepatitis B surface antigen; HIV=human immunodeficiency virus.

Considerations before testing

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Before tests are carried out, it is essential that:

- women are informed that it is their choice to have tests
- women are able to give informed consent: verbal discussion should cover the reasons for testing, harms and benefits and associated treatments and be supported by appropriate resources (eg written materials, audio or video) and efforts should be made to ensure that women have understood the information they are given
- women have opportunities to ask questions about tests and treatments
- women are reassured that test results remain confidential (unless the condition is notifiable, in which case they are given information about the notification process)
- discussions about consent are documented by the health professional involved
- women who decline testing are offered the opportunity to discuss any concerns they may have without being coerced to reconsider the test
- there are processes for follow-up of women with a positive test result, their babies and, in some situations, partners.

Discussion of testing should be approached with sensitivity, particularly when there is a potential for testing to raise maternal anxiety or if testing is for a sexually transmitted infection.

Considerations after a positive test result

- *Psychosocial support:* Diagnosis of a condition that may affect pregnancy and/or the health of the baby can be distressing, particularly if there are no interventions that can change outcomes. Women should be given information about available supports and assisted to access these.
- *Referral for specialist care:* For some conditions, such as haemoglobin disorders and thyroid dysfunction, specialist involvement will be required.
- *Sexually transmitted infections*: If a sexually transmitted infection is identified, there is an increased risk of other sexually transmitted infections. Testing and treatment of sexually transmitted infections and contact tracing have public health benefits as transmission to partners is reduced.
- *Blood-borne infections*: Specific supports are likely to be required for women identified as using intravenous drugs.
- *Notification:* State/Territory legislation on notification of communicable diseases must be followed.

Type of test

The tests discussed in this section are those currently in use in Australia. With continuous advances in technology and testing, techniques change rapidly. The most appropriate test may also depend on the clinical setting.

Testing in rural and remote areas

It is acknowledged that in Australia, access to tests may vary (eg due to distance from pathology services), storing tests and samples appropriately may be challenging (eg due to high temperatures or humidity) and there may be difficulties in recalling women to receive test results. In these situations, resources should be focused on responding to local needs (eg ensuring that tests are available to identify highly prevalent conditions).

[20] Tests are offered in the context of engagement and consultation with women. Health professionals must use standard precautions for infection prevention and control. Tests evolve with advances in technology and health professionals must keep up-to-date with the latest developments and evidence.

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9.1 Anaemia

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Antenatal care provides an opportunity to identify women with possible anaemia. If anaemia is diagnosed, supplementation with the deficient nutrient (most commonly iron) may be advised where indicated.

Background

Anaemia is a lower than normal concentration of haemoglobin or number of red blood cells, which results in reduced capacity of the blood to carry oxygen. During pregnancy, the WHO criteria for mean minimum normal haemoglobin concentration in healthy pregnant women is 110 mg/dL in the first half of pregnancy and 105 mg/dL in the second. Iron deficiency is the most common cause of anaemia in pregnancy worldwide *[883]*, but other deficiencies may also cause anaemia:

- *iron deficiency*: demand for iron is increased during pregnancy *[870]* and insufficient iron intake or absorption (eg diet poor in iron-rich foods and/or rich in foods that diminish iron absorption) or blood loss (eg due to gastrointestinal parasites) *[851]* can result in microcytic anaemia
- *folate deficiency*: demand for folate is also increased during pregnancy and inadequate dietary intake, prolonged vomiting or impaired absorption (eg due to gastric bypass surgery or gastrointestinal conditions) can result in macrocytic anaemia
- *vitamin B_{12} deficiency*: prolonged inadequate intake (eg limited access to source foods or vegetarian diet) or impaired absorption (eg due to gastric bypass surgery, pernicious anaemia or gastrointestinal conditions) can result in macrocytic anaemia
- *haemoglobinopathies*: these include sickle cell anaemia and thalassaemia (see Section 9).

Symptoms of anaemia include general weakness and tiredness but the threshold concentrations of haemoglobin at which these symptoms occur in pregnancy is not known *[872]*.

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Prevalence of iron, folate and vitamin B_{12} deficiency during pregnancy

- Estimates suggest that one-quarter of the world's population has anaemia. The burden of anaemia is considerably higher among indigenous populations compared to the general population *[864]*.
- The prevalence of iron-deficiency anaemia during pregnancy is generally low (< 20%) in developed countries *[878]* and higher (35–75%) in developing countries (Africa, Asia, South America) *[878][862]* and areas of socioeconomic disadvantage *[877]*. Reported predictors for having anaemia by 32 weeks gestation include young maternal age, non-white ethnic origin and increasing parity *[853]*.
- Few studies have reported the prevalence of iron-deficiency anaemia during pregnancy in Australia. Iron-deficiency anaemia was identified in 18% of pregnant women in a Tasmanian study (n=2,654) *[863]* and in 11% of pregnant women in a South Australian study (n=430) *[885]*.
- Data from Queensland suggest higher prevalence of iron-deficiency anaemia during pregnancy among Aboriginal than non-Indigenous women *[884]*. Smaller studies have found a prevalence of anaemia during pregnancy among Aboriginal women of 50% in remote Northern Territory communities *[854]*, 12% across 34 Aboriginal community health services (range 3–22%) (n=535) *[873]* and 10% in Brisbane (n=1,523) *[876]*.
- Data from Western Australia and South Australia show higher prevalence of iron-deficiency anaemia during pregnancy among adolescent (14%) than adult women (6%) and among Aboriginal (23–25%) compared with non-Indigenous (8–10%) adolescent women *[879][865]*.
- Mandatory fortification of flour with folic acid has reduced the prevalence of low folate levels among Australian women of childbearing age (0.16% in 2010) *[858]*. A Western Australian study found low folate levels in 10% of Aboriginal women before flour fortification *[867]*.
- Vitamin B_{12} deficiency is common in most of the developing world *[875] [852]*. Few studies have examined the prevalence of vitamin B_{12} deficiency in Australia *[861]*. However, there is emerging evidence of vitamin B_{12} deficiency among refugees due to limited or no sources of animal foods before resettlement *[855][856]*.

Preventing iron deficiency (through inclusion of iron-rich foods in the diet and/or iron supplementation) is discussed in Section 11.

Risks associated with iron, folate and vitamin B_{12} deficiency during pregnancy

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Severe iron-deficiency anaemia (haemoglobin concentration <70 mg/dL) can cause cardiac failure, *[866][880] [883]* and reduce tolerance of blood loss associated with birth. It is unclear whether mild to moderate anaemia is associated with poor outcomes *[872]*.

Deficiencies of folate *[860]* or vitamin B_{12} *[868]* during pregnancy are associated with neural tube defects.

Info Box

Testing for anaemia

Routinely offering a full blood count early in pregnancy and at 28 weeks is recommended in the United Kingdom *[869]* and in Australia *[871]*. Initial haemoglobin concentration is usually assessed in the context of this full blood count.

Assessing haemoglobin concentration

During pregnancy, maternal red cell mass and plasma volume increase and the haemoglobin concentration is reduced *[869]*. Haemoglobin is therefore checked against gestation-related thresholds.

Table F2: Assessing haemoglobin concentration during pregnancy

Gestational age	Minimum haemoglobin concentration
0-20 weeks	110 mg/dL
20+ weeks	105 mg/dL

Source: WHO (1993).

Consensus-based recommendation		
XXXIX.	Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

Practice point		
NN.	In areas where prevalence of iron-deficiency anaemia is high consider testing ferritin at the first antenatal visit.	
	Approved by NHMRC in June 2014; expires June 2019	UNDER REVIEW

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Further investigations

Haemoglobin concentration is not sensitive enough to be the sole means of diagnosing anaemia. Diagnostic tests include:

- full blood count (if this has not already been conducted)
- serum ferritin, which is the most sensitive single test to detect adequate iron stores (90% sensitivity at a cut-off of 30 mg/litre) *[857]*
- specific tests for folate and vitamin B_{12}, if mean cell volume is high.

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Info Box

Treating iron-deficiency anaemia

Effectiveness and safety of treatments for iron-deficiency anaemia

The evidence on treatments for iron-deficiency anaemia covers a very wide range of supplements, doses and routes of administration and focuses on changes in maternal haemoglobin concentration.

- Iron supplementation improves maternal haemoglobin concentrations, but there is a lack of evidence about the overall benefits of treating mild iron-deficiency anaemia in pregnancy *[872]*.
- Oral iron can cause gastrointestinal adverse effects (eg nausea, constipation) *[872]*. Intramuscular or intravenous iron is more effective than oral iron, but may have adverse effects (venous thrombosis and allergic reactions for intravenous treatment and pain, discolouration and allergic reactions for intramuscular treatment) *[872]*.

Iron as part of general nutritional supplementation is discussed in Section 11.2.2. Given the lack of evidence on outcomes, the recommendation is not to routinely offer iron supplementation to women during pregnancy.

Dose of supplementation

Recent studies provide high-level evidence on lower doses of iron supplementation. Iron supplements that are low dose (eg 20 mg) or taken less often than daily appear to be effective in treating anaemia in pregnancy with fewer gastrointestinal side effects compared with high-dose (eg 80 mg) or daily supplements *[859][874][886][872]*.

Other considerations

Treatment for hookworm infestation should also be considered in areas of high prevalence.

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Discussing anaemia

When haemoglobin concentration is low, points for discussion include:

- while anaemia in pregnancy is most commonly associated with iron deficiency, deficiencies of folate or vitamin B_{12} also result in anaemia and further tests are required to identify the cause
- if a deficiency is identified, supplementation with the appropriate nutrient can correct the deficiency
- supplements can be combined with foods rich in the relevant nutrient:
- iron-rich foods include meat, seafood and poultry; including a vitamin C rich fruit or vegetable in each meal and limiting tea and coffee to between meals aids absorption *[317]*
- foods rich in folate include fortified bread and cereals, dried beans and peas, dark green vegetables and citrus fruit and juice
- foods that contain vitamin B_{12} include meat, eggs, milk and cheese.

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Practice summary: anaemia

When: Early in pregnancy and at 28 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the reasons for testing for anaemia:** Explain that anaemia causes tiredness and can have other effects on the pregnancy.
- ☐ **Explain the causes of anaemia:** Iron-deficiency anaemia is common during pregnancy. Other causes of anaemia may be a consideration for women who live in or have come from areas where folate or vitamin B_{12} deficiencies are common.
- ☐ **Take a holistic approach:** Consider the availability of iron-rich foods appropriate to the woman's cultural practices and preferences and the affordability of supplements. For women taking supplements for iron-deficiency, explore culturally appropriate, low cost ways for women to increase their fibre and fluid intake if they are experiencing constipation.
- ☐ **Consider referral:** If there is concern about the quality of dietary iron intake or if the woman would like information about nutrition for herself and her family, consider referral to an accredited dietitian.
- ☐ **Document and follow-up:** When a woman is tested for anaemia, tell her the results and note them in her antenatal record. Have a system in place so that women with iron-deficiency anaemia during pregnancy are given information about iron supplementation and receive ongoing follow-up, including further investigation if anaemia does not resolve after pregnancy.

Consensus recommendation

Routinely offer testing for haemoglobin concentration to pregnant women early in pregnancy (at the first visit) and at 28 weeks gestation.

Good practice statement

In areas where prevalence of iron-deficiency anaemia is high consider testing ferritin at the first antenatal visit.

Good practice statement

Further investigation is required for women with a low haemoglobin concentration for their gestational stage. Repeat testing at 36 weeks may also be required for women who have symptoms or risk factors for anaemia or who live in or have come from an area of high prevalence.

Weak recommendation

Advise iron supplementation for women identified as having iron-deficiency anaemia.

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Good practice statement

Oral iron remains first-line treatment for iron-deficiency anaemia identified in the antenatal period. Intravenous iron should be offered to women who do not respond to oral iron or are unable to comply with therapy. In some remote settings, intramuscular iron may be administered by a health professional who does not have intravenous endorsement or where intravenous iron cannot be accessed.

Weak recommendation

Advise women with iron-deficiency anaemia that low-dose iron supplementation is as effective as high dose, with fewer side effects.

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Resources

Remote Primary Health Care Manuals. (2017). Anaemia (weak blood) in pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

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9.2 Haemoglobin disorders

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While identifying parents who are carriers for haemoglobin disorders before conception is preferable, discussing testing and the implications of carrier status early in pregnancy enables women and their partners to make informed choices.

Background

Mutation of the genes that contain the information for cells to make haemoglobin can result in low or absent production of normal adult haemoglobin (thalassaemias) or changes in the structure of the haemoglobin protein (haemoglobin variants such as sickle cell disease).

When babies inherit mutated globin genes from both parents, they may be affected by or be a carrier for a haemoglobin disorder. It is very unlikely that the baby will be affected when only one parent is a carrier for a haemoglobin disorder, but the baby may be a carrier.

Prevalence of haemoglobin disorders

- Globally, over 330,000 affected infants are born each year (83% sickle cell disorders and 17% thalassaemias), around 7% of pregnant women are carriers of haemoglobin disorders and over 1% of couples are at risk *[931]*.
- The risk of being a carrier for a haemoglobin disorder varies with ethnicity *[926]*:
- alpha thalassaemia is most prevalent among people of Chinese and South-East Asian origin but occurs in many other ethnic groups, including people from Southern European countries, the Middle East, the Indian subcontinent, Pakistan, Africa, the Pacific Islands and New Zealand (Maori)
- beta thalassaemia is prevalent among people from the Middle East, Southern Europe, Indian subcontinent, Central and South-East Asia and Africa
- sickle cell disease is seen in many populations including people from Africa, the Middle East, Southern Europe, India, Pakistan, South America and the Caribbean.
- In Australia *[926]*:
- alpha thalassaemia has been identified in some Aboriginal and Torres Strait Islander communities in the Northern Territory and northern Western Australia
- sickle cell disease has been most commonly seen in individuals of Southern European and Middle-Eastern origin (especially Lebanese and Turkish) but is becoming more prevalent with increasing immigration from sub-Saharan Africa and the Indian subcontinent.

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Risks associated with haemoglobin disorders

- Thalassaemias vary in severity depending on the number of faulty globin genes *[922]*. Symptoms range from mild anaemia to severe anaemia that requires blood transfusions lifelong. A baby with alpha thalassaemia, if born alive, does not usually survive for long after the birth (Bart's hydrops fetalis).
- Sickle cell anaemia is characterised by chronic anaemia, bone and chest pain, organ damage, failure to thrive, repeated infections and painful swelling of the hands and feet *[922]*.

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Testing for haemoglobin disorders

In Australia, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) recommends that local policies for testing for haemoglobin disorders take into account the ethnic mix of women tested *[932]*.

Discussing ethnicity

It is not possible to assume ethnicity from country of birth or surname. More information can be obtained by asking women where their parents, grandparents or great-grandparents were born *[926]*. An RCT in the United Kingdom found that a questionnaire listing a range of ethnicities was more effective in ascertaining ancestry than a simple question about ethnic origins outside the United Kingdom *[925]*.

Test

The RANZCOG recommends that mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) be tested in all women *[932]*. A small study found that MCV had a sensitivity of 92.9% and specificity of 83.9% for thalassaemia testing *[933]*.

Testing using MCV and MCH will identify some but not all carriers of alpha and beta globin gene changes. It should be noted that some beta globin gene changes (eg sickle cell trait) result in normal red cell indices and detection relies on haemoglobin electrophoresis.

Harms and benefits of testing

Narrative reviews indicate testing of women at increased risk of being carriers for haemoglobin disorders can identify couples who are both carriers and have a 25% risk of having a pregnancy with a significant genetic disorder for which antenatal diagnosis is possible *[928]*. No studies identified harms associated with testing. One study found that being well informed about haemoglobin disorders may reduce anxiety in women who are subsequently identified as carriers *[920]*.

Timing of testing

Narrative reviews suggest that the ideal time for testing for haemoglobin disorders would be preconception *[926]*. If this is not possible, testing should take place as early as possible in pregnancy. Studies have found that when testing was offered in primary care (eg as part of the pregnancy confirmation visit), women were tested at an earlier gestation *[934][923][924]*.

Cost-effectiveness of testing

Studies have found that antenatal testing in populations with a high prevalence of haemoglobin disorders is cost effective*[929][927]*. While testing at confirmation of pregnancy may require additional resources, it increases the number of women tested by 10 weeks gestation *[923]*. Cost-effectiveness studies support testing of fathers after a woman has been identified as a carrier for a haemoglobin disorder rather than on confirmation of pregnancy *[923][921]*.

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Further investigations

Further testing is recommended for women who *[926]*:

- have a MCV ≤ 80 fL and/or MCH ≤ 27 pg
- have a family history of anaemia, thalassaemia or other abnormal haemoglobin variant and/or
- originate from high-risk population groups: Southern Europe, Middle East, Africa, China, South-East Asia, the Indian subcontinent, Pacific Islands, New Zealand (Maori), South America and some Aboriginal and Torres Strait Islander communities in northern Western Australia and the Northern Territory.

Relevant tests include:

- ferritin testing to exclude iron-deficiency anaemia
- electrophoresis or high pressure liquid chromatography, to identify haemoglobin variants (red cell indices can be normal in carriers for some haemoglobin disorders).

Further studies (eg DNA analysis) may be carried out for final clarification of the carrier state.

Diagnosis of an affected baby is generally by chorionic villus sampling, usually in the first trimester *[926]*. A small study (n=777) found that ultrasound markers (middle cerebral artery peak systolic velocity combined with fetal cardiothoracic ratio) had a low false positive rate in diagnosing alpha thalassaemia *[930]*.

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Discussing haemoglobin disorders

Providing women with sufficient information about haemoglobin disorders enables informed choices about testing *[920]*. Discussion to inform a woman's decision-making about testing for haemoglobin disorders should take place before testing and include:

- people can be carriers of haemoglobin disorders without being affected by the condition or may be only mildly affected
- people from some ethnic groups are more likely to be carriers of or affected by haemoglobin disorders
- if only one parent is a carrier, it is unlikely that the baby will be affected but he or she may be a carrier
- if both parents are carriers for a haemoglobin disorder, there is a chance that the baby will be affected by the condition
- there are implications for the health of an affected baby.

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Practice summary

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the reasons for testing for haemoglobin disorders**: Explain that when both parents are carriers for a haemoglobin disorder, the baby may be affected (1 in 4 chance) with possible serious consequences.
- ☐ **Offer testing to fathers:** If a woman is identified as a carrier of a significant haemoglobin disorder, testing should be offered to the father. Other family members may also benefit from being offered testing.
- ☐ **Take a holistic approach**: Arrange counselling for parents when both are identified as carriers of haemoglobin disorders.
- ☐ **Document and follow-up**: Ensure that women receive timely notice of the results of any tests carried out. Have a system in place so that women identified as carriers of haemoglobin disorders receive ongoing support.

Consensus recommendation

As early as possible in pregnancy, routinely provide information about haemoglobin disorders and offer testing (full blood count).

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

Consider offering ferritin testing and haemoglobin electrophoresis as part of initial testing to women from high-risk population groups.

Approved by NHMRC in June 2014; expires June 2019

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Resources

CGE (2021) Fact Sheet 43 Thalassaemia. Sydney: NSW Health Centre for Genetics Education.

9.3 Hyperglycaemia

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Identifying the risk or presence of hyperglycaemia in pregnancy enables women to receive early testing if risk factors are present and lifestyle advice, education, blood glucose monitoring and appropriate treatment if diabetes is identified.

Background

Hyperglycaemia (raised blood glucose level) in pregnancy is defined here as pre-existing type 1 diabetes, pre-existing type 2 diabetes (either previously diagnosed or diagnosed during pregnancy) and gestational diabetes (developing during pregnancy). Gestational diabetes can recur in subsequent pregnancies, and women who develop gestational diabetes are at high risk of developing type 2 diabetes in later life.

This section does not address the care of women diagnosed with Type 1 or type 2 diabetes **before pregnancy** as the Guidelines cover the antenatal care of healthy pregnant women (ie those who do not have identified pre-existing conditions). For women with diagnosed type 1 or type 2 diabetes, preconception counselling is recommended.

Prevalence of hyperglycaemia in pregnancy

The prevalence of hyperglycaemia in pregnancy varies with the characteristics of the population being tested and the diagnostic criteria used. Population-based studies have estimated prevalence ranging from 1% to 50% *[1730]*. The prevalence of hyperglycaemia in pregnancy has increased over the past decades in parallel with the increase in rates of obesity (BMI > 30 kg/m^2) and type 2 diabetes and this trend is expected to continue *[1712][1730]*.

Among women who gave birth in Australia in 2009–11, 0.7% had known pre-existing diabetes (type 1 or type 2 diabetes) and 5.8% developed gestational diabetes *[1711]*.

In 2013, rates of known pre-existing diabetes were *[1895]*:

- lowest among women aged <20 years (0.4%) and highest among women aged ≥40 years
- lower among nulliparous women (1.0%) than among women of higher parity (ie 1.9% for parity of four)
- higher among Aboriginal and Torres Strait Islander women (4.4%) than among non-Indigenous women (1.1%)(age-standardised)
- higher among women born overseas (1.2%) than among women born in Australia (0.9%).

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Risks associated with diabetes in pregnancy

Cohort studies have found an independent relationship between hyperglycaemia during pregnancy and adverse outcomes for mother and baby *[1777][1782][1779][1729]*. The most comprehensive of these studies, the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study, showed a continuum of risk across maternal glucose levels for adverse pregnancy outcomes, including pre-eclampsia, caesarean section, birth trauma, high birth weight (>90th centile) and percentage of body fat as well as premature birth *[1729]*. High birth weight babies are at risk of birth complications (eg shoulder dystocia) *[1717][1720]*, jaundice *[1761]* and of long-term effects including childhood overweight *[1748][1746]* and metabolic factors that may increase risk of type 2 diabetes and cardiovascular disease *[1724]*.

In Australia in 2005–07 *[1800]*:

- women with pre-existing type 1 or type 2 diabetes were more likely to have preterm birth, induced labour, caesarean birth, hypertension and hospital stay longer than 7 days than women with gestational diabetes or without type 1 or type 2 diabetes identified in pregnancy and their babies had higher rates of stillbirth, high birth weight, low Apgar score and admission to special care nursery/neonatal intensive care unit
- women with gestational diabetes had a higher risk of induced labour and were more likely to have a preterm birth, caesarean section, hypertension and longer hospital stay than women without gestational diabetes, and their babies were more likely to be admitted to a special care nursery/neonatal intensive care unit
- Aboriginal and Torres Strait Islander mothers with pre-existing diabetes or gestational diabetes were at the greatest risk of preterm birth, induced labour, caesarean section and hypertension and their babies had higher rates of stillbirth, low Apgar score and admission to neonatal intensive care unit than non-Indigenous babies of mothers with pre-existing diabetes or gestational diabetes.

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While hyperglycaemia is the principal concern of diabetes in pregnancy, hypertension and dyslipidaemia associated with diabetes also contribute to the risk of adverse outcomes.

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Assessing risk of diabetes

Identifying women at risk of diabetes during pregnancy

The risk factors for undiagnosed type 2 diabetes are similar to those for gestational diabetes. There is a considerable body of evidence supporting an independent association between increased risk of gestational diabetes and the following factors.

- *Age*: Risk increases with maternal age (*[1781][1727][1740][1718][1742][1797][1764][1798][1741][1759][1785][1786][1721][1730][1750][1772]*.
- *Weight*: Risk increases with increased BMI*[1781][1727][1776][1718][1744][1771][1509][1797][1764][1793][1759][1780][1785][1786][1721][1730][1731][1734][1745][1750][1772][1784]* or percentage of body fat *[1740]*. BMI thresholds for increased risk vary by ethnic group (ie are lower among Asian women) (*[1731]*. Excessive weight gain early in pregnancy also contributes to risk *[1733][1764][1741] [1467][1726][1734]*.
- *Polycystic ovary syndrome:* The glucose metabolism alterations associated with polycystic ovary syndrome lead to an increased risk of gestational diabetes *[1715][1788][1730][1774]*.
- *Previous obstetric history*: Risk is increased among women with previous gestational diabetes *[1727][1771][1725][1764][1793][1759][1785][1786][1730]*, a previous high birth weight baby *[1718][1764][1793][1759][1730]* or previous pregnancy losses, including spontaneous miscarriage and unexplained stillbirth *[1730]*
- *Family history:* Family history of diabetes, especially maternal family history *[1781] [1753][1727][1718][1797][1793][1741][1785][1786][1751][1772]* or type 2 diabetes in a first-degree relative *[1764] [1759][1730]*, increases the risk of developing gestational diabetes.
- *Ethnic origin*: Risk of gestational diabetes is increased among women who originate from an ethnic group with a high prevalence of type 2 diabetes *[1793]*. These include Aboriginal and Torres Strait Islander peoples *[1768]* and people who are of Hispanic, African, Native American, South or East Asian or Pacific Island origin *[1781][1759][1785][1786][1730][1750][1784]*.
- *Migration:* Being a migrant (including entering another country as a refugee) rather than being native to the country is associated with increased risk *[1732][1723][1780]*.

A recent systematic review *[1762]*had similar findings and noted that it is likely that interactions between risk factors, rather than any single risk factor, predispose a woman to gestational diabetes.

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Lifestyle interventions for preventing gestational diabetes

- *Physical activity*: A Cochrane review *[1728]* concluded that exercise programs had no clear effect on preventing gestational diabetes among healthy pregnant women. An RCT found that a physical activity intervention did not reduce the risk of healthy pregnant women developing gestational diabetes but did reduce maternal weight gain and the risk of caesarean section and having a high birth weight newborn *[1713]*.
- *Dietary interventions*: A systematic review of RCTs found that a low glycaemic index diet reduced the risk of a high birth weight baby, that any dietary counselling was effective in reducing the incidence of gestational diabetes compared to standard care and that dietary counselling with probiotics was more effective in reducing incidence of gestational diabetes than dietary counseling alone *[1765]*. An RCT found that a low glycaemic index diet during pregnancy did not reduce the risk of having a high birth weight baby among women at risk of gestational diabetes but had a beneficial effect on maternal weight gain and glucose intolerance *[1792]*.
- *Combined interventions*: RCTs into the effect of advice on diet and physical activity in preventing gestational diabetes have inconsistent results. In some studies, intervention did not reduce the risk of gestational diabetes among women at high risk but resulted in lower weight gain among women at high risk and healthy pregnant women *[1743][1767][1791][1738]*. Other studies found that combined interventions reduced the risk of gestational diabetes and weight gain among women who were overweight or obese *[1766]* and the incidence of high birth weight newborns among women at high risk *[1749]*.

Management plans: An Australian study reported that a four-step management plan (including continuity of carer, weighing at each visit, brief food technologist intervention and clinical psychology management) aiming to reduce maternal weight gain among women who were obese reduced the incidence of gestational diabetes and maternal weight gain *[1769]*.

Section 6 includes specific advice on nutrition and physical activity. See Section 7 for information on weight management.

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Testing for hyperglycaemia

There is no agreement among current guidelines on whether testing for hyperglycaemia should be offered to all women or only to women with risk factors. However, a number of major international guidelines recommend universal testing for gestational diabetes at 24–28 weeks gestation, including the Australasian Diabetes in Pregnancy Society (ADIPS) *[1760]*, RANZCOG *[1773]*, the Endocrine Society (USA) *[1714]*, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) *[1754]*, the United States Preventive Services Task Force *[1789]*, the World Health Organization *[1796]*, the International Federation of Gynecology and Obstetrics *[1735]* and the International Diabetes Federation *[1739]*.

The decision whether to test all pregnant women or only those with risk factors depends on the background frequency of abnormal glucose metabolism in the population and on local circumstances *[1754]*. The WHO guidelines leave it to local health authorities to specify the testing coverage according to local burden, resources and priorities *[1796]*. Whether testing is universal or risk factor based, it is important that organisational protocols are consistently followed and outcomes audited.

A technical report from the United Kingdom concluded that testing for hyperglycaemia in pregnancy is worthwhile due to the costs of managing pregnancies complicated by diabetes *[1793]*. An Australian study suggested that treating mild gestational diabetes involved additional costs to hospitals and women but resulted in reductions in perinatal mortality and serious perinatal complications *[1758]*.

These Guidelines recommend a two-stage approach to testing, with women at risk of hyperglycaemia tested early in pregnancy and women who are not part of this group tested later at 24–28 weeks gestation.

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Early testing for hyperglycaemia

Detection and treatment of undiagnosed type 1 or type 2 diabetes in early pregnancy has the potential to reduce immediate and long-term harm to the baby and have a positive effect on maternal health *[1736]*. For these reasons, it has been recommended that women with risk factors for type 2 diabetes be tested for hyperglycaemia at the first antenatal visit *[1783][1709]*.

In New Zealand, it is recommended that all women are offered glycated haemoglobin (HbA1c) testing at the first antenatal visit *[1762]*. Prospective cohort studies in New Zealand since the introduction of the recommendation have found that:

- HbA1c ≥41 mmol/mol (5.9%) had a sensitivity of 100% (95%CI 91.8 to 100) and specificity of 97.4% (95%CI 95.5 to 99.2) for detecting diabetes and that women with HbA1c of 41–46 mmol/mol (5.9–6.4%) (n=200) had poorer pregnancy outcomes than those with HbA1c <41 mmol/mol (n=7,897; very low quality evidence) *[1737]*
- earlier treatment (<24 weeks) for women with an HbA1c of 41–49 mmol/mol (5.9–6.6%) was associated with a reduced risk of pre-eclampsia (but not other pregnancy or neonatal outcomes) compared with treatment ≥24 weeks (1.5 vs 8.0%, adjusted P=0.03; very low quality evidence) *[1775]*.

However, the evidence on HbA1c as a test in early pregnancy is limited and it is not currently included in the Medicare Benefits Schedule as a diagnostic test in pregnancy. Further research is needed to evaluate the benefit of early treatment for hyperglycaemia in pregnancy.

Suggested thresholds for identifying hyperglycaemia in early pregnancy are given in Table F3.

Table F3: Suggested thresholds for glycated haemoglobin and fasting plasma glucose to identify hyperglycaemia in early pregnancy

Test	Suggested threshold
HbA1c	≥41 mmol/mol (5.9%)
Fasting plasma glucose	6.1 to 6.9 mmol/L

Sources: (NZ MoH 2014; McIntyre et al 2016).

[1762][1752]

Testing for gestational diabetes

A lack of an agreed gold standard for diagnosing hyperglycaemia creates challenges for assessing the accuracy of tests, making comparisons between them and establishing clear thresholds *[1730]*. There is currently no universally accepted testing

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or diagnostic regimen. A Cochrane review concluded that, although gestational diabetes was more likely to be detected when all women were tested, the effects of subsequent management on health outcomes are unclear *[1787]*. A large retrospective cohort study concluded that selective testing would miss one third of women with gestational diabetes *[1716]*. As the condition is prevalent, asymptomatic and benefits from treatment, universal testing is generally recommended. However, at present, the benefits of treating early hyperglycaemia in pregnancy are uncertain.

International consensus guidelines recommend the use of fasting plasma glucose or plasma glucose 1 hour and 2 hours after 75 g glucose loading for testing for gestational diabetes *[1754][1796][1735][1739]*. HbA1c is not recommended as a test for gestational diabetes due to a lack of sensitivity *[1762]*.

Diagnostic thresholds

The optimal diagnostic threshold for diabetes in pregnancy is uncertain and difficult to determine based on the available evidence.

After review of the findings of the HAPO Study, the IADPSG defined diagnostic values on the basis of an odds ratio of 1.75 for adverse neonatal outcomes (see Table F4). These criteria use a one-step approach to testing for gestational diabetes and have been adopted by the WHO *[1796]* and the American Diabetes Association *[1709]*. Recent ADIPS guidelines on diagnosis of gestational diabetes also include these criteria *[1760]*. Other documents, including the RACGP/Diabetes Australia *Diabetes Management in General Practice [1770]* and a US National Institutes of Health consensus development conference statement *[1790]* support the use of a two-step approach to testing and higher thresholds.

Table F4: WHO/IADPSG criteria for diagnosis of diabetes in pregnancy

Diabetes in pregnancy: one or more of the following criteria are met	
Fasting plasma glucose	≥ 7.0 mmol/l (126 mg/ dl)
2-hour plasma glucose	≥ 11.1 mmol/l (200 mg/dl) following a 75g oral glucose load
Random plasma glucose	≥ 11.1 mmol/l (200 mg/ dl) in the presence of diabetes symptoms
Gestational diabetes: one or more of the following criteria are met at any time during pregnancy	
Fasting plasma glucose	5.1-6.9 mmol/l (92 -125 mg/dl)
1-hour plasma glucose	≥ 10.0 mmol/l (180 mg/dl) following a 75g oral glucose load
2-hour plasma glucose	8.5-11.0 mmol/l (153 -199 mg/dl) following a 75g oral glucose load

Source: WHO 2013.

[1796]

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The WHO criteria for diagnosing pre-existing diabetes are based on the risk of developing microvascular complications, predominantly retinopathy. There are no data available to assess diagnostic accuracy of current diabetes diagnostic criteria if used in pregnancy in untreated women *[1796]*. The WHO grade the quality of the evidence supporting the criteria for diagnosing gestational diabetes as very low *[1796]*. The criteria are not based on diagnostic accuracy because there is no reference test to define disease status.

A systematic review found evidence to support a positive association between increasing plasma glucose on a 75 g or 100 g oral glucose tolerance test and high birth weight and primary caesarean section but clear thresholds for increased risk were not identified *[1730]*. Another systematic review found that the risk of these adverse events was similar between the WHO/ IADPSG and former WHO criteria *[1794]*. Cohort studies have found that women classified as having gestational diabetes under the WHO/IADPSG criteria but not under former criteria had a significantly increased risk of caesarean section *[1747][1763]*, hypertensive complications *[1763]* and having a high birth weight baby *[1756][1763]*. However, no RCTs have compared the outcomes of management following diagnosis under the two criteria.

While a full cost-effectiveness analysis has not been published, two studies that modelled the cost effectiveness of the WHO/ IADPSG criteria concluded that they would only be cost effective if detection of gestational diabetes reduced the rate at which type 2 diabetes subsequently developed *[1795]* or if the rate of caesarean section was reduced *[1755]*.

It is acknowledged that using the WHO/ IADPSG criteria has the potential to increase the diagnosis of gestational diabetes in Australia, with resource implications. However, calculations of the prevalence in populations may increase or decrease with changes to both testing criteria and uptake, as well as changes in population demographics. For example:

- a prospective study in Wollongong comparing the use of the previous ADIPS criteria with the WHO/ IADPSG criteria found that prevalence varied between the public and private sectors: 8.6% vs 9.1% (public sector), 10.5% vs 16.2% (private sector) and 9.6% vs 13.0% (overall) *[1757]*

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- an analysis of the HAPO sites in Australia using the WHO/ IADPSG criteria found a prevalence of gestational diabetes of 13.2% in Brisbane and 13.6% in Newcastle *[1778]*
- an analysis of oral glucose tolerance test results from women in two Area Health Services in the Sydney area found that using the WHO/IADPSG criteria rather than the previous ADIPS criteria would increase rates of diagnosis and therefore affect the health service workload for management of gestational diabetes *[1722]*
- in a cohort of Aboriginal and Torres Strait Islander women in Far North Queensland, gestational diabetes prevalence increased threefold over 2 years due to enhanced testing practices, but prevalence would have been lower if the WHO/ IADPSG criteria had been in place at the time *[1719]*.

Increased diagnosis also has implications for women. Gestational diabetes occurs across a continuum with a variety of potential threshold points. The risk of labelling a woman with gestational diabetes needs to be weighed against any potential benefits to the woman and baby, particularly if lifestyle advice is likely to be the first treatment option. There is a need for evidence on the risks and benefits of testing at different thresholds.

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Discussing diabetes in pregnancy (gestational diabetes, type 1 or type 2 diabetes)

Discussion to inform a woman's decision-making about testing for diabetes should take place before testing and include that:

- undetected and uncontrolled diabetes during pregnancy is associated with risks to the mother (eg high blood pressure, pre-eclampsia) and to the baby in the short term (eg stillbirth, preterm birth, high birth weight, congenital anomalies, birth complications) and the longer term (childhood overweight and development of diabetes)
- a diagnosis of diabetes in pregnancy may lead to increased monitoring and interventions during pregnancy and labour (eg induced labour, caesarean section).

If diabetes is diagnosed during pregnancy, points for discussion include:

- the role of diet, physical activity and body weight in managing diabetes
- the role of insulin or oral hypoglycaemic agents in the management of diabetes (ie if diet and physical activity do not adequately control blood glucose levels)
- the importance of monitoring and controlling blood glucose levels during pregnancy, labour, birth and early feeding of the baby to reduce the likelihood of the baby having low blood glucose levels after the birth and the associated risks
- the possibility of the baby having low blood glucose levels in the period after the birth, which may require admission to a special care nursery/neonatal intensive care unit
- the risk of the baby developing obesity, heart disease and/or diabetes in the future
- the woman's increased risk of developing type 2 diabetes and the importance of regular assessment for glucose tolerance and maintaining a healthy weight
- the benefits of registering with the National Gestational Diabetes Register (eg annual reminders for glucose tolerance assessment)
- the benefits of breastfeeding in reducing the risk of the woman developing type 2 diabetes in the future
- whether the woman understands the information she has been given.

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Info Box

Practice summary: diabetes in pregnancy

When: Assess risk of undiagnosed diabetes or prediabetes at the first antenatal visit and offer testing to women with risk factors

At 24-28 weeks offer testing to women not already tested and repeat testing to women with risk factors with a previous normal blood glucose level

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited practising dietitian, diabetes educator; endocrinologist; accredited exercise physiologist

- ☐ **Discuss the reasons for testing blood glucose levels:** Explain that diabetes in pregnancy can have effects on the pregnancy and the baby and that early identification and taking steps to manage raised blood glucose as soon as possible can reduce the risk of these effects.
- ☐ **Take a holistic approach:** Provide women with practical advice on healthy eating and physical activity (this information is available in the full Guidelines), taking into consideration the availability of foods and ways of being physically active that are appropriate to the woman's cultural practices and preferences. Consider a health promotion program to improve community understanding of the effects of diabetes in pregnancy and the importance of healthy lifestyle patterns.
- ☐ **Consider referral:** Where possible, women diagnosed with pre-existing diabetes should be referred for specialist assessment (by an endocrinologist or obstetric physician) and education on nutrition, monitoring and management (eg to a multidisciplinary team involving an accredited practising dietitian, diabetes educator, endocrinologist, obstetric physician). Where specialist allied health professionals are not available, other sources of information (eg written information, video or audio resources, telehealth services) may be useful.
- ☐ **Document and follow-up:** When a woman's blood glucose is tested, tell her the results and note them in her antenatal record. Have a system in place so that women diagnosed with diabetes receive ongoing follow-up, including further testing of blood glucose levels after pregnancy. Postnatal education and support are important in preventing or delaying the onset of diabetes in the future and women should be encouraged to attend postnatal testing.

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In the first trimester, assess a woman's risk of hyperglycaemia including: her age, body mass index, previous gestational diabetes or high birth weight baby, family history of diabetes, presence of polycystic ovarian syndrome and whether she is from an ethnic group with high prevalence of diabetes, such as Aboriginal and Torres Strait Islander peoples.

Advise women that physical activity and healthy eating during pregnancy help to reduce excessive weight gain but do not appear to directly reduce the risk of diabetes in pregnancy.

Consensus recommendation

When a woman has risk factors for hyperglycaemia in the first trimester, suitable tests are glycated haemoglobin (HbA1c) or fasting blood glucose

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Consensus recommendation

Between 24 and 28 weeks gestation, advise testing for hyperglycaemia to all women who have not previously been tested in the current pregnancy. Advise repeat testing to women who were tested early in pregnancy due to risk factors and who had a normal result on an initial test.

Consensus recommendation

Use the World Health Organization/International Association of Diabetes and Pregnancy Study Groups tests and criteria to diagnose diabetes and gestational diabetes in pregnancy.

Info Box

Resources

Metzger BE, Gabbe SG, Persson B et al (2010) *International association of diabetes and pregnancy study groups recommendations on the diagnosis and classification of hyperglycemia in pregnancy*. *Diabetes Care* 33(3): 676-82.

Nankervis A, McIntyre HD, Moses R et al (2013) *ADIPS Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes Mellitus in Australia*. Sydney: Australian Diabetes in Pregnancy Society.

NHMRC (2011) *National Evidence-Based Clinical Care Guidelines for Type 1 Diabetes for Children, Adolescents and Adults*. Canberra: National Health and Medical Research Council.

NICE (2015) *Diabetes in Pregnancy: management from preconception to the postnatal period (NG3)*. NICE Clinical Guideline. London: National Institute for Health and Clinical Excellence.

The Royal Australian College of General Practitioners (2016). *General practice management of type 2 diabetes: 2016–18*. East Melbourne, Vic: RACGP.

SIGN (2017). *Management of Diabetes. A National Clinical Guideline*. Edinburgh: Scottish Intercollegiate Guidelines Network.

WHO (2013) *Diagnostic Criteria and Classification of Hyperglycaemia First Detected in Pregnancy*. Geneva: World Health Organization.

National Gestational Diabetes Register

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9.4 Human immunodeficiency virus

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Testing for HIV in pregnancy enables measures to be taken to reduce the risk of mother-to-child transmission and for the woman to be offered treatment and psychosocial support.

Background

Human immunodeficiency virus (HIV) is a blood-borne infection that is initially asymptomatic but involves gradual compromise of immune function, eventually leading to acquired immunodeficiency syndrome (AIDS). The time between HIV infection and development of AIDS ranges from a few months to 17 years in untreated patients *[1015]*. Undiagnosed HIV infection during pregnancy has serious implications for the health of both the woman and her child. Early HIV diagnosis can reduce the risk of mother-to-child transmission and the rate of disease progression in the mother *[869]*.

HIV in Australia

- *Rates of diagnosis of HIV*: The number of notifications of newly diagnosed HIV among women in Australia has remained stable for the past 10 years and was 0.7 per 100,000 women in 2016 *[842]*. In 2016, notification rates were more than three times higher among Aboriginal and Torres Strait Islander women than among Australian-born non-Indigenous women (1.1 vs 0.3 per 100,000) *[843]*).
- *Geographical distribution*: Recent trends in the population rate of newly diagnosed HIV have differed across jurisdictions. Over the past 10 years (2007–2016) rates per 100,000 fluctuated in Victoria (range 4.4 to 5.3; 2016 rate 5.0), Queensland (range 3.9 to 5.3; 2016 rate 4.1), Western Australia (range 3.0 to 4.3; 2016 rate 3.6), Tasmania (1.0 to 4.2), the Northern Territory (2.6 to 8.1) and the ACT (range 1.8 to 4.2; 2016 rate 3.0) and declined in New South Wales (from 5.8 to 4.2)*[842]*.
- *Country of origin*: In overseas born populations, HIV notification rates per 100,000 in 2016 were 17.3 for people born in the Americas (North and South America), 17.1 for people born in South-East Asia, 10.9 for people born in sub-Saharan Africa and 7.3 for people born in North-East Asia and *[842]*.
- *Risk factors*: Transmission of HIV in Australia continues to occur primarily through sexual contact between men. In 2015, 20% of new HIV diagnoses were attributed to heterosexual sex and 3% to injecting drug use *[841]*. Of new diagnoses attributed to heterosexual sex, 36% were in people from high-prevalence countries or with partners from high prevalence countries.
- *Perinatal exposure*: Among 223 women with HIV who gave birth in the 5-year period 2012–2016, the transmission rate to newborns was 2%, compared to 39% in the period 1985–1991 and 28% in 1992–1996 *[842]*. In the past 10 years, the transmission rate has dropped from 9% in 2007 to 0% in 2016.

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Risks associated with HIV infection in pregnancy

Globally, most children with HIV acquire infection through mother-to-child transmission during pregnancy, during birth or through breastfeeding *[1024]*. Maternal viral load is a strong independent determinant of transmission risk *[1011][1013][1010] [1025]*.

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Testing for HIV infection in pregnancy

Universal testing for HIV in pregnancy is recommended in the United Kingdom *[1005][546][1017]*, the United States *[999]* and Canada *[1020][1004]*. These policies are based on the availability of accurate diagnostic tests and effectiveness of antiretroviral treatment in preventing mother-to-child transmission. They also reflect the fact that testing based on risk factors would miss a substantial proportion of women with HIV *[1003]*.

Diagnostic accuracy of tests

Tests for HIV diagnosis in pregnant women include:

- standard tests: the enzyme immunoassay (EIA) and Western blot protocol is highly (>99%) sensitive and specific *[1019][1001][1003] [1002]*
- rapid HIV tests, which have similar accuracy *[1001][1003]* and provide results within hours without requiring a return visit *[1022]*, with blood-based tests having greater sensitivity than tests using oral fluids *[1014]*.

The sensitivities and specificities of various commercial HIV assays can be found at the *Therapeutic Goods Administration website*.

Interventions to prevent mother-to-child transmission

Cochrane reviews into the effectiveness of interventions in preventing mother-to-child transmission have found that:

- short courses of certain antiretroviral medicines are effective and are not associated with any safety concerns in the short term *[1024]*
- caesarean section before labour and before ruptured membranes is effective among women with HIV not taking antiretrovirals or taking only zidovudine *[1018]*
- vitamin A supplementation is not effective in preventing transmission *[1026]*
- there is no evidence of an effect of vaginal disinfection *[1026]*
- complete avoidance of breastfeeding is effective in preventing mother-to-child transmission of HIV *[1009]*
- if breastfeeding is initiated, the combination of exclusive breastfeeding during the first few months of life and extended antiretroviral prophylaxis to the infant is effective *[1009]*.

Prospective cohort studies and meta-analyses have not found a significant association between antiretroviral treatments and intrauterine growth restriction (n=8,192) *[1000]*, congenital anomalies (n=8,576) *[1023]*, or preterm birth (n=20,426) *[1012]*.

Recommended interventions appear to be acceptable to pregnant women and are associated with mother-to-child transmission rates of 1% to 2% *[1003]*. In Australia between 1982 and 2005, uptake of interventions to reduce mother-to-child transmission of HIV was high *[1008]*.

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Pre-test and post-test discussions

Pre- and post-test discussions are an integral part of HIV testing.

Considerations before testing

Providing information and support associated with testing aims to minimise the personal and social impact of HIV infection. The Australian Department of Health and Ageing HIV testing guidelines recommend that *[1006]*:

- antenatal testing only be performed with the informed consent of the woman
- all women contemplating pregnancy or seeking antenatal care be made aware of the benefits of diagnosis of HIV infection and management, and prevention strategies available for both the mother and the baby
- women receive materials (in written and other formats) outlining the tests that will be offered antenatally and explaining the testing procedure
- women with limited literacy or for whom English is a second language receive appropriate educational resources (eg using media such as video, audio, multimedia or in languages other than English)
- women with a first language other than English be offered access to accredited interpreting services.

Women most at risk of HIV may decline testing *[998][1016]* or may not access testing and available interventions *[1007][1021]*.

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Testing in rural and remote areas

Rapid tests improve the availability of HIV testing in situations where there is limited access to pathology services and returning for results may be difficult *[1006]*. However, the use of these tests should be limited to situations where *[1006]*:

- testing is conducted in, or backed up by, a clinical setting
- testing is conducted under the auspice of a National Association of Testing Authorities/Royal College of Pathologists of Australia medical testing accredited laboratory
- reliable Therapeutic Goods Administration approved rapid tests are available
- high quality information on the tests and their use is available and provided
- the health professional performing the test is suitably trained in conducting and interpreting the test and has the skills to provide pre- and post-test information/discussion (if conducted outside an accredited laboratory)
- quality assurance programs are available to ensure ongoing competency of healthcare professionals performing the tests.

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Info Box

Practice summary: HIV testing

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss HIV testing:** Explain that it is important to find out whether a woman has HIV because of the risk of transmission to the baby. Testing also gives the woman the opportunity to receive appropriate treatments.
- ☐ **Document and follow-up:** Note the results of HIV testing in the woman's record and have a follow-up system in place so women who have HIV have access to counselling to discuss the test results and available interventions to prevent transmission during pregnancy.
- ☐ **Take a holistic approach:** If a woman is found to have HIV, specialist advice on management is required. Other considerations include psychosocial support, contact tracing, partner testing, testing for other sexually transmitted infections and continuing follow-up.

Weak recommendation

Routinely offer and recommend HIV testing at the first antenatal visit as effective interventions are available to reduce the risk of mother-to-child transmission.

Approved by NHMRC in December 2011; expires December 2016

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Good practice statement

A system of clear referral paths ensures that pregnant women who are diagnosed with an HIV infection are managed and treated by the appropriate specialist teams.

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

ASHA (2017) *Australian STI Management Guidelines for Use in Primary Care*. Australasian Sexual Health Alliance. Accessed: 10 August 2018.

DoHA (2011). *National HIV Testing Policy 2011*. Canberra: Australian Government Department of Health.

RCOG (2010). *Green Top Guideline no 39 Management of HIV in Pregnancy*. London: Royal College of Obstetricians and Gynaecologists.

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9.5 Hepatitis B

Info Box

Testing in pregnancy allows arrangements to be made for vaccinating the newborn if the mother is found to have hepatitis B.

Background

Hepatitis B virus is a global acute and chronic communicable disease that causes major hepatic disease *[820]*. The virus has an incubation period of 6 weeks to 6 months and is excreted in various body fluids including blood, saliva, vaginal fluid and breast milk. These fluids may be highly infectious. Adults who have hepatitis B may have no symptoms. After infection, some people do not clear the virus; they become carriers and may infect other people.

Hepatitis B in Australia

- *Rates of notification of hepatitis B:* The notification rate for hepatitis B has declined by 17% in the past 10 years (from 33.0 to 27.4 per 100,000). Rates have been consistently higher among males than females, and were 29.9 and 24.8 per 100,000 in 2016, respectively *[842]*. In 2016, the age-standardised notification rate of newly diagnosed hepatitis B infection among Aboriginal and Torres Strait Islander women was 1.2 times as high as that for non-Indigenous women (25.3 vs 20.5 per 100,000) *[843]*.
- *Age*: Among women, the hepatitis B notification rate in 2016 was highest in the 30–39 age group (57.0 per 100,000) followed by the 25–29 age group (47.0 per 100 000) but, in the latter group, declined by 45% (from 85.0 per 100,000 in 2007). The hepatitis B notification rates also decreased in the 0–14, 15–19 and 20–24 age groups by 50%, 38% and 54% respectively. Rates have been stable in the 30–39 age group over the past 10 years *[842]*.
- *Geographical distribution*: The notification rate for hepatitis B infection in Australia has consistently been highest in the Northern Territory, but declined by 64% between 2007 and 2016 (from 118.7 to 43.1 per 100,000) *[842]*. In most other jurisdictions, the rate of hepatitis B diagnosis has fluctuated over this period, with small declines in New South Wales (19%, 38.3 to 31.1 per 100,000), Victoria (18%, 37.4 to 30.5 per 100,000) and Western Australia (10%, from 28.9 to 26.1 per 100,000).
- *Country of origin*: The prevalence of hepatitis B carriage varies between and within countries *[818]*. Carrier rates vary from 0.1–0.2% among Caucasians in the United States, northern Europe and Australia, 1–5% in the Mediterranean countries, parts of eastern Europe, China, Africa, Central and South America, and greater than 10% in many sub-Saharan African, south-east Asian and Pacific island populations *[830][847][823]*. First-generation immigrants usually retain the carrier rate of their country of origin, but subsequent generations show a declining carrier rate irrespective of vaccination *[830]*.
- *Risk factors*: Routes of transmission of hepatitis B virus include sharing injecting equipment (such as occurs in injecting drug use), needle-stick injury and sexual contact *[818]*. Based on reported cases, hepatitis B transmission in Australia in 2015 continued to occur predominantly among people with a recent history of injecting drug use *[841]*.
- *Hepatitis B in pregnancy*: A retrospective cohort study (n=14,857) found around 2% of women to HbsAg positive *[825]*. A prevalence study in the Northern Territory found 3.7% of Aboriginal and Torres Strait Islander women and 0.98% of non-Indigenous women to be HbsAg positive *[836]*.

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Risks associated with hepatitis B in pregnancy

Mother-to-child transmission occurs frequently either in the uterus, through placental leakage, or through exposure to blood or blood-contaminated fluids at or around the time of birth *[827]*. Perinatal transmission is believed to account for 35–50% of hepatitis B carriers *[849]*.

The risk of perinatal transmission is associated with the hepatitis B envelope antigen (HbeAg) status of the mother. If a woman is both hepatitis surface antigen (HbsAg) and HbeAg positive, 70–90% of her children will develop hepatitis B *[839][817]*. If the mother is HbsAg positive but HbeAg negative, the risk is reduced *[835][822][821][833][816]*. In a cohort study of HbsAg-positive, hepatitis B DNA-positive women in Sydney (n=313) *[845]*, transmission rates were 3% among hepatitis B DNA-positive women overall, 7% among HbeAg-positive mothers and 9% among women with very high hepatitis B DNA levels.

It has been estimated that people who are chronic carriers of HbsAg are 22 times more likely to die from hepatocellular carcinoma or cirrhosis than noncarriers (95%CI 11.5 to 43.2) *[820]*.

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Testing for hepatitis B infection in pregnancy

Testing of all pregnant women for hepatitis B is recommended in the United Kingdom *[834]* and the United States *[831][828][844]*. The *Australian Immunisation Handbook*, while making recommendations on vaccination rather than testing, notes that routine antenatal testing for hepatitis B allows appropriate measures to be implemented to prevent newborn infants developing chronic HBV infection *[818]*.

Testing of all women is supported by the findings of observational studies into selective testing:

- testing using risk factors to identify 'high-risk' women for HbsAg would miss about half of all pregnant women with HbsAg infection *[840]*
- of women offered examination for hepatitis B at 18 weeks pregnancy (n=4,098), one third of women at risk of hepatitis B were not identified by selective testing *[826]*
- universal testing resulted in an estimated detection of 50 additional pregnant women carrying hepatitis B each year who would not have been detected through selective testing *[824]*.

A recent systematic review *[828]* found no new evidence on the benefits or harms of testing for hepatitis B infection in pregnant women.

Testing method

Testing of blood samples is the accepted standard for antenatal detection of hepatitis B virus *[791]* and consists of stages *[819]* testing for HbsAg and confirmatory testing with a new sample upon a positive result.

Other considerations

- Mother-to-child transmission of the hepatitis B virus is approximately 95% preventable by administering vaccine and hepatitis B immunoglobulin to the baby at birth *[821][832][846][829][848][837][850][827]*.
- While a meta-analysis (n=5,900) found that multiple hepatitis B immunisation injections in women with a high degree of infectiousness in late pregnancy reduced rates of intrauterine transmission *[838]*, all studies included were carried out in China and the findings may not be applicable in the Australian context.
- For women with high viral loads (>log 7 IU/mL), discussion with a hepatologist or hepatitis B specialist and maternal antiviral treatment in the third trimester are considerations.

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Info Box

Practice summary: hepatitis B testing

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss hepatitis B testing:** Explain that it is important to find out whether a woman has or is carrying hepatitis B because of the risk to the baby.
- ☐ **Document and follow-up:** Note the results of hepatitis B testing in the woman's record and have a follow-up system in place so that the babies of women who are found to have hepatitis B are vaccinated on the day of birth.
- ☐ **Take a holistic approach:** If a woman is found to have or be a carrier of hepatitis B, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and continuing follow-up. Consider testing other children, depending on circumstances.

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Strong recommendation

Routinely offer and recommend hepatitis B virus testing at the first antenatal visit as effective postnatal intervention can reduce the risk of mother-to-child transmission.

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

Australian Technical Advisory Group on Immunisation (2017 update) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health.

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9.6 Hepatitis C

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While there is currently no way of preventing mother-to-baby transmission of hepatitis C, identifying women who have hepatitis C during pregnancy means that interventions that increase the risk of transmission to the baby can be avoided and effective treatments commenced after the birth or cessation of breastfeeding.

Background

Hepatitis C is a blood-borne virus that is one of the major causes of liver cirrhosis, hepatocellular carcinoma and liver failure. Perinatal transmission is the main source of hepatitis C in Australian children. Babies with hepatitis C are mostly born to mothers who used intravenous drugs, had invasive procedures overseas or have tattoos *[751]*.

Hepatitis C in Australia

- *Rates of notification of hepatitis C*: Overall there was a 15% decline in the hepatitis C notification rate in Australia between 2007 and 2016 (from 58.8 to 49.9 per 100,000) *[754]*. However, since 2012, the rate has increased by 12% (from 44.5 to 49.9 per 100,000), with most of this increase occurring in 2015 and 2016.[21] In contrast, the age-standardised notification rate of newly diagnosed hepatitis C infection in the Aboriginal and Torres Strait Islander population increased by 25% between 2012 and 2016 (from 138.1 to 172.7 per 100,000) *[755]*.
- *Age*: Among women, rates of notification remained stable between 2012 and 2016 in the 40 years and over age group (from 36.9 to 35.6 per 100,000) and declined in the 25–39 age group (from 88.5 to 56.5 per 100,000) and the 15–24 age group in 2016 (45.5 to 25.2 per 100,000) *[754]*.
- *Geographical distribution*: The notification rate of newly diagnosed hepatitis C in 2016 was highest in the Northern Territory (76.0 per 100,000), followed by Queensland (58.7 per 100,000), New South Wales (55.0 per 100,000), and Tasmania (54.4 per 100,000). Hepatitis C notification rates either remained stable or increased slightly between 2012 and 2016. In New South Wales, rates increased by 17% between 2015 and 2016 (from 47.1 to 55.0 per 100,000). Rates of notification in 2016 were higher in inner and outer regional areas (65.3 per 100 000) than in remote and very remote areas (46.8 per 100 000) and major cities (41.2 per 100 000) *[754]*.

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Observational studies conducted in Australia also identified people who inject drugs *[742][739][740][737]* and people in prison *[757][744][753][750][737]* as at higher risk of testing positive for hepatitis C antibodies or infection.

Risks associated with hepatitis C in pregnancy

The clearest and most serious risk associated with maternal hepatitis C in pregnancy is transmission of the infection to the baby. There are several factors that influence the risk of mother-to-infant transmission:

- risk of transmission is estimated to be 5.8% (95%CI 4.2 to 7.8%) among antibody–positive and RNA-positive women *[727]*
- the highest reported transmission rates occur in infants born to mothers who are both hepatitis C and HIV positive, with rates as high as 36% *[727][746]*
- risk of transmission is increased with a higher maternal viral load of hepatitis C *[746][756][735]*
- risk is increased with intrapartum invasive procedures (fetal scalp blood sampling or internal electronic fetal heart rate monitoring via scalp electrode) (OR 10.1; 95% CI 2.6 to 39.02) and episiotomy (OR 4.2; 95%CI 1.2 to 14.16) *[735][746][734][748]*
- transmission does not appear to be influenced by mode of birth *[746][736][729][748]* or gestational age at birth *[746]*
- prolonged rupture of membranes may increase the risk of transmission *[746][729]*, however this could be related to maternal viral load and length of membrane rupture *[748]*
- amniocentesis in women infected with hepatitis C does not appear to significantly increase the risk of vertical transmission but very few studies have properly addressed this possibility *[746][734][748]*
- there is no evidence that breastfeeding is associated with an increased risk of hepatitis C transmission to the newborn *[746][756][729][726]*, unless the nipples are cracked and/or bleeding *[726][748]*.

[21] The recent increase in notificationrates may reflect increased testing in response to availability of new direct-acting antiviral treatments.

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Testing for hepatitis C infection in pregnancy

Internationally, routine testing of pregnant women for hepatitis C has not been recommended *[730][724][745]*. In Australia, RANZCOG suggests that all pregnant women be tested for hepatitis C *[749]*.

Targeted versus universal testing

Studies were largely consistent in finding that hepatitis C seropositivity was associated with the following risk factors:

- injecting drug use *[743][731][741][759]*
- receipt of blood transfusion or organ transplant *[759][731]*
- history of tattooing or body piercing *[731][741]*
- use of intranasal cocaine *[741][731]*
- incarceration *[731]*
- origin from a country of high prevalence *[731][741]*; these include Africa and central and east Asia *[758]*.

Additional findings were:

- only high severity risk factors (exposure to intravenous drug use or to the blood of a hepatitis C-positive individual) were significantly associated with testing positive for hepatitis C antibodies (P=0.002) *[743]*
- age, history of prior pregnancy and healthcare employment were additional considerations *[733]*.

However, studies have estimated that, compared to universal testing, targeted testing would fail to identify 2.5 to 27% of seropositive women *[733][731][741][759]*.

Clinical utility of testing

The clinical utility of testing for hepatitis C in pregnancy is limited by the lack of effective treatment options to avoid mother-to-child transmission during pregnancy or childbirth *[732][748][747][725]*.

However, new treatment options (direct-acting antiviral agents) for people living with hepatitis C have become available and were recently listed on the Australian Pharmaceutical Benefits Scheme (PBS). While these treatments have not been proven to be safe in pregnancy or during breastfeeding *[725][748]*, women who are diagnosed with hepatitis C during pregnancy could commence such curative treatment after completion of breastfeeding (or immediately after the birth if the infant is not breastfed), thus reducing their risk of significant liver disease and the risk of perinatal infection for subsequent pregnancies.

In addition, knowledge of a woman's hepatitis C status means interventions that may increase the risk of mother-to-baby transmission (fetal scalp blood sampling, internal electronic fetal heart rate monitoring via scalp electrode, episiotomy) can be avoided.

Costs of testing

No cost-effectiveness studies relevant to the Australian context were identified. A study in the Netherlands found a modest cost-effective outcome for testing first-generation non-Western women *[728]* and a study conducted in the United States *[738]* found that universal testing was not cost-effective with or without elective caesarean section. However, a study in the United Kingdom found that antenatal testing and postnatal treatment was feasible and effective at an acceptable cost *[752]*.

Planned invasive procedures

Testing of women who are to have a planned invasive procedure has been recommended, due to the risk of hepatitis C transmission to the baby.

Testing process

If an initial test for hepatitis C antibodies is positive, a confirmatory hepatitis C ribonucleic acid (RNA) test will allow assessment of the potential implications and associated risks for the woman and her baby *[726]*.

Other considerations

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For a woman with a diagnosis of hepatitis C during pregnancy, referral to an infectious diseases specialist or hepatologist, as well as to hepatitis support groups for information and advice, should be made during the pregnancy *[726]*. This will facilitate provision of accurate information, counselling and linkages for follow-up and treatment if desired after the birth.

Info Box

Practice summary: hepatitis C testing

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss hepatitis C testing:** Explain that if hepatitis C is identified during pregnancy, interventions that increase the risk of transmission can be avoided and that effective treatment can be started after pregnancy/breastfeeding.
- ☐ **Document and follow-up:** If hepatitis C testing is undertaken, note the results in the woman's record and advise the woman of her result. Have a system in place so that women who test positive receive education about further transmission (eg to family members) and ongoing support and their babies are followed up after birth.
- ☐ **Take a holistic approach:** If a woman is found to have hepatitis C, specialist advice on management may be required depending on the severity of disease and the health professional's expertise. Other considerations include counselling and follow-up.

Consensus recommendation

At the first antenatal visit, recommend testing for hepatitis C.

Approved by NHMRC in October 2017; expires October 2022

Good practice statement

For women who have not previously been tested and who are having a planned invasive procedure (eg chorionic villus sampling), recommend testing for hepatitis C before the procedure.

Approved by NHMRC in October 2017; expires October 2022

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Info Box

Resources

NSW Ministry of Health (2014) *Clinical Guidelines for the Management of Substance Use During Pregnancy, Birth and the Postnatal Period*. North Sydney: NSW Ministry of Health.

Websites

Hepatitis NSW

Hepatitis SA

Hepatitis Victoria

Hepatitis Queensland

Hepatitis WA

Northern Territory AIDS and Hepatitis C Council

Hepatitis ACT

Tasmanian Council on AIDS, Hepatitis C and Related Diseases

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9.7 Syphilis

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Info Box

Testing for syphilis in pregnancy aims to detect women who have the infection so that they can be treated and transmission to their babies prevented.

Background

Syphilis is a sexually acquired infection caused by *Treponema pallidum* subs. *pallidum*. In pregnancy, it can result in spontaneous miscarriage or stillbirth or cause congenital syphilis infection. Syphilis in pregnancy can be safely treated with antibiotics, which can prevent these complications.

Syphilis in Australia

Rates of diagnosis of syphilis

Between 2013 and 2017, the notification rate of infectious syphilis increased 135% from 7.8 per 100,000 in 2013 to 18.3 per 100,000 in 2017, with an increase in both men (119%) and women (309%) *[709]*.[22] Rates among women in 2017 were highest in the 15–19 year (15.9 per 100,000), 20-24 year (15.1 per 100,000) and 25–29 year (13.7 per 100,000) age groups. The rate of notification for infectious syphilis among Aboriginal and Torres Strait Islander women was 40 times greater than among non-Indigenous women (97.4 vs 2.3 per 100,000) *[710]*.

Geographical distribution

In 2017, infectious syphilis notification rates were higher in remote and very remote areas (62.9 per 100 000) than in major cities (17.8 per 100,000) *[709]*. Increases in notification rates occurred in all regions of residence between 2013 and 2017, with the greatest increase in remote areas (284% increase) and regional areas (271%), followed by major cities (127%). Rates of notification among Aboriginal and Torres Strait Islander people were highest in the Northern Territory (353.1 per 100,000) and Queensland (151.0 per 100,000) *[710]*, corresponding with regions in which there has been an outbreak of infectious syphilis (see below).

Congenital syphilis

Australia is a country of low prevalence for congenital syphilis. However, coinciding with peaks in infectious syphilis notifications, there have been peaks in cases of congenital syphilis (see below). Over the last 10 years (2008–2017), more than half (59%) of the 44 congenital syphilis notifications were in the Aboriginal and Torres Strait Islander population *[710]*.

Risk factors

Syphilis in Australia largely continues to be primarily among men having male-to-male sex in urban settings and of young heterosexual Aboriginal and Torres Strait Islander people in remote communities *[708]*. However, syphilis is increasing in some geographic areas and among some population groups *[710]*. A pregnant woman is at high risk of syphilis infection or reinfection when she:

- (or her partner[s]) resides in a declared outbreak area (see *Syphilis outbreak* below) or an area of known high prevalence
- is aged 15 to 29 years and resides in an area of high prevalence
- has a sexually transmitted infection in the current pregnancy or within the previous 12 months
- has previously had infectious syphilis in pregnancy
- engages in intravenous substance use during pregnancy.

Factors that increase the risk of syphilis infection or reinfection about which women may not be aware include when:

- she is a sexual contact of a person with infectious syphilis
- she has unprotected vaginal, oral or anal sex with a male partner at high risk of having syphilis
- she has a male sexual partner who has sex with men
- she and/or her partner(s) have sexual partners from high prevalence countries (eg countries in Africa and Asia, especially among refugees from these countries).

An existing syphilis infection may be undetected among women who have had no or limited antenatal care.

Syphilis outbreak in Australia

In January 2011, an increase of infectious syphilis notifications among young Aboriginal and Torres Strait Islander people was identified in the North-West region of Queensland, which subsequently spread to other regions in north Queensland *[700]*. Subsequent increases in notifications were reported in the Northern Territory and Western Australia in July 2013 and June 2014

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respectively, following sustained periods of low notification rates. In March 2017, South Australia declared an outbreak in the Western and Eyre and Far North regions from November 2016 *[713]*. By 30 June 2018, there had been seven confirmed cases of congenital syphilis, six probable cases and six deaths from congenital syphilis (three confirmed and three probable) associated with the outbreak *[713]*. Surveillance reports on the outbreak are published online regularly by the *Multijurisdictional Syphilis Outbreak Working Group*. Outbreak management is discussed briefly in Section 36.5 and detailed in the Communicable Disease Network Australia (CDNA) *Syphilis CDNA National Guidelines for Public Health Units Version 1.1* (see Section 36.7).

Notification

Syphilis is a notifiable disease under the public health acts of all states and territories, and nationally. Cases of reactive serology are reported by pathology laboratories to public health authorities *[703]*. In some jurisdictions, the health professional who diagnoses syphilis is also required to notify the jurisdictional public health authority. Probable or confirmed congenital syphilis must also be notified, including syphilis-related stillbirth *[703]*.

Risks associated with syphilis in pregnancy

Untreated syphilis during pregnancy is associated with stillbirth *[697][705][715]* and fetal loss, preterm birth, neonatal death, low birthweight and congenital syphilis *[715][705]*. Early treatment of maternal syphilis improves outcomes for the baby (see Section 36.4).

A baby with congenital syphilis may be severely affected at birth (with hepatomegaly, ascites, hydrops, fetal anaemia) or more frequently, may appear unaffected *[702]*. If the diagnosis is not made then, the baby will present later with non-specific complaints (rhinitis, failure to thrive, pneumonia), nearly always within 3 months of birth. Neonates with severe disease have a poorer prognosis.

[22] An expanded infectious syphilis national case definition was implemented in July 2015 in all jurisdictions except for New South Wales, where it was implemented in July 2016. The new case definition includes a subcategory of 'probable' infectious syphilis to capture infectious syphilis cases in people without a prior testing history, particularly young people aged 15–19 years. The probable infectious syphilis cases are included in the number of infectious syphilis notifications in 2015, 2016 and 2017.

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Syphilis testing

There are two main classifications of serological tests for syphilis (*T. pallidum*) performed in medical testing laboratories *[703]*:

- treponemal tests, which detect specific treponemal antibodies and can be run on high throughput random access instruments — commonly used assays include EIAs and particle agglutination assays (eg *T. pallidum* particle agglutination [TPPA])
- non-treponemal tests, which detect non-specific antibodies and are performed manually — the assay most commonly used is the rapid plasma reagin (RPR).

In Australia, serum from blood specimens is usually screened with a treponemal assay and confirmed with an alternative treponemal assay using a different platform (ie screening with an EIA and confirmation with a TPPA). In people with prior treated syphilis, because the treponemal assays remain reactive for life, an RPR alone is sometimes used to detect reinfection or treatment success *[698]*.

Due to intralaboratory and interlaboratory variation, when a person has a changing non-treponemal antibody result, the current specimen should be tested in parallel with previous specimens.

Point-of-care tests are now available that present results within 15–20 minutes (see Section 36.2.3).

Universal testing

Given the severity of outcomes associated with syphilis during pregnancy (see Section 36.1.2) and the availability of effective treatment (see Section 36.4), routine testing for syphilis at the first antenatal contact is recommended.

Repeat testing in women at high risk of infection or reinfection

Studies in the United States found that universal testing in the third trimester is not cost-effective when prevalence is low *[696][718]*. However, testing and treatment early in the third trimester prevented 78% of cases of congenital syphilis in an area of very high prevalence (*[712]*.

Testing at additional time points is recommended in areas affected by an ongoing syphilis outbreak (see Section 36.5).

This recommendation provides the minimum time points for testing women at high risk of infection or reinfection. The testing schedule may be expanded based on local needs.

Monitoring changes in risk is also important for women at high risk of infection or reinfection.

Point-of-care testing

In Australia, the only syphilis point-of-care test registered by the Therapeutic Goods Administration is the Determine Syphilis TP™ manufactured by Alere, Abbott *[703]*.

Point-of-care tests for syphilis have sensitivity and specificity in the ranges of 0.70 to 0.92 and 0.93 to 0.99 for Determine™ *[716]*, 0.60 to 0.83 and 0.96 to 1.00 for SD Bioline Syphilis 3.0 *[716][720]*, and 0.95 to 1.00 and 0.97 to 1.00 for SD Bioline HIV/Syphilis Duo Kit *[714][701][717]* (moderate to high certainty).

A systematic review *[721]* reported substantial increases in antenatal syphilis testing following introduction of point-of-care syphilis testing in low and middle income countries. Qualitative data revealed that women were highly satisfied with point-of-care syphilis testing. Adequate training for health care workers and supplies of commodities were cited as key implementation barriers. Another study noted the requirement for health professional training *[720]*.

Studies into the cost-effectiveness of point-of-care testing conducted in developing countries highlighted that point-of-care tests were more cost-effective than RPR both in the field *[722]* and in the laboratory *[711]*. No cost-effective studies conducted in Australia were identified.

More detailed information on the use and limitations of point-of-care tests in Australia, including the need for serological confirmation, their inability to distinguish between current and previous infection and the need for training of health professionals conducting point-of-care testing, is given in *Syphilis CDNA National Guidelines for Public Health Units Version 1.1* (see Section 36.7).

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Caring for women with a positive syphilis test result

All cases of syphilis in pregnancy should be discussed with a health professional with expertise in the area *[703]*.

Women with infectious syphilis need to be informed of the infectious nature of the condition, even in the absence of visible lesions or symptoms, and to abstain from sexual activity for 5 days post-treatment or until symptoms have resolved, 5 days post treatment of their partners or until symptoms have completely resolved (whichever is longer). The risk of reinfection should be reinforced and the possible signs and symptoms of a new syphilis infection discussed. The importance of follow-up and repeat syphilis serology testing to monitor the response to treatment and detect reinfection should be emphasised and women assisted to access this follow-up (eg through recall systems). The woman should be informed that she is likely to continue to have positive treponemal specific tests for life, even after successful treatment.

Contact tracing and treatment for the woman's partner(s) are critical to minimise the potential for re-infection as this represents a particular threat to the unborn baby *[703]*. Where possible, the interview should be conducted by someone known to and trusted by the woman and her partner *[703]*. Contacts should be treated presumptively without waiting for serology results.

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Treatment for women with confirmed syphilis

While these Guidelines do not generally make recommendations on treatment, a recommendation on treatment for newly confirmed infectious syphilis is included here due to the current outbreak, deaths from congenital syphilis and rising prevalence nationally. This recommendation is consistent with advice from the CDNA.

Systematic reviews found that:

- treatment of syphilis in pregnancy with at least 1.8 g (2.4 MU) benzathine penicillin intramuscularly as a single dose reduces the incidence of congenital syphilis by 97% (95%CI 93 to 98%; 3 studies; moderate certainty), stillbirth by 82% (95%CI 67 to 90%; 8 studies; low certainty), preterm birth by 64% (95%CI 53 to 73%; 7 studies; low certainty) and neonatal deaths by 80% (95%CI 68 to 87%; 5 studies; low certainty) *[699]*
- rates of adverse outcomes were higher among women receiving treatment in the third trimester compared to those treated in the first or second trimester (OR 2.24; 95%CI 1.28 to 3.93), although there was considerable heterogeneity (I^2=78.3 to 81.7%) for outcomes other than congenital syphilis (odds ratio [OR] 2.92, 95%CI 0.66 to 12.87; I^2=48.2%, p=0.165) (low certainty) *[706]*
- based on the risk of adverse reactions to benzathine penicillin in the general population (pooled absolute risk 0.169%; 95%CI 0.073 to 0.265% I^2 = 97%), risks from treatment among pregnant women are likely to be low (very low certainty) *[704]*.

Observational studies in settings of very high prevalence were consistent in finding treatment in the first trimester to be more effective than treatment in the third trimester *[707][723]*.

As treatment for syphilis varies depending on its duration, it is advisable to seek expert advice and arrange to see the woman again in one week as further treatment may be required.

Due to the high risk of mother-to-child transmission during pregnancy, particular care is required to conduct follow-up serology to monitor the response to treatment. Further details on monitoring and management of syphilis in pregnancy and postnatally, including treatment for women who are allergic to penicillin, and for congenital syphilis are given in the *Syphilis CDNA National Guidelines for Public Health Units Version 1.1* (see Section 36.7).

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Outbreak management

This section is based on guidance from the CDNA *[703]*. Local guidance about testing schedules and treatment should be sought in areas affected by an outbreak.

In the jurisdictions affected by an ongoing syphilis outbreak, syphilis serology testing five times around the pregnancy is recommended for women at risk of infection or re-infection within the outbreak areas: at the booking visit, again at 28 weeks, at 36 weeks, at birth, and 6 weeks post-partum *[703]*. As local guidelines within those areas may recommend different or additional times for testing, it is advisable to seek direction from local authorities *[703]*. In areas where point-of-care tests are used, serology confirmation of current infection or stages should be performed *[703]*.

Women should be reassessed at every antenatal visit for symptoms of syphilis, and/or change in risk factors, and additional testing outside of the routine screening intervals should be considered based on clinical indication. Women at risk of inadequate antenatal care should be screened opportunistically, outside of the set interval where appropriate, whenever they present for care.

Women who present with symptoms consistent with infectious syphilis should be treated at the time of first presentation *[703]*. Women with infectious syphilis diagnosed on serology should be treated as soon as possible (and ideally within 2 days) of diagnosis *[703]*. Contact tracing must be initiated immediately and support provided to ensure that current and previous contacts receive treatment. Women who are named as contacts of syphilis should also be treated at the time of initial presentation without waiting for serology results. Notification of confirmed or probable infectious syphilis in a pregnant woman is an urgent public health priority.

Notification of congenital syphilis
One study found that 95% of babies in the Northern Territory meeting CDNA criteria for probable congenital syphilis were not notified between 2009 and 2014 and that improved education regarding CDNA criteria for notification of congenital syphilis is necessary for clinicians and public health staff. This study contributed to the release of new national case definitions for congenital syphilis in July 2015.

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Practice summary: syphilis testing

When: Early in antenatal care or at five key times in areas experiencing an outbreak (see Section 36.5)

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker, infectious diseases specialist, public health unit staff

- ☐ **Discuss the reasons for syphilis testing:** Explain that it is important to find out whether a woman has syphilis because of the effects that infection can have on the pregnancy and the baby.
- ☐ **Monitor changes in risk:** Discuss potential symptoms and changes in risk-factors at all antenatal visits, particularly in areas experiencing an outbreak.
- ☐ **Document and follow-up:** Note the results of syphilis testing in the woman's record, including whether the syphilis is newly diagnosed or was previously treated. Have a follow-up system in place so that women with confirmed syphilis receive timely treatment or referral. Any positive tests should be notified to the relevant public health authority.
- ☐ **Take a holistic approach:** If a woman is found to be infected with syphilis, important considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections (if this has not already been done) and follow-up.

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Routinely recommend syphilis testing at the first antenatal contact.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Recommend repeat testing early in the third trimester (28–32 weeks) and at the time of birth for women at high risk of infection or reinfection.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Seek advice from an expert in sexual health or infectious diseases regarding the care of women who test positive and their partners.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Ensure contact tracing (including offering testing and treatment to identified contacts) is carried out. Involve an expert in contact tracing if required or seek advice from a sexual health clinic or other relevant expert.

Approved by NHMRC in April 2019; expires April 2024

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For women with newly confirmed infectious syphilis, recommend an intramuscular dose of 1.8 g (given as two 900 mg injections) benzathine penicillin as soon as possible, ensuring that women receive treatment at least 30 days before the estimated date of birth to ensure adequate treatment before the birth.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

In areas affected by an ongoing syphilis outbreak, recommend testing at the first antenatal visit, at 28 and 36 weeks, at the time of birth and 6 weeks after the birth.

Approved by NHMRC in April 2019; expires April 2024

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Consensus recommendation

In areas affected by an outbreak, treat women as soon as possible without waiting for confirmatory testing, particularly if there is a risk of loss to follow-up.

Approved by NHMRC in April 2019; expires April 2024

Info Box

Resources

ASHA (2018) *Australian STI Management Guidelines for Use in Primary Care*. Australasian Sexual Health Alliance.

ASHM (2016) *Australasian Contact Tracing Guidelines*. Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine.

CDNA (2018) *Syphilis CDNA National Guidelines for Public Health Units Version 1.1*. Canberra: Communicable Diseases Network Australia.

MJSO (2018) *Multijurisdictional Syphilis Outbreak Surveillance Reports*. Multijurisdictional Syphilis Outbreak Working Group.

Palasanthiran P, Starr M, Jones C et al (2014) *Management of perinatal infections*. Sydney: Australasian Society for Infectious Diseases (ASID).

WHO (2017) *WHO Guideline on Syphilis Screening and Treatment for Pregnant Women*. Geneva: World Health Organization.

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9.8 Rubella

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Rubella testing in pregnancy does not attempt to identify current affected pregnancies. Instead, it aims to identify women who are non-immune, so that they can be vaccinated after the birth and future pregnancies are protected against rubella infection and its consequences.

Background

Rubella (German measles) is usually a mild self-limiting disease with few complications. However, if contracted during the first trimester, it can affect the pregnancy and lead to congenital rubella syndrome at birth. Preventing congenital infection relies on maintaining high levels of immunity to rubella in the general population. There is no treatment to prevent or reduce mother-to-child transmission of rubella once infection has been detected in pregnancy. Rubella vaccination is contraindicated in pregnancy.

Rubella infection and immunity in Australia

- *Diagnoses of rubella*: In 2014, there were 17 diagnoses of rubella (0.1 per 100,000 population) *[669]*. Most notified cases were women (65%), with 64% being of childbearing age (15–44 years).
- *Geographical distribution*: Rates of diagnosis of rubella were low and fairly consistent across jurisdictions in 2014, ranging from no reported diagnoses in the Australian Capital Territory, Northern Territory and Tasmania to 0.1 per 100,000 population in Queensland, Victoria, New South Wales, South Australia and Western Australia *[669]*.
- *Congenital rubella syndrome*: This is rare in Australia and in recent years has mainly occurred among infants of women who were born overseas *[669]*.
- *Risk factors*: In Australia, populations at risk of non-immunity to rubella have been identified as including:
- women born overseas who may not have received rubella vaccines in their countries of birth *[663][672]* and are twice as likely to be non-immune than Australian-born women, with a higher likelihood of non-immunity among women born in Asia *[672]*
- Aboriginal and Torres Strait Islander women from rural and remote communities, with fewer than 75% of women tested antenatally having adequate levels of immunity (compared with more than 90% of women living in an urban area) *[667]*
- women 35 years of age or older, who were found to be twice as likely to be non-immune as younger women, possibly due to declining immunity over time *[672]*.

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Risks associated with rubella infection in pregnancy

Maternal rubella infection can result in spontaneous miscarriage, fetal infection, stillbirth, or fetal growth restriction *[670]*. Congenital infection is most likely if the maternal infection occurs in the first 16 weeks of pregnancy, with congenital rubella syndrome occurring in all fetuses infected before the 11th week and in 35% of those infected at 13–16 weeks *[668]*. If infection occurs after 16 weeks of pregnancy, the risk of fetal damage is negligible.

Features of congenital rubella syndrome include cardiac defects, deafness, ocular defects, thrombocytopenic purpura, haemolytic anaemia, enlarged liver and spleen, and inflammation of the meninges and brain *[671]*. Pneumonitis, diabetes, thyroid dysfunction and progressive panencephalitis are other late expressions of the syndrome *[673][662]*.

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Testing for rubella non-immunity

The NICE guidelines reviewed the evidence on rubella testing in pregnancy and found:

- high sensitivity and specificity of tests for immunity *[664]*
- high rates of congenital infection among babies born to women with symptoms of rubella in the first 12–16 weeks of pregnancy *[668][665]*
- no association between congenital infections and inadvertent rubella vaccination in pregnancy *[661]*.

The NICE guidelines reviewed the evidence on rubella testing in pregnancy and found:

- high sensitivity and specificity of tests for immunity *[664]*
- high rates of congenital infection among babies born to women with symptoms of rubella in the first 12–16 weeks of pregnancy *[668][665]*
- no association between congenital infections and inadvertent rubella vaccination in pregnancy *[661]*.

Info Box

Practice summary: rubella testing

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss rubella non-immunity:** Explain that it is important to find out whether a woman is immune to rubella because of the effects that infection can have on the pregnancy and the baby.
- ☐ **Document and follow-up:** Note the results of rubella testing in the woman's record. Have a follow-up system in place so that non-immune women are offered vaccination after the birth. Some women may not develop immunity even after repeated vaccination.
- ☐ **Take a holistic approach:** If a woman is found to be non-immune to rubella, offer advice on symptoms and transmission of rubella so that she can avoid contact as far as possible. Advise vaccination of family members who may also be non-immune.
- ☐ **Report inadvertent vaccination:** Report inadvertent vaccination with MMR (or MMRV) to the jurisdictional immunisation unit to enable follow-up and collection of data on adverse events following immunisation with this vaccine during pregnancy.

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Weak recommendation

Routinely offer and recommend testing for rubella immunity at the first antenatal visit to identify women at risk of contracting rubella and enable postnatal vaccination to protect future pregnancies.

Approved by NHMRC in December 2011; This recommendation is currently considered stable and no update is planned.

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Strong recommendation

Inform women who have been vaccinated against rubella before they were aware of the pregnancy that the baby is highly unlikely to have been affected by the vaccine.

Approved by NHMRC in December 2011; This recommendation is currently considered stable and no update is planned.

Good practice statement

Advise women identified as non-immune to rubella to avoid contact with people experiencing possible symptoms of rubella.

Approved by LEAPP Steering Committee 7 December 2023. This is a draft recommendation that has not yet been approved by NHMRC.

Info Box

Resources

Australian Technical Advisory Group on Immunisation (2017 update) *Australian Immunisation Handbook*. 10th edition. Canberra: Department of Health.

South Australian Perinatal Practice Guidelines Workgroup (2015) *Rubella infection in pregnancy*. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health.

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9.9 Asymptomatic bacteriuria

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Info Box

Testing for asymptomatic bacteriuria in pregnancy allows treatment to be offered to reduce the risk of progression to pyelonephritis.

Background

Asymptomatic bacteriuria is the persistent bacterial colonisation of the urinary tract (usually by Escherichia coli) without symptoms. It is common in pregnancy.

Asymptomatic bacteriuria in Australia

- *Incidence*: Incidence of asymptomatic bacteriuria during pregnancy has been reported to be 2–10% in the United States *[887][914]* and 2–5% in the United Kingdom *[898][889][892]*. In Australia, available estimates suggest that asymptomatic bacteriuria during pregnancy may be more common among Aboriginal and Torres Strait Islander women*[894][888][905]*.
- *Risk factors*: The prevalence of infection is most closely related to socioeconomic status and is similar in pregnant and non-pregnant women *[917][919]*. Other factors associated with an increased risk of bacteriuria include a history of recurrent urinary tract infections, diabetes and anatomical abnormalities of the urinary tract *[893]*.

Risks associated with asymptomatic bacteriuria in pregnancy

While asymptomatic bacteriuria in non-pregnant women is usually benign, in pregnancy it increases the likelihood of kidney involvement (pyelonephritis), with an incidence of around 30% in affected women *[919]*.

An association between untreated asymptomatic bacteriuria and low birth weight and preterm birth has also been suggested *[897][896][898][908]*. However, while a reduction in preterm birth and low birth weight is consistent with understanding of the role of infection in pregnancy complications *[911][912]*, other factors may be involved (eg other asymptomatic genitourinary infections) *[889][899]* or links with socioeconomic status *[906]*. There may only be an association between asymptomatic bacteriuria and preterm birth if the infection progresses to pyelonephritis *[901]*.

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Testing for asymptomatic bacteriuria

Universal testing for asymptomatic bacteriuria in pregnancy is recommended in the United Kingdom *[869]*, the United States *[918][903][904]*, Canada and Scotland *[910]*, based on the effectiveness of available treatments and the reduced risk of pyelonephritis.

Benefits of testing

Testing for asymptomatic bacteriuria has been shown to reduce the number of women per 1,000 who experience pyelonephritis from 23.2 with no testing, to 16.2 with dipstick testing and 11.2 with urine culture *[907]*. Both tests were found to be cost beneficial compared to no testing.

Effectiveness of interventions to treat asymptomatic bacteriuria

A Cochrane review found that antibiotic treatment compared with placebo or no treatment is effective in clearing asymptomatic bacteriuria (RR 0.25; 95%CI 0.14 to 0.48). The incidence of pyelonephritis was reduced by 75% (RR 0.23; 95%CI 0.13 to 0.41) *[912]*.

Testing method

Midstream urine culture is considered the standard for diagnosis of asymptomatic bacteriuria in pregnancy.

Dipstick urinalysis of nitrites may be useful for excluding asymptomatic bacteriuria but is not accurate for diagnosis *[890]*. A meta-analysis *[890]*) and a small number of RCTs *[915][895][891] [902]* have shown high specificity (89–100%) but low sensitivity (33–98%), with a mid range around 50%. Lower level studies have had similar results.

Timing of the test

There is no consensus in the literature about the optimal timing and testing frequency for asymptomatic bacteriuria. However, in a prospective study (n=3,254), a single urine specimen obtained between 12 and 16 weeks gestation identified 80% of women who ultimately had asymptomatic bacteriuria *[913]*.

Testing in rural and remote areas

Due to difficulties in transporting specimens to laboratories, dipstick tests are commonly used in remote areas to 'rule out' asymptomatic bacteriuria, with samples from women testing positive then sent for culture to confirm infection. While urine culture is the preferred method of testing, this process has been found to be cost effective *[907]*. However, factors specific to conditions in rural and remote Australia (eg high humidity and ambient temperatures) may contribute to under diagnosis and overtreatment. Considerations in testing for asymptomatic bacteriuria in these areas include *[888]*:

- whether specimens can be provided to pathology services within the timeframe in which they can still be cultured (ideally within 24 hours)
- the availability of appropriate storage facilities for dipstick tests
- the consequences of treating all women with a positive dipstick result given the high rate of false positives and the risk of increased resistance to antibiotics associated with over-prescribing
- recall systems for women with a positive result on culture.

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Repeat testing

Although most guidelines recommend a single urine culture at the first antenatal visit, two prospective studies have concluded that urine should be cultured in each trimester of pregnancy to improve the detection rate of asymptomatic bacteriuria *[900][916]*. There has been no prospective evaluation of repeated testing during pregnancy *[909]*.

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Practice summary: testing for asymptomatic bacteriuria

When: Early in antenatal care

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss testing for asymptomatic bacteriuria:** Explain that identifying urinary tract infection enables women to be treated with antibiotics and avoids the risk of complications.
- ☐ **Document and follow-up:** Note the results of testing in the woman's record and have a follow-up system in place so that appropriate treatment is provided if a woman is found to have bacteriuria.

Strong recommendation

Routinely offer and recommend testing for asymptomatic bacteriuria early in pregnancy as treatment is effective and reduces the risk of pyelonephritis.

Approved by NHMRC in December 2011; expires December 2016

Strong recommendation

Use urine culture testing wherever possible, as it is the most accurate means of detecting asymptomatic bacteriuria.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Where access to pathology services is limited, dipstick tests may be used to exclude infection, with positive results confirmed by urine culture. Appropriate storage of dipsticks is essential to the accuracy of these tests.

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

Widmer M, Lopez I, Gülmezoglu A et al (2015) *Duration of treatment for asymptomatic bacteriuria during pregnancy*. *Cochrane Database of Systematic Reviews 2015*, Issue 11. Art. No.: CD000491.

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9.10 Group B streptococcus

Info Box

Identifying women who are at risk of having a baby with Group B streptococcus enables treatment to be given during labour to prevent transmission of infection to the baby.

Background

Group B streptococcus is a common bacterium that can colonise people of all ages without symptoms. It is generally found in the gastrointestinal tract, vagina and urethra. The bacteria can be passed from mother to baby during labour and lead to infection in the first week of life (early onset infection). Late onset infection can develop up to 3 months of age. Prevention focuses on early onset, which is the most common cause of serious infection in newborn babies.

Prevalence and incidence

- *Maternal colonisation*: A systematic review estimated rates of maternal colonisation in Europe to range from 6.5% to 36% *[938][939]*, with one-third of included studies reporting rates greater than 20%. Lower level studies in Europe and other regions have found similar rates *[996][948][991][942][964][955][959][978][958][967][966][997]*. Australian studies have identified colonisation rates in the range of 20% to 24% *[957][936]*. A study of antenatal care for Aboriginal and Torres Strait Islander women in Townsville (n=456) identified Group B streptococcus as a complication of pregnancy in 15.2% of women *[971]*, with a testing rate of around 60% *[971][972]*.
- *Group B streptococcus infection in the newborn*: The incidence of neonatal Group B streptococcus infection ranges from 0.2/1,000 live births to 1.71/1,000 live births *[935][962][969][987][940][964][986] [944][941][994] [966][997]*.
- *Risk factors*: Risk factors for early onset Group B streptococcus infection of the newborn include maternal colonisation during the pregnancy, previous infant with Group B streptococcus infection, preterm birth, prolonged rupture of the membranes and maternal fever during labour *[970]*. There is low-level evidence that Group B streptococcus colonisation in a previous pregnancy may be a risk factor for recolonisation in a subsequent pregnancy *[947][989][983]* but this association was not found in all studies *[995]*. HIV infection does not appear to increase the risk of colonisation *[981]*.

Risks associated with Group B streptococcus colonisation during pregnancy

- A positive result for Group B streptococcus on urine culture may be a risk factor for preterm labour, premature rupture of the membranes, intrapartum fever and chorioamnionitis *[963]*.
- Early onset Group B streptococcus may affect babies before birth and increase the risk of preterm birth or caesarean section *[988]*. In the newborn, the infection is usually evident as respiratory disease, general sepsis, or meningitis within the first week after birth. Population-based surveillance in the United States suggests a neonatal death rate of around 5% of affected babies *[945]*.

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Info Box

Preventing Group B streptococcus

Intravenous antibiotic treatment during labour has been shown to prevent early onset Group B streptococcus infection in 86–89% of newborns of mothers colonised before birth *[968][980]*. Preventive approaches involve offering treatment to all women with a previous infant with Group B streptococcus infection and to other women based on:

- colonisation as identified by routine antenatal culture of vaginal-rectal swabs: recommended in the United States *[943][993][976]* and Canada *[982]*; or
- risk factors for transmission during labour (preterm birth, maternal body temperature >38°C, membrane rupture > 18 hours): recommended in the United Kingdom*[869][979]*.

Both routine antenatal testing and risk-based treatment approaches are currently used in Australia.

Benefits and harms of preventive approaches

While there is no high-level evidence on the benefits of approaches to prevent transmission of Group B streptococcus, prospective and retrospective studies have identified reductions in the incidence of Group B streptococcus in the newborn associated with both routine antenatal testing *[936][946][952][973][975]* and risk-based testing *[986]*.

Narrative reviews have identified limitations associated with routine antenatal testing including a lack of predictive certainty that a positive Group B streptococcus culture will lead to infection of the newborn, the potential for a false negative result and maternal anxiety *[950][964][941]*.

Both preventive approaches increase exposure of mother and baby to antibiotics, with possible harmful effects (eg allergic reactions, increase in drug-resistant organisms) (*[970]*. However, anaphylaxis following penicillin treatment is rare (4/10,000–4/100,000 women with no known allergy) and the risk is greatly offset by the reduced incidence of neonatal and maternal sepsis *[980]*.

Cost-effectiveness

In the United Kingdom, available modelling on cost-effectiveness does not support introducing routine antenatal testing *[949][961]*. A French study found that PCR testing during the birth was associated with lower hospital costs than antenatal testing *[953]*. No Australian evidence on the cost-effectiveness of approaches to preventing early onset Group B streptococcus was identified in the systematic literature review.

An economic analysis carried out to inform the development of these Guidelines (see separate document on economic analyses) found that the benefits of testing do not outweigh the costs involved, whatever approach is taken. This is because of the relatively low number of newborns affected and the absence of robust data on severe or long-term health effects in the event of an infection. Of the strategies evaluated, routine testing only is slightly more cost-effective than routine testing with treatment for certain risk factors, when compared to 'doing nothing'.

Timing of antenatal testing

A systematic review *[991]* into the optimal timing of antenatal testing found cultures collected in late pregnancy had a high positive predictive value for colonisation during labour. These findings are supported by other smaller studies *[957][984]*.

Type of antenatal test

Detection rates of Group B streptococcus are higher when a combined vaginal-rectal swab is taken *[965][951][993][977]*, with a sensitivity of 84% compared to 58% for a vaginal swab and 71% for a rectal swab *[951]*. Limited low-level evidence suggests vaginal-perianal swabs may be an alternative to vaginal-rectal swabs as culture yields are similar and collection causes less discomfort to the woman *[960] [985]*.

Self-collection of vaginal-rectal specimens has been found to have similar culture yields to collection by a health professional *[937][956][974]*, without the need for standardised or lengthy information about specimen collection methods *[956]*.

Organisational practice

Prospective studies evaluating the effects of introducing routine antenatal testing have found that, although testing had been extensively and successfully adopted, early onset Group B streptococcal infection still occurred due to culture detection failure, deviation from protocol *[941]* or missed testing *[954][993]*. This highlights the importance of consistently following organisational protocols and auditing outcomes.

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Discussing Group B streptococcus

Discussion about Group B streptococcus should take place at around 35 weeks gestation so that women have received information about preventive treatment before they go into labour. This timing also enables testing at 35–37 weeks and receipt of test results, if testing is being offered. Points for discussion include:

- Group B streptococcus is part of the normal bacteria that live in the body and anyone can become colonised with Group B streptococcus without having symptoms
- Group B streptococcus is transmitted to the baby during the birth in 1–2 per 1,000 live births and can cause serious infection in the newborn
- treatment with intravenous antibiotics during labour reduces the risk of transmission of the infection to the baby
- women may be advised to remain in hospital for at least 24 hours after the birth so that the baby can be observed for signs of Group B streptococcus infection.

Info Box

Practice summary: Group B streptococcus

When: At around 35 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss prevention:** Explain that treatment during labour is offered to women who are identified as being colonised with Group B streptococcus, have previously had a baby with Group B streptococcus infection and/or have risk factors for transmission during labour.
- ☐ **If testing is offered, give information about the test:** Discuss how the test is carried out and, unless the woman would prefer to have the specimen collected by a health professional, provide the test for her to carry out in the health care setting or at home. For women who choose to self-collect, provide clear explanation of how this is done (eg using diagrams or pictures).
- ☐ **Take a holistic approach:** Explain the implications of a positive test result or a previous baby with Group B streptococcus (eg a woman may not be able to give birth in the setting she had planned, treatment may not be possible if labour is very short). If a woman needs to travel to give birth, explain the importance of the test being carried out at 35-37 weeks (ie she needs to plan to have the test before she travels or arrange to have it where she will give birth).
- ☐ **Document and follow-up:** If antenatal testing is carried out, tell the woman the results and note them in her antenatal record. Have a system in place so that a woman with a positive test result or a previous infant with Group B streptococcus infection is informed about the importance of relaying this information to the health professionals who will care for her during labour.

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Weak recommendation

Offer either routine antenatal testing for Group B streptococcus colonisation or a risk factor-based approach to prevention, depending on organisational policy. (Grade C recommendation)

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Weak recommendation

If offering antenatal testing for Group B streptococcus, arrange for testing to take place at 35–37 weeks gestation.

Weak recommendation

Encourage women to self-collect vaginal-rectal specimens for culture testing for Group B streptococcus and offer information about how to do this. (Grade C Recommendation)

Info Box

Resources

Allen VM, Yudin MH, Bouchrad C et al (2012) *Management of group B streptococcal bacteriuria in pregnancy*. J Obstet Gynaecol Can 34(5): 482–86.

RANZCOG (2016) *Maternal Group B Streptococcus in Pregnancy: screening and management*. College Statement C-Obs 19. Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

RCOG (2017) *Group B Streptococcal Disease, Early–onset* (Green-top Guideline No. 36). London: Royal College of Obstetricians and Gynaecologists.

Remote Primary Health Care Manuals. (2017). Group B streptococcus (GBS). In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

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10. Targeted maternal health tests

New

Info Box

Download Health Professional Summary Sheet for this section *here*

Info Box

This section discusses the evidence for offering women a range of tests for women identified as at increased risk (see Table G1). Recommendations are based on evidence about the diagnostic accuracy of available tests, the effectiveness of interventions to prevent mother-to-child transmission of infection or other effects on the unborn baby, and the availability of treatments.

For notifiable infections (chlamydia, gonorrhoea), diagnoses are required to be reported to the National Notifiable Diseases Surveillance System. This allows analysis of trends in jurisdictions and groups at risk, although data quality varies for the different conditions and reporting of Indigenous status is incomplete in some States and for some conditions. Evidence on the prevalence and incidence of other conditions is generally from observational studies and may not be representative of the Australian population or groups within the population. While incidence or prevalence data are not always available, each section includes a brief discussion that aims to give health professionals an indication of the likelihood that women in their community will be affected.

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Table G1: Summary of advice on tests offered to women at increased risk

Condition	Offer test to:	Test(s)	Rationale/follow-up	Chapter
Chlamydia*	Women younger than 30 years All pregnant women in areas of high prevalence	First pass urine NAAT	Treatment may reduce the risk of preterm birth, premature rupture of the membranes and low birth weight	40
Gonorrhoea*	Women with known risk factors or living in areas where prevalence is high	Vaginal, urine or endocervical specimens NAAT	Treatment may prevent neonatal infection	41
Trichomoniasis*	Women with symptoms	PCR testing of vaginal swabs	Treatment may prevent certain infections in the newborn but is associated with adverse effects	42
Toxoplasmosis	Women may request testing based on exposure to sources	Studies into tests are limited and inconclusive	Insufficient evidence on treatment. Advice on prevention may reduce the risk of infection	43
Cytomegalovirus	Women who have frequent contact with large numbers of very young children	Studies into tests are limited and inconclusive	Advice on prevention may reduce the risk of infection; seek expert advice if infection is identified	44
Hyperglycaemia	Women with risk factors for hyperglycaemia	Glycated haemoglobin or fasting blood glucose	Hyperglycaemia can be minimised during pregnancy to improve outcomes	32
Asymptomatic bacterial vaginosis	Women with a previous preterm birth	High vaginal swab Amsel's criteria Nugent's criteria	Early treatment (<20 wks) may reduce risk of premature rupture of the membranes and low birth weight	45
Thyroid function	Women with symptoms or risk factors	Blood test for thyroid-stimulating hormone	Treatment improves maternal and newborn outcomes	46
Vitamin D status	Women considered to be at risk	Blood test for serum 25-OHD	Women at high risk of deficiency may benefit from supplementation	47
Human papilloma virus	Women who have not had a cervical screen in the recommended time period	Pap smear	Allows detection of precancerous cervical abnormalities	48

* Psychosocial support, partner testing and contact tracing are required for women with sexually transmitted infections.
25-OHD=25-hydroxyvitamin D; NAAT=nucleic acid amplification test; PCR=polymerase chain reaction; RNA=ribonucleic acid.

10.1 Chlamydia

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Info Box

Antenatal care provides opportunities for testing women from population groups with a high prevalence of chlamydia infection.

Background

Chlamydia is caused by the bacterium *Chlamydia trachomatis*. Chlamydia infection is asymptomatic in at least 70% of women. In women, chlamydia initially infects the cervix and urethra, eventually causing abnormal vaginal discharge and dysuria *[815]*. Untreated, the infection can reach the fallopian tubes, causing pelvic inflammatory disease and adhesions. In pregnant women, chlamydia may affect normal intra- and extrauterinedevelopment *[815]*.

Prevalence of chlamydia

Rates of diagnosis

Chlamydia is the most frequently reported sexually transmissible infection in Australia. The notification rate was relatively stable between 2011 and 2015 and increased by 13% between 2015 and 2017 *[807]*. Notifications have been higher in women than in men in all years (441.8 vs 349.9 per 100,000 in 2017). In 2017, the rate in the Aboriginal and Torres Strait Islander population was 2.8 times that in the non-Indigenous population (1,193.9 vs 427.0 per 100,000), increasing to five times higher in remote/very remote areas *[808]*.

Age

Among women, rates in the 15–19 year age group have declined (from 2302.0 in 2011 to 1,772.8 per 100,000 in 2017), rates in the 20–24 year age group have remained stable (2,226.7 in 2011 and 2,346.0 in 2017) and rates in the 25–29 year age group have increased (from 927.8 in 2011 to 1,111.4 per 100,000 in 2017) *[807]*. In 2017, rates among Aboriginal and Torres Strait Islander women aged 15–19 and 20–29 years were 3.8 times and 2.7 times higher, respectively, than in the non-Indigenous population*[808]*.

Geographical distribution

Between 2013 and 2017 in New South Wales, there was a 30% increase in chlamydia notification rates from 289.9 to 377.5 per 100,000 *[807]*. Similarly, in Queensland there was a steady increase from 437.8 to 488.4 per 100,000. Between 2016 and 2017, notification rates increased by 9% in New South Wales and by 8% in South Australia and Victoria. Notification rates of chlamydia have been highest and remained stable in remote and very remote regions in the 5-year period from 2013 to 2017 (824.6 per 100,000 in 2017) *[807]*. Notification rates increased by 20% in major cities in the same period (335.8 to 403.4 per 100,000 in 2017), but declined by 5% in inner and outer regional areas (407.2 to 398.9 per 100,000).

Risks associated with chlamydia in pregnancy

A systematic review of cohort studies *[815]* found that chlamydia infection during pregnancy was associated with an increased risk of preterm birth (RR 1.35; 95%CI 1.11 to 1.63), low birth weight (RR 1.52; 95%CI 1.24 to 1.87) and perinatal mortality (RR 1.84; 95%CI 1.15 to 2.94). There was no clear evidence of an increased risk of premature rupture of membranes (RR 1.13; 95%CI 0.95 to 1.34), miscarriage (RR 1.20; 95%CI 0.65 to 2.20) or postpartum endometritis (0.89; 95%CI 0.49 to 1.61).

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Chlamydia testing

The *Australian STI Management Guidelines* recommend nucleic acid amplification testing (NAAT) of first pass urine, endocervical, vaginal or anorectal swabs (if the woman has anal sex or anorectal symptoms) and advise consideration of self-collection of samples by pregnant women *[803]*.

Diagnostic accuracy

No recent studies were identified that explicitly compared a diagnostic test to a reference test among pregnant women with uncomplicated pregnancies. Identified studies found that:

- sensitivity and specificity for chlamydia of urine samples relative to endocervical samples were 96.5% (95%CI 90.1 to 99.3%) and 100% (99.8 to 100%) and positive and negative predictive values were 100% (95%CI 95.6 to 100%) and 99.8% (95%CI 99.5 to 100%) *[813]*
- while pregnant women specifically have not been studied, the results available in non-pregnant populations are encouraging for the ability to test and treat women in antenatal care using point-of-care tests *[806]*.

Availability of effective treatment

A cohort study found that, compared to women whose chlamydia infection was detected after 20 weeks or persisted during pregnancy, women whose chlamydia was detected and treated before 20 weeks gestation had a reduced risk of preterm birth in the less than 20 year age group (RR 0.54; 95%CI 0.37 to 0.80) but there was no clear difference in risk for women in other age groups *[805]*.

Cost-effectiveness

An Australian cost-effectiveness study *[810]* found that, from an Australian Government perspective, chlamydia testing for all women aged 16–25 years old during an antenatal visit was likely to be cost-effective compared with no testing or selective testing, especially with increasing chlamydia prevalence (the study assumed a prevalence of 3%; in 2016 prevalence was 1.9% among women aged 15–19 years, 2.4% among women aged 20–24 years and 1.1% among women aged 24–29 years).

International cost-effectiveness studies found that:

- universal antenatal testing for chlamydia was cost-saving in the Netherlands (estimated overall prevalence 3.9%), with further increases in savings when testing was targeted to pregnant women younger than 30 years of age *[814]*
- cost and benefit of universal testing in pregnancy in the United States was reliant on the prevalence of chlamydia — when prevalence was above 16.9% there were net cost savings; at a prevalence of 8%, expenses were $124.65 million ($19.34/individual); and at a prevalence of 6.7%, net expenditure for screening was $249.08 million ($38.65/individual) *[804]*.

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Routine versus targeted testing

No recent studies were identified that directly compared outcomes associated with universal antenatal testing with those associated with targeted or no testing. However, the evidence supports testing of young Australian women at the first antenatal visit based on:

- the high prevalence of chlamydia in young people in Australia and the increase in notifications among women aged 25–29 years (see Section 40.1.1)
- early treatment reducing the risk of preterm birth among young women (see Section 40.2.2)
- the cost-effectiveness of antenatal screening among women aged 16–25 years (see Section 40.2.3)
- the benefits of consistency between recommendations in national guidelines (eg *[803][811]*).

In areas of high prevalence, repeat testing may be required.

Uptake of testing recommendations

An Australian study that assessed clinical uptake of the RANZCOG 2006 recommendation to test women younger than 25 found that, in 2010, only about one-fifth of participants routinely offered testing to women in this population group *[809]*. The study highlighted the need for national clinical leadership regarding testing for chlamydia among pregnant women. Current RANZCOG guidance is to selectively test women based on local prevalence *[812]*.

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Treatment of chlamydia

The recommended treatment for chlamydia in pregnancy is oral azithromycin 1g as a single dose *[803]*. Testing for other sexually transmitted infections for women with diagnosed chlamydia is also recommended.

Info Box

Practice summary: chlamydia

When: At the first contact with women younger than 30 years

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

- ☐ **Discuss chlamydia**: Explain the association between chlamydia and preterm birth and low birth weight, that tests for the infection are available and that it is easily treated with antibiotics.
- ☐ **Take a holistic approach**: If a woman tests positive for chlamydia, important considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up. Any positive tests should be notified to public health.
- ☐ **Learn about locally available resources**: Available testing services and support organisations will vary by location.

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Consensus recommendation

When testing for chlamydia in pregnant women, consider the use of urine samples or self-collected vaginal samples.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Routinely offer chlamydia testing at the first antenatal visit to pregnant women younger than 30 years.

Approved by NHMRC in April 2019; expires April 2024

Info Box

Resources

ASHA (2018) *Australian STI Management Guidelines for Use in Primary Care*. Australasian Sexual Health Alliance.

ASHM (2016) *Australasian Contact Tracing Guidelines*. Australasian Society for HIV, Viral Hepatitis and Sexual Health Medicine.

Palasanthiran P, Starr M, Jones C et al (2014) *Management of perinatal infections*. Sydney: Australasian Society for Infectious Diseases (ASID).

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10.2 Gonorrhoea

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Info Box

Gonorrhoea is a sexually transmitted infection that can cause complications in pregnancy. Antenatal care provides opportunities for women from population groups with a high prevalence of the infection to be offered testing.

Background

Gonorrhoea is a sexually acquired infection caused by Neisseria gonorrhoeae. In women it may be asymptomatic, or present as an abnormal vaginal discharge, pelvic pain and/or difficulty urinating. Women with untreated gonorrhoea infection can have high morbidity (eg pelvic inflammatory disease, chronic pelvic pain). In pregnancy, gonorrhoea infection can cause adverse obstetric and neonatal outcomes. There is evidence that tests can accurately detect gonorrhoea infection and that antibiotics are effective in its treatment *[1098]*).

Diagnoses of gonorrhoea in Australia

- *Rates of diagnosis*: Between 2012 and 2016, there was a 63% increase in notification rates (from 61.9 to 100.8 per 100,000), with a 43% increase among women (from 25.7 to 55.9 per 100,000) *[842]*. By 2012, most laboratories had switched to using dual chlamydia and gonorrhoea tests where, if a chlamydia test was ordered, a gonorrhoea test would be conducted automatically. The emphasis on testing for chlamydia in young people has therefore led to a substantial rise in the number of tests conducted for gonorrhoea, which may explain the increase in diagnoses in women before 2012 but not since then.
- In 2016, The gonorrhoea notification rate for Aboriginal and Torres Strait Islander women was 15 times that of non-Indigenous women (611.8 vs 41.8 per 100,000; data do not include New South Wales) *[843]*. However, since 2012, the rate of notification of gonorrhoea decreased by 17% in the Aboriginal and Torres Strait Islander population, compared with a 125% increase in the non-Indigenous population.
- *Age:* Between 2012 and 2016, the notification rate of gonorrhoea increased in all age groups 20 years and above *[842]*. Among women, the largest increases were in the 30–39 year (94%), 25–29 year (93%) and 20–24 year (39%) age groups.
- *Geographical location:* Between 2007 and 2016, gonorrhoea notification rates increased in all jurisdictions except the Northern Territory, where rates fluctuated *[842]*. In 2016, gonorrhoea notification rates were highest in the Northern Territory (699.6 per 100,000), followed by Western Australia (132.8 per 100,000). Notification rates increased in major cities (99% increase) and inner and outer regional areas (15% increase) but declined in remote and very remote areas (8% decline). In 2016, gonorrhoea notification rates were highest in remote areas (532.5 per 100,000), followed by major cities (101.3 per 100,000) and regional areas (50.7 per 100,000).
- *Country of origin:* In 2008, the World Health Organization estimated the incidence of gonorrhoea per 1,000 women aged 15–49 years to be 50 in Africa, 35 in the Western Pacific, 19 in the Americas, 16 in South-East Asia and 8 in Europe *[1099]*.
- *Incidence in pregnancy:* The incidence of gonorrhoea in pregnant women who are not at high risk for infection is generally low. However, it varies by population, approximately 1% among pregnant women in the United States *[1089]* (range 0.2–4%) (CDC 2004), 3.3% in a developing country setting *[1097]* and 3.4% among adolescent women in a low-income area in the United States *[1092]*.
- *Risk factors:* Increased risk of gonorrhoea has been associated with previous gonorrhoea infection or other sexually transmitted infection, new or multiple sex partners and inconsistent condom use, commercial sex work and drug use and living in communities with a high prevalence of gonorrhoea *[1098]*.

Risks associated with gonorrhoea in pregnancy

Untreated gonorrhoea during pregnancy is associated with adverse outcomes including ectopic pregnancy, septic spontaneous miscarriage, chorioamnionitis, premature rupture of membranes, preterm labour and postpartum infection *[1090][1098]*.

N. gonorrhoeae can be transmitted from the mother's genital tract to the newborn at the time of birth and occasionally, when there is prolonged rupture of the membranes, it can be transmitted to the baby before birth *[1084]*. The usual manifestation of neonatal infection is conjunctivitis (ophthalmia neonatorum), which begins in the first days of life and, if left untreated, may lead to blindness *[1084]*. The risk of transmission from an infected mother is between 30% and 47% *[1088][1087]*.

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Testing for gonorrhoea

While testing all women for gonorrhoea during pregnancy is recommended in Canada *[1093]*, a number of bodies in the United States recommend testing only women at high risk *[1082][1083][1081][1098]*. The Royal Australian College of General Practitioners (RACGP) also supports testing only women considered to be at risk *[1094]*. The prevalence of gonorrhoea is regionally variable and, in some areas, high prevalence may occur with that of other sexually transmitted infections, such as chlamydia. It is important for health professionals to be aware of the rates of sexually transmitted infection in their community and develop local protocols accordingly.

Diagnostic accuracy of tests

In Australia, culture methods for detection of N. gonorrhoeae have been increasingly replaced by NAATs, especially in remote areas *[1096]*. These tests can be performed on self-collected vaginal swabs, urine and endocervical specimens. The sensitivity and specificity of vaginal swabs are similar whether collected by the woman (96.1%; 99.3%) or health professional (96.2%; 99.3%), identifying as many infections as endocervical swabs and more than first-catch urine samples *[1095]*. These tests are evolving and guidelines for laboratories on their use and interpretation have been developed to reduce the high risk of false positives associated with some tests (Smith et al 2005). Where possible, positive results should be confirmed with culture for antibiotic sensitivity testing and to exclude false positives, particularly in low-risk individuals.

In a retrospective study, repeat testing of women at high risk at 34 weeks identified additional women with infection (n=751) (Miller et al 2003). In the United States *[1098]*) and Canada *[1093]*, testing is recommended in the first trimester, with testing in subsequent trimesters (Canada) or in the third trimester (United States) for women at continued risk or with a new risk factor.

Harms and benefits of testing

There is some evidence that testing and subsequent treatment of pregnant women at high risk of gonorrhoea may prevent complications associated with gonococcal infection during pregnancy *[1098] [1086]*. Potential harms of testing include false-positive results, anxiety and unnecessary antibiotic use *[1098]*. There is insufficient evidence to quantify the magnitude of these harms but it is likely that they are outweighed by the benefits of testing women at increased risk *[1098]*.

No evidence on the cost-effectiveness of testing for gonorrhoea in pregnancy was identified.

Effect of treatments on risks associated with gonorrhoea

The aim of treating gonorrhoea during pregnancy is to eradicate the infection and prevent neonatal infection, postpartum sepsis for the mother and transmission to sexual partners *[1084]*. In a systematic review (n=346) *[1084]*, all tested antibiotic regimens (penicillins, spectinomycin or ceftriaxone) demonstrated a high level of effectiveness as judged by 'microbiological cure', with eradication rates of between 89% and 97%. However, the effects of treatment on substantive outcomes such as ophthalmia neonatorum have not been reported and may vary between different antibiotics.

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Discussing gonorrhoea

Discussion to inform a woman's decision-making should take place before testing takes place and include:

- it is possible to have gonorrhoea without experiencing symptoms
- risk factors for sexually transmitted infection
- the possibility of false positive results
- gonorrhoea causes problems with the pregnancy including spontaneous miscarriage, preterm birth and infection of the newborn
- treatment of gonorrhoea may prevent pregnancy complications associated with infection
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved
- testing for other sexually transmitted infections may be needed
- a second test may be given a week later if symptoms remain
- repeat testing for gonorrhoea may be needed for women at ongoing risk of infection.

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Info Box

Practice summary: gonorrhoea

When: A woman has risk factors for gonorrhoea infection, lives in an area of high prevalence or has come from a country with high prevalence

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss the reasons for gonorrhoea testing:** Explain that it is important to find out whether a woman has gonorrhoea because of the effects that the infection can have on the pregnancy and the baby.
- ☐ **Take a holistic approach:** If a woman is found to have gonorrhoea infection, other considerations include counselling, contact tracing, partner testing, testing for other sexually transmitted infections and follow-up.
- ☐ **Document and follow-up:** If a woman is tested for gonorrhoea, tell her the results and note them in her antenatal record. Have a follow-up system in place so that infected women receive timely treatment or referral. Consider repeat testing for women who may be at ongoing risk of infection.

Consensus recommendation

Do not routinely offer gonorrhoea testing to all women as part of antenatal care.
Offer gonorrhoea testing to pregnant women who have known risk factors or who live in or come from areas where prevalence is high.

Approved by NHMRC in June 2014; expires June 2019

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Info Box

Resources

AGSP (2011) *Australian Gonococcal Surveillance Programme Annual Report, 2010. Commun Dis Intell* 35(3): 229–36.

ASHA (2016) *Australian STI Management Guidelines for Use in Primary Care. Australasian Sexual Health Alliance*. Accessed: 10 August 2018.

Papp JR, Schachter J, Gaydos CA et al ; Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC (2014) *Recommendations for the laboratory-based detection of Chlamydia trachomatis and Neisseria gonorrhoeae - 2014.MMWR Recomm Rep* 263(RR-02): 1–19.

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Remote Primary Health Care Manuals. (2017). Sexual health. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Workowski KA & Berman S (2010) *Sexually transmitted diseases treatment guidelines, 2010*. Centers for Disease Control and Prevention. *MMWR Recomm Rep* 59(RR-12): 1–110.

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10.3 Trichomoniasis

Info Box

Identifying the cause of vaginitis symptoms enables a woman to make an informed decision about treatment during pregnancy.

Background

Trichomoniasis is a sexually transmitted vaginitis caused by the single-celled protozoan parasite Trichomonas vaginalis. Around 70% of people with trichomoniasis do not experience symptoms *[1372]*. When symptoms are present in women, they include a smelly, yellow-green vaginal discharge with vulval irritation *[1372]*. Trichomoniasis is associated with infertility, pelvic inflammatory disease and enhanced HIV transmission *[1363][1366][1345][1336]*).

Prevalence of trichomoniasis in pregnancy

Trichomoniasis is the most common curable sexually transmitted infection globally, with a prevalence among women of 8.1% *[1371]*. Prevalence varies with age as well as geographical region.

- *Population-level data*: There are no accurate data available regarding the national prevalence of trichomoniasis in Australia and the infection is not notifiable.
- *Geographical location:* The reported prevalence of trichomoniasis in different regions of Australia is extremely variable, ranging from virtually zero in the largest cities *[1354][1351][1368]* to 25% in remote northern Aboriginal communities *[1341]*. A study of prevalence in rural and remote New South Wales found that prevalence increased with remoteness in both Aboriginal and non-Indigenous women *[1360]*.
- *Aboriginal and Torres Strait Islander women:* Small studies of discrete populations have found an prevalence among pregnant women of 15.5–17.6% *[1346]* in remote areas and 7.2% in an urban area *[905]*.
- *Country of origin*: Prevalence has been estimated as 3–3.7% among women in the United States *[1032][1366][1353]*, 0.3–6% among South American women *[1350][1339]*, 5.5–8.5% among Asian women *[1361][1330][1352]*, 10–14% among African American women *[1333][1355][1032]* and 5.4–17.6% among African women *[1329][1364]*.
- *Risk factors*: Risk factors include multiple sexual partners, previous sexually transmitted infections, non-use of barrier contraceptives, work in the sex industry, intravenous drug use, smoking, low socioeconomic status and incarceration *[1331][1362][1345][1372]*.

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Risks associated with trichomoniasis in pregnancy

- *Pregnancy risks:* Trichomoniasis in pregnancy may be associated with increased risk of preterm birth and low birth weight *[1332][1353][1340]*.
- *Risks to the baby:* Maternal trichomoniasis has been associated with genital and respiratory infections of the newborn *[1335][1367]*.

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Testing for trichomoniasis

In the United States *[1372]*, testing for trichomoniasis during pregnancy is only recommended for women with symptoms. Recommendations on testing during pregnancy have not previously been developed in the United Kingdom or Australia.

Specimen collection

Small low-level studies in non-pregnant populations have concluded that:

- self-collected vaginal swabs correlate with specimens collected by health professionals *[1050][1347][1343]* and are easy to perform *[1347]*
- self-collection by tampon sampling is acceptable to women *[1369]*, is easily incorporated into practice and may be suitable in remote settings as samples do not require refrigeration *[1338]*.

Diagnostic test accuracy

Testing for trichomoniasis in Australia is mostly carried out using PCR, which is rapidly replacing culture testing as it has higher sensitivity and results are available more quickly.

- *PCR testing* of vaginal swabs has high sensitivity (96–100%) and specificity (97–100%) *[1350][1333] [1050][1358]*. Small studies have found that PCR testing of tampon samples has high sensitivity (94–100%) *[1348][1365]*. PCR testing of urine samples has lower sensitivity and specificity (76.7% and 97%) *[1358]*.
- *Culture testing* of vaginal swabs has a sensitivity of 63.0–98.2% and specificity of 99.4–100% *[1350][1329] [1333][1050]*. It requires an incubator and culture medium and may take up to 7 days for a result.

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While trichomoniasis is occasionally diagnosed by Pap smear, its use is not adequate as the sole method of diagnosis because of its low sensitivity (60.7–72.1%) and the delay in obtaining results *[1349] [1350][1050]*.

Benefits and harms of testing

While accurate diagnostic tests are available, the benefits of testing are limited by uncertainties about the effect of treatments during pregnancy. Advantages of identifying and treating trichomoniasis include relief of symptoms, reduced risk of further transmission and possible prevention of genital and respiratory infections in the newborn *[1372]*. Potential harms of testing include false positive diagnosis *[1344]* and adverse effects associated with treatment (see below).

Availability of safe and effective treatments for trichomoniasis

Metronidazole and tinidazole are used to treat trichomoniasis *[1357][1337][1370][1372]*. The Therapeutic Goods Administration classifies metronidazole as pregnancy category B2 and tinidazole as B3.

Based on the limited evidence available, treatment with metronidazole provides parasitological cure in around 90% of women and would likely be more effective if partners were also treated *[1372][1340]*. However, it does not reduce risk of preterm birth or low birth weight in asymptomatic women *[1340]* and may increase the risk of preterm birth *[1334][1342]*.

Studies into the effect of treatment in women with symptomatic trichomoniasis are also limited and findings are inconsistent. Some suggest an increased incidence of preterm birth *[1359][1356]*and others found no association with preterm birth *[1353]*. Findings may be affected by method of assessing gestational age *[1364]* and timing of diagnosis.

Due to the lack of clarity on the risk of preterm birth, treatment of asymptomatic pregnant women is not recommended but may be a consideration after 37 weeks gestation. Treatment for women with symptoms requires consideration of the risks and benefits for the individual woman.

Repeat testing

Due to the high rates of reinfection among women diagnosed with trichomoniasis, retesting 3 months following treatment may be a consideration, although this approach has not been evaluated *[1372]*.

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Discussing trichomoniasis

Discussion to inform a woman's decision-making should take place before testing takes place and include:

- trichomoniasis is a sexually transmitted infection and most people do not experience symptoms
- trichomoniasis is associated with increased risk of preterm birth and low birth weight and may cause some types of infection in the newborn
- treatment of trichomoniasis relieves symptoms, reduces the risk of transmission and may prevent related infections in the newborn but may not reduce the risk of preterm birth
- testing and treatment of partners is advisable if infection is identified and the couple should abstain from sex until treatment is complete and symptoms have resolved
- testing for other sexually transmitted infections may be needed.

Info Box

Practice summary: trichomoniasis

When: A woman has signs or symptoms of vaginitis

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker

- ☐ **Discuss the reasons for testing for trichomoniasis:** Explain that testing is necessary to identify the cause of the symptoms.
- ☐ **Take a holistic approach:** If a woman is found to have trichomoniasis, other considerations include counselling, contact tracing, partner testing and treatment and testing for other sexually transmitted infections.
- ☐ **Document and follow-up:** If a woman is tested for trichomoniasis, tell her the results and note them in her antenatal record. Have a system in place so that women's decisions about treatment are documented and women who test positive for trichomoniasis during pregnancy are given ongoing follow-up and information.

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Weak recommendation

Offer testing to women who have symptoms of trichomoniasis, but not to asymptomatic women.

Approved by NHMRC in June 2014; expires June 2019

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Info Box

Resources

Remote Primary Health Care Manuals. (2017). Sexual health. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

Workowski KA & Berman S (2010) *Sexually transmitted diseases treatment guidelines, 2010. MMWR Recomm Rep* 59(RR-12): 1–110.

10.4 Toxoplasmosis

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Info Box

There is limited evidence to support testing for toxoplasmosis during pregnancy. As infection may be transmitted to the baby during pregnancy, the focus is on providing women with advice about how to avoid sources of toxoplasmosis.

Background

Toxoplasmosis, which is caused by the parasite Toxoplasma gondii, is usually asymptomatic and self-limiting. Symptoms when they occur include swollen lymph nodes, muscle aches and pains and fever.

When women who have not previously been exposed to the parasite (eg are non-immune) become infected during pregnancy, the infection can be transmitted to the baby *[1304]*. The likelihood of a woman acquiring a primary infection during pregnancy varies, depending on local prevalence *[1319]*:

- *low prevalence*: the potential for a woman to become infected is low but if she is infected during pregnancy it will most likely be a primary infection
- *high prevalence*: primary infection during pregnancy is unlikely due to previous exposure.

Toxoplasmosis infection can be acquired by *[1304]*:

- eating raw or insufficiently cooked meat
- not washing hands thoroughly after handling raw meat or gardening
- contact with cat faeces (directly or indirectly through the soil or cat litter); or
- contact with contaminated raw vegetables or fruits.

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Prevalence and incidence

In Australia, primary infection with toxoplasmosis during pregnancy is rare *[1310]* although it is estimated that between 60% and 80% of Australians are non-immune *[1319]*.

- *Country of origin*: The prevalence of immunity to toxoplasmosis is high in Latin America, parts of Eastern/Central Europe, the Middle East, parts of South-East Asia and Africa. There is a trend towards lower prevalence of immunity in many European countries and the United States *[1319]*.
- *Congenital toxoplasmosis*: The incidence of congenital toxoplasmosis has been reported to range from 0.03/1,000 live births in England and Wales *[1312]* to 0.3/1,000 live births in south-eastern Brazil *[1302]*.

Risks associated with toxoplasmosis during pregnancy

- Mother-to-child transmission rates have been reported to range from 11.3% *[1322]* to 18.5% *[1326]*. The risk of transmission increases with gestational age (from 5% at 12 weeks to 80% just before birth) (*[1305]*. However, babies infected early in pregnancy have a greater risk of congenital anomalies *[1304]*).
- Congenital toxoplasmosis has been associated with stillbirth, intracranial anomalies and/or developmental delay, ocular inflammation *[1312]* and impaired hearing *[1297] [1301]*. In a prospective cohort study (n=620), babies with congenital toxoplasmosis had lower gestational age but there was no significant association with low birth weight or small for gestational age *[1309]*.

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Testing for toxoplasmosis

The evidence on the benefits to women and babies of testing for toxoplasmosis is limited and inconclusive. Routine testing for toxoplasmosis during pregnancy is not recommended in the United Kingdom *[103]*.

Diagnostic accuracy of tests

Tests for toxoplasmosis aim to identify whether maternal infection is acute or chronic. Studies have compared a range of tests for IgG and IgM antibodies and IgG avidity *[1320][1324] [1308][1300][1315] [1317] [1306] [1327] [1314][1318][1323] [1328]*. There is great heterogeneity between the studies, making it difficult to comment on the predictive and diagnostic accuracy of one test over another. Studies into the timing of testing are limited and inconclusive *[1311]*.

Harms and benefits of testing

No high-level evidence on the harms and benefits of testing for toxoplasmosis was identified. A narrative review found that psychological consequences of testing included parental anxiety due to false positive results and uncertainties related to prognosis of children with an antenatal diagnosis of congenital toxoplasmosis *[1316]*.

Availability of safe and effective treatments

Spiramycin and sulphonamide medications have been used to treat toxoplasmosis with the aim of reducing mother-to-child transmission and the severity of fetal infection *[1321]*.

A systematic review *[1325]* found weak evidence for an association between early maternal treatment and reduced risk of congenital toxoplasmosis. A subsequent review *[1321]* concluded that despite the large number of studies performed, it is still not known whether treatment of pregnant women with presumed toxoplasmosis reduces the transmission of T. gondii.

While some studies have reported a lack of symptoms among babies whose mothers were treated during pregnancy *[1298][1299][1303]*, current research is inadequate to assess whether the possible benefits outweigh the potential harm to the baby from treatment *[1321]*.

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Info Box

Discussing toxoplasmosis

There is suggestive evidence that women may have low levels of knowledge about the risks associated with T. gondii *[1307]* and that health education approaches may help reduce risk of congenital toxoplasmosis *[1313]*.

Info Box

Practice summary: toxoplasmosis

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss sources of toxoplasmosis**: Explain that becoming infected with toxoplasmosis during pregnancy can lead to the infection being transmitted to the baby so it is important to take measures to avoid infection.
- ☐ **Take a holistic approach**: Women who are originally from an area of low prevalence are at risk of primary infection if they travel to countries where toxoplasmosis is highly prevalent.
- ☐ **Document and follow-up**: If a woman is tested for toxoplasmosis, tell her the results and note them in her antenatal record. Have a system in place so that women who become infected with toxoplasmosis during pregnancy are given ongoing follow-up and information.

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Weak recommendation

Do not routinely offer testing for toxoplasmosis to pregnant women.

Recommendation strength Grade C

Approved by NHMRC in June 2014; expires June 2019

Weak recommendation

Advise pregnant women about measures to avoid toxoplasmosis infection such as:

- washing hands before handling food
- thoroughly washing all fruit and vegetables, including ready-prepared salads, before eating
- thoroughly cooking raw meat and ready-prepared chilled meals
- wearing gloves and thoroughly washing hands after handling soil and gardening
- avoiding cat faeces in cat litter or in soil.

Recommendation strength Grade C

Approved by NHMRC in June 2014; expires June 2019

Info Box

Resources

SA Perinatal Practice Guidelines Workgroup (2015) *Toxoplasmosis in pregnancy*. In: *South Australian Perinatal Practice Guidelines*. Adelaide: SA Health.

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10.5 Cytomegalovirus

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Info Box

Cytomegalovirus is the most common infectious cause and the second most common overall cause of congenital malformation in Australia. However, there is limited evidence to support universal testing of pregnant women for cytomegalovirus. As cytomegalovirus may be transmitted to the baby and can have serious consequences, the current focus is on giving women advice about hygiene measures that help to reduce their risk of infection during pregnancy.

Background

Cytomegalovirus is a member of the herpes virus family transmitted by contact with saliva, urine or genital secretions. Most people who acquire the virus after birth experience few or no symptoms. Cytomegalovirus remains latent (dormant) in the host for their lifetime after primary infection. Cytomegalovirus may become active again particularly during times of compromised immunity, including pregnancy. Congenital cytomegalovirus (infection of the baby that is present at birth) is the most frequent infectious cause of newborn disability in developed countries including Australia *[1074]*.

Incidence

Transmission

Vertical transmission (spread of infection from mother to child) may occur across the placenta resulting in congenital infection in the baby *[1073]*. Mother-to-child transmission rates of cytomegalovirus are higher for primary maternal infection (30-35%) than reactivated (non-primary) infection or reinfection (1-2%) *[1064][1079]*. However, reactivation or reinfection during pregnancy represents the higher burden of disease due to the high prevalence of past cytomegalovirus infection in women of childbearing age, and frequent reactivation and reinfection during pregnancy *[1069]*.

Congenital infection

The birth prevalence of congenital cytomegalovirus infection in developed countries has been estimated at 0.64%, of whom approximately 10% are symptomatic at birth and a similar number develop symptoms before 5 years of age *[1064]*. Based on average global figures in all socioeconomic groups, it has been estimated that each year approximately 400 children in Australia will be born with or develop cytomegalovirus-related disease resulting from primary or non-primary maternal infection *[1073]*.

Risk factors for transmission

Cytomegalovirus is a highly prevalent infection in the general population; seropositivity prevalence in adult women ranges between 40% and 90%, with the highest prevalence occurring in individuals from lower socioeconomic background *[1073]*. Cytomegalovirus transmission occurs via body fluids including saliva and urine. Transmission via objects contaminated with body fluids (eg utensils such as drink bottles, dummies/soothers) occurs between individuals *[1073]*. Children, when infected in the first few years of life, can shed virus in urine and saliva for many years either continuously or intermittently. Cytomegalovirus therefore spreads readily in settings where preschool-aged children are concentrated *[1069]*. This means that there is an increased risk of infection for seronegative pregnant women who have a young child in the home or who work in child care centres.

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Risks associated with cytomegalovirus during pregnancy

Adverse effects on the developing baby include late miscarriage, stillbirth, hydrops and growth restriction *[1070]*. Approximately 10% of babies infected with cytomegalovirus *in utero* will have symptoms at birth (including rash, microcephaly, hepatosplenomegaly) and are at high risk of developing sensorineural hearing loss (35%) or cognitive deficits (up to 60%), other neurodevelopmental disabilities (epilepsy and cerebral palsy) or death (4%) *[1055][1069][1072][1078]*. Infants with cytomegalovirus who are born without symptoms ("asymptomatic congenital cytomegalovirus") are at risk of later onset of symptoms, in particular hearing loss (5–15%) *[1061]* and possibly neurodevelopmental abnormality. Asymptomatic infants without hearing loss are expected to have the best outcome *[1056][1065]*. In developed countries, congenital cytomegalovirus accounts for approximately 20% of congenital hearing loss *[1058][1059][1075]*.

The risk for adverse outcomes and/or long-term sequelae is highest in infants born to mothers with primary infection in the first half of pregnancy (approximately 10% overall) *[1069]*.

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Info Box

Discussing reducing the risk of cytomegalovirus

Awareness of cytomegalovirus infection in pregnancy is low in Australia among pregnant women *[1066]* and health professionals *[1077]*. Knowledge about cytomegalovirus among women who are pregnant or planning a pregnancy is limited to one in six women *[1066]* and only one in ten health professionals routinely discuss cytomegalovirus prevention with pregnant women *[1077]*.

Prevention through hygiene and behavioural interventions reduces maternal infection during pregnancy *[1054][1063]*. Provision of information regarding congenital cytomegalovirus prevention strategies to pregnant women improves their knowledge, is acceptable to them and results in no significant increased anxiety *[1066]*.

Women need to be given advice about prevention strategies regardless of their serological status. Women who are aware of the cytomegalovirus negative status are more likely to adhere to prevention strategies *[1054]*.

Hygiene precautions and behavioural interventions to prevent cytomegalovirus infection in pregnant women

- Do not share food, drinks, or utensils used by young children
- Do not put a child's dummy/soother/pacifier in your mouth
- Avoid contact with saliva when kissing a child
- Thoroughly wash hands with soap and water for 15–20 seconds, especially after changing nappies/diapers, feeding a young child, or wiping a young child's nose or saliva
- Other precautions that can be considered, but are likely to less frequently prevent infection, include cleaning toys, countertops, and other surfaces that come into contact with children's urine or saliva, and not sharing a toothbrush with a young child

Source: (Rawlinson et al 2017). *[1074]*

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Info Box

Testing for cytomegalovirus

Diagnostic accuracy of tests for cytomegalovirus

Up to 50% of maternal cytomegalovirus infections have nonspecific clinical manifestations, and most remain undetected unless specific serological testing is undertaken *[1072]*. The combination of serology tests for cytomegalovirus-specific immunoglobulin (Ig)M, IgG and IgG avidity provide improved distinction between primary and secondary maternal infections and better define timing of infection *[1073]*.

Universal versus targeted testing

An International Congenital Cytomegalovirus Recommendations Group *[1074]* noted that universal testing of pregnant women for primary cytomegalovirus infection is not recommended. The consensus document recommends that cytomegalovirus serology tests (cytomegalovirus-specific IgG, IgM, and IgG avidity) should be offered when a pregnant woman develops an illness, typically fever, fatigue, and headache, not attributable to another specific infection, and/or when imaging findings (ultrasound or magnetic resonance imaging [MRI]) are suggestive of fetal cytomegalovirus infection *[1074]*.

Risks and benefits of maternal testing

Maternal testing to identify primary cytomegalovirus infection in pregnancy may allow for early identification of infected infants. Some countries perform more extensive testing of pregnant women *[1068]*. However, several issues arise with extensive testing: difficulties in accurate diagnosis, absence of effective interventions in preventing transmission of cytomegalovirus from mothers with primary cytomegalovirus infection to their infant, reinfection or reactivation resulting in congenital infection, and the challenges in providing definite prognosis to an individual mother. Therefore, universal testing of asymptomatic pregnant women is not recommended *[1068]*.

Conclusions on the cost-effectiveness of testing for cytomegalovirus are currently limited by insufficient evidence on the effectiveness of treatments in preventing congenital cytomegalovirus (see Section 44.3.4) *[1060]*.

Caring for a woman with a positive result

Cytomegalovirus hyperimmune globulin and intravenous immunoglobulin treatment do not significantly reduce the risk of congenital infection *[1057][1063][1076]*. The evidence for cytomegalovirus antiviral therapy as prophylaxis or treatment of pregnant women is too limited for conclusions to be drawn *[1063][1067]*.

Given the absence of an effective treatment, it is advisable to seek expert advice, including regarding assessment of the baby after the birth.

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Practice summary: cytomegalovirus

When: Early in pregnancy

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; infectious disease specialist

- ☐ **Discuss transmission of cytomegalovirus**: Explain that becoming infected with cytomegalovirus during pregnancy can lead to the infection being transmitted to the baby, babies born with cytomegalovirus infection at risk of impaired hearing and developmental delay.
- ☐ **Take a holistic approach**: Explain that avoiding contact with a young child's saliva and frequent hand washing are the most important measures in reducing infection with cytomegalovirus and are especially important after contact with objects contaminated with urine or saliva.
- ☐ **Document and follow-up**: If a woman is tested for cytomegalovirus, tell her the results and note them in her antenatal record. If a woman has a result suggestive of recent infection, seek advice or referral to a health professional with appropriate expertise in infections in pregnancy.

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Consensus recommendation

Advise all pregnant women about hygiene measures to help reduce the risk of cytomegalovirus infection, including avoiding contact with a child's saliva or urine and hand washing after such exposure.

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Offer testing for cytomegalovirus to women who come into frequent contact with large numbers of very young children (eg child care workers), using serology (cytomegalovirus-specific IgG only).

Approved by NHMRC in April 2019; expires April 2024

Consensus recommendation

Offer testing for cytomegalovirus to pregnant women if they have symptoms suggestive of cytomegalovirus that are not attributable to another specific infection or when imaging findings suggest fetal infection.

Approved by NHMRC in April 2019; expires April 2024

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Info Box

Resources

SA Perinatal Practice Guidelines Workgroup (2014) *Cytomegalovirus in pregnancy.* In: *South Australian Perinatal Practice Guidelines.* Adelaide: SA Health.

Palasanthiran P, Starr M, Jones C et al (2014) *Management of perinatal infections.* Sydney: Australasian Society for Infectious Diseases (ASID).

10.6 Asymptomatic bacterial vaginosis

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Info Box

As identifying and treating asymptomatic bacterial vaginosis does not appear to change the risk of preterm birth or other pregnancy complications, routine testing in pregnancy is not appropriate.

Background

Bacterial vaginosis results from the relative deficiency of normal Lactobacillus species in the vagina and relative overgrowth of anaerobic bacteria. This reduces the normal acidity of the vagina. Bacterial vaginosis is asymptomatic for 50% of women in pregnancy *[1040]* but may result in a vaginal discharge that can be grey in colour with a characteristic 'fishy' odour *[1042]*.

Asymptomatic bacterial vaginosis in pregnancy

- Several large prospective, longitudinal studies have found the prevalence of bacterial vaginosis to be in the range 9–23% *[1038][1049][1044][1033][1034][1037]*. A study in remote central Australia (n=205) *[1050]* found a prevalence of 26–36% among women attending clinics for a women's health assessment (for either a symptomatic episode or routine check but not for antenatal care).
- *Risk factors*: Bacterial vaginosis in pregnancy is more common among women of low socioeconomic status and women who had low birth weight babies in previous pregnancies *[1038][1032]*.

Risks associated with asymptomatic bacterial vaginosis in pregnancy

Bacterial vaginosis has been associated with an increased risk of preterm birth *[1043][1041][1036][1038]*, with a review of case–control and cohort studies finding that women with bacterial vaginosis were 1.85 times more likely (95% CI 1.62–2.11) to give birth preterm than women without *[1031]*. The higher risk of preterm birth remains in women diagnosed with bacterial vaginosis early in pregnancy, even if the bacterial vaginosis spontaneously resolves later in pregnancy *[1035]*.

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Testing for asymptomatic bacterial vaginosis

Routine testing for asymptomatic bacterial vaginosis in pregnancy is not recommended in the United Kingdom (NICE 2008), the United States *[1053]* or Canada *[1051]*. The systematic review supporting the United States statement *[1048]* found that:

- no studies directly addressed the adverse effects of testing pregnant women who are asymptomatic for bacterial vaginosis
- there is no clear benefit for the general population from testing and treating asymptomatic bacterial vaginosis during pregnancy
- although a subgroup of high-risk women may benefit from testing and treatment for bacterial vaginosis in pregnancy, a sizeable group would receive either no benefit or may experience harm.

Diagnosis of bacterial vaginosis

Bacterial vaginosis is generally diagnosed by either:

- Amsel's criteria (thin white-grey homogenous discharge, pH greater than 4.5, release of 'fishy odour' on adding alkali, clue cells present on direct microscopy) *[1028]*; or
- Nugent's criteria (Gram-stained vaginal smear to identify proportions of bacterial morphotypes with a score of greater than six indicating bacterial vaginosis) *[1047]*, which has both high sensitivity and specificity *[1045][1052][1039] [1046]*, does not seem to vary with the vaginal site of collection *[1030]* and has greater sensitivity than standard antenatal clinical diagnosis or a commercial test *[1039]*.

Other forms of testing, including the pH/whiff test or QuickVue Advanced pH and Amines test, have not been found to be reliable in detecting asymptomatic bacterial vaginosis in pregnancy *[1029][1046]*.

Effect of treatments on risks associated with bacterial vaginosis

While antibiotics are effective in eradicating bacterial vaginosis *[1042]*, treatment does not change the risk of preterm birth, low birth weight or premature rupture of the membranes in women at low risk of preterm birth. The Cochrane review *[1042]* found:

- no statistically significant decrease in the risk of preterm birth at less than 37 weeks gestation for any treatment versus no treatment or placebo (n=5,888; OR 0.91; 95% CI 0.78–1.06)
- no evidence of an effect on birth before 34 weeks (n=851; OR 1.22; 95% CI 0.67–2.19) or birth before 32 weeks (n=3,565; OR 1.14; 95% CI 0.76–1.70)
- no difference in the incidence of low birth weight (n=4,107; OR 0.95; 95% CI 0.77–1.17)
- no decrease in the risk of preterm rupture of membranes (n=2,579; OR 0.88; 95% CI 0.61–1.28)
- a possible reduction in risk of preterm birth if treatment is given before 20 weeks pregnancy (n=2,387; OR 0.72; 95% CI 0.55–0.95).

In women with a previous preterm birth, treatment did not affect the risk of subsequent preterm birth (n=622; OR 0.83; 95% CI 0.59–1.17). However, two small studies showed a decrease in the risk of preterm rupture of the membranes (OR 0.14; 95% CI 0.05–0.38) and low birth weight (OR 0.31; 95% CI 0.13–0.75; n=114).

Although there is no evidence that testing and treating all women with bacterial vaginosis in the antenatal period will have a major impact on the rate of preterm birth, there is emerging evidence that early treatment may be more effective *[1042]*.

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Info Box

Practice summary: testing for bacterial vaginosis

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker

☐ **Document and follow-up:** If a woman is tested for bacterial vaginosis, note the results in her record. Have a system in place so that women who test positive are given information about treatments.

Weak recommendation

Do not routinely offer pregnant women testing for bacterial vaginosis.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Early treatment (before 20 weeks pregnancy) of proven bacterial vaginosis may be beneficial for women with a previous preterm birth.

Approved by NHMRC in December 2011; expires December 2016

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Info Box

Resources

BASHH (2006) *National Guideline for the Management of Bacterial Vaginosis.* Clinical Effectiveness Group, British Association for Sexual Health and HIV.

SOGC (2008)*Screening and Management of Bacterial Vaginosis in Pregnancy.* SOGC Clinical Guideline No 211. Infectious Diseases Committee and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada.

Pirotta M, Fethers KA, Bradshaw CS (2009) Bacterial vaginosis – more questions than answers. *Aust Fam Pract* 38, (6) 394–97.

10.7 Thyroid dysfunction

FOI 26-2285 - Document

Info Box

There is currently insufficient evidence to support routine testing for thyroid dysfunction. As there is an association between thyroid dysfunction and adverse pregnancy and fetal outcomes, the focus is on identifying and treating women at high risk of the condition.

Background

Thyroid dysfunction in pregnancy often results from a pre-existing condition but may arise during pregnancy. Thyroid dysfunction involves either over or under activity of the thyroid gland. E17-181212

- *Hyperthyroidism,* in which thyroid hormone levels are raised, is most commonly caused by Graves' disease, an autoimmune disorder *[1278]* but may also be induced by excessive exposure to iodine *[1269]*. Symptoms include weight loss, heat intolerance and hypertension. It is generally diagnosed and treated before conception *[1279][1278]*.
- *Hypothyroidism* is a thyroid hormone deficiency, which may be overt (with symptoms including cold sensitivity, fatigue and dry skin) *[1270]*, or subclinical with few or no symptoms but abnormal levels of thyroid hormones *[1284]*. It is most commonly caused by endemic iodine deficiency *[1275]*. Autoimmune thyroid disease (eg Hashimoto's disease) is the most common cause when iodine intake is adequate *[1284]*. Detection of thyroid autoantibodies (to thyroid peroxidase or thyroglobulin) confirms the autoimmune origin of hypothyroidism, or in euthyroid women may indicate increased risk of thyroid dysfunction *[1284]*.

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Incidence

- Thyroid dysfunction is the second most common endocrine condition (after diabetes mellitus) affecting women of reproductive age *[1284]*.
- The incidence of hyperthyroidism in pregnancy is in the range of 0.1–0.4% *[1270]*.
- Studies in relatively iodine-sufficient populations estimate an incidence of 0.3–0.5% for overt hypothyroidism and 3–5% for subclinical hypothyroidism *[1270]*. It is likely that incidence would be higher in areas of iodine insufficiency.
- The Australian National Health Survey *[1265]* found that, in 2011–2012, iodine levels were relatively low among women of childbearing age. Although women aged 16–44 years had sufficient iodine levels overall, around 18% had iodine levels considered moderately deficient (compared to the national average of 13%) and nearly two thirds (62%) had an iodine level below that recommended by WHO for pregnant and breastfeeding women.
- The WHO Global Database on Iodine Deficiency identifies moderate iodine deficiency in some African countries (Algeria, Chad, Senegal), Afghanistan, Belarus and Vietnam *[1269]*. Urinary iodine levels associated with a high risk of iodine-induced hyperthyroidism or autoimmune thyroid disease were identified in Brazil, Chile, Ecuador, Liberia and Uganda.
- Thyroid autoantibodies are present in 5–15% of women of childbearing age *[1270]*.

Risks associated with thyroid dysfunction in pregnancy

- Overt hypothyroidism and hyperthyroidism are associated with a range of adverse obstetric outcomes (miscarriage, pre-eclampsia, placental abruption, preterm birth and post-partum haemorrhage) and risks to the baby (low birth weight, increased neonatal respiratory distress and decreased cognitive function) *[1274][1275]*.
- Studies are now focusing on the potential effect of subclinical thyroid dysfunction and autoimmune disease. A systematic review found that subclinical hypothyroidism in pregnancy is associated with pre-eclampsia (OR 1.7; 95%CI 1.1 to 2.6) and perinatal mortality (OR 2.7; 95%CI 1.6 to 4.7) and the presence of maternal thyroid autoantibodies is associated with miscarriage (OR 3.73; 95%CI 1.8 to 7.6) and preterm birth (OR 1.9; 95%CI 1.1 to 3.5) *[1289]*. A meta-analysis of cohort studies had similar findings for miscarriage (OR 3.90; 95%CI 2.48 to 6.12) *[1288]* and another for preterm birth (RR 1.41; 95%CI 1.08 to 1.84)*[1273]*.

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Testing for thyroid dysfunction

Routine testing for thyroid dysfunction is not recommended by RANZCOG *[1283]* or in the United States *[1266]* and is not addressed in the United Kingdom antenatal guidelines *[745]*.

Benefits and harms of testing for thyroid dysfunction

More evidence is needed to assess the benefits or harms of different approaches to testing for thyroid dysfunction in pregnancy on maternal, infant and child health outcomes. A recent Cochrane review *[1285]* found that:

- compared to case finding, universal testing increased diagnosis and subsequent treatment of thyroid dysfunction (moderate to high quality) but there were no clear differences in outcomes reported (pre-eclampsia, preterm birth, miscarriage, fetal or neonatal death) (moderate to high quality)
- compared to no testing, universal testing similarly increased diagnosis and subsequent treatment but there was no clear difference in neurosensory disability for the infant as a child (IQ<85 at 3 years) and other outcomes were not reported.

A subsequent RCT reported that the risk of miscarriage (3.1 vs 8.5%, RR 0.36, 95%CI 0.23 to 0.58, p< 0.001) was lower and the risk of caesarean section higher (41.0 vs 33.5%, RR 1.22, 95%CI 1.08 to 1.39, p<0.001) in the testing group than in the control group (low quality evidence) *[1277]*. The difference in risk of preterm birth did not reach significance (p=0.772) (very low quality).

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Identifying women at high risk of thyroid dysfunction

While this is an evolving area of practice, the American Thyroid Association considers women with the following to be at high risk of thyroid disease *[1267]*:

- history of thyroid dysfunction
- symptoms or signs of thyroid dysfunction,
- presence of a goitre
- known thyroid antibody positivity.

Other risk factors for thyroid disease include *[1267]*:

- age >30 years
- history of type 1 diabetes or other autoimmune disorders
- history of pregnancy loss, preterm birth or infertility
- history of head or neck radiation or prior thyroid surgery
- family history of autoimmune thyroid disease or thyroid dysfunction
- BMI ≥40 kg/m^2
- use of amiodarone, lithium, or recent administration of iodinated radiologic contrast
- two or more prior pregnancies
- residing in area of moderate to severe iodine deficiency.

Assessment of risk factors at the first antenatal visit is recommended *[1270]*. However, onset of thyroid dysfunction can occur later in pregnancy *[1280]*.

Timing of testing

Low-level evidence was inconsistent regarding the timing of testing for thyroid dysfunction. One study found that first trimester testing identifies mainly minor elevations in thyroid-stimulating hormone (TSH), which do not predict adverse pregnancy outcomes *[1281]*, while another found that testing in the second and third trimesters was of limited value *[1271]*.

However, where thyroid function testing is indicated, ideally testing should take place as early as possible after 6 weeks gestation as women with overt hypothyroidism with a TSH >10 need urgent treatment to avoid effects on the fetus.

Interpreting thyroid function test results

Thyroid function is initially assessed through testing of TSH, with measurement of serum thyroxine if maternal TSH is either elevated or reduced.

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Diagnosis of thyroid dysfunction in pregnancy is complicated by the fact that normal TSH levels differ from the non-pregnant state *[1286]*. Applying the general laboratory reference range for TSH to pregnant women can result in misclassification of thyroid status *[1268][1287][1272][1276]*. TSH levels vary with gestational age and between single and twin pregnancies *[1268]*. Pregnancy-specific reference ranges that take into consideration gestational age and fetal number (eg Panesaer et al 2001)*[1282]* should therefore be used. In addition, TSH and free thyroxine values differ according to the laboratory method used to perform testing.

Effectiveness and safety of treatments

For women with pre-existing thyroid disease, hormone levels are monitored throughout pregnancy and medications adjusted to maintain a euthyroid state. Regular monitoring and adjustment of medication dosage is also needed when thyroid dysfunction is detected during pregnancy.

Economic analysis

A review of the cost implications of routine testing for thyroid dysfunction was undertaken in 2014 (see separate document on economic analyses). The review found insufficient clinical evidence to show that treatment reduces adverse obstetric and neonatal outcomes. Additionally, there were no economic evaluations relevant to Australia to enable an assessment of the impact of a routine testing program for thyroid dysfunction to detect women with hypothyroidism who have not already been diagnosed. Further research is needed before a comprehensive economic analysis can be conducted

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Discussing thyroid dysfunction

Discussion to inform a woman's decision-making about thyroid function testing should take place before testing and include that:

- thyroid function can be affected by autoimmune disorders or inadequate or excessive exposure to iodine in the diet
- a family history of thyroid dysfunction means that a woman is more likely to be at risk
- an under-active or over-active thyroid can cause complications to the pregnancy and risks to the baby
- as some symptoms of an over-active thyroid may be part of normal pregnancy (eg heat intolerance) and under-active thyroid may not cause symptoms, it is important to test thyroid function in women who have symptoms or are at high risk of thyroid problems (eg if they have recently arrived from a country with a high prevalence of iodine deficiency)
- consultation with a specialist may be necessary if thyroid problems are identified.

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Practice summary: thyroid dysfunction

When: A woman has symptoms or risk factors for thyroid dysfunction

Who: Midwife; GP; specialist obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; endocrinologist

- ☐ **Discuss the reasons for thyroid function testing**: Explain that it is important to check a woman's thyroid hormone levels because of the effects that thyroid problems can have on the pregnancy and the baby.
- ☐ **Use pregnancy specific ranges**: If interpreting thyroid function test results, use pregnancy-specific reference ranges appropriate to the method used by the laboratory, that take into consideration gestational age and fetal number.
- ☐ **Take a holistic approach**: While iodine fortification of bread in Australia means that women will likely enter pregnancy with adequate iodine intake, supplementation (150 micrograms a day) is still recommended during pregnancy and breastfeeding. Women who have recently arrived in Australia may have previous exposure to inadequate or excessive iodine, depending on their country of origin.
- ☐ **Document and follow-up**: If a woman's thyroid function is tested, tell her the results and note them in her antenatal record. Also, note whether thyroid dysfunction is newly diagnosed or was previously treated. Have a follow-up system in place to facilitate timely referral and treatment.

Do not routinely test pregnant women for thyroid dysfunction.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

Recommend thyroid testing to pregnant women who are at increased risk of thyroid dysfunction.

Approved by NHMRC in October 2017; expires October 2022

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Resources

De Groot L, Abalovich M, Alexander EK et al (2012) *Management of thyroid dysfunction during pregnancy and postpartum: an Endocrine Society Clinical Practice Guideline*. *J Clin Endocrinol Metab* 97(8): 2543–65.

NHMRC (2010) NHMRC Public Statement: Iodine Supplementation for Pregnant and Breastfeeding Women. Canberra: National Health and Medical Research Council.

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10.8 Vitamin D status

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There is limited evidence to support testing of all women for vitamin D status in pregnancy and the benefits and harms of vitamin D supplementation in pregnancy remain unclear.

Background

Vitamin D is essential for bone development in children and skeletal health in adults. It regulates calcium and phosphate absorption and metabolism. Vitamin D is obtained through the direct action of sunlight on the skin (90%) or through dietary nutrients (10%), in particular, dairy products, eggs and fish.

Definitions of vitamin D sufficiency vary, with Australian organisations generally considering levels lower than 50 nmol/L as suboptimal *[1444][1447][1413][1450]*.

Vitamin D status in Australia

The Australian Health Survey 2011–12 *[1413]* found that most Australian adults had Vitamin D levels above 50 nmol/L, with 23% having lower levels. Prevalence of vitamin D levels lower than 50 nmol/L was:

- lower in summer (14%) and higher in winter (36%)
- relatively low across all the States and Territories in summer, ranging from 6% in Queensland to 19% in New South Wales
- particularly high in winter for those living in the south-eastern states of Australia, such as Victoria and ACT (49% compared with only 16% and 13% respectively in summer) but remained relatively low in winter for those in Queensland and the Northern Territory.

Differences were seen across geographical areas, with vitamin D levels lower than 50 nmol/L more common in major cities (27%) than in inner regional (16%), outer regional (13%) and remote areas (9%). Vitamin D levels lower than 50 nmol/L were much more common among people born in Southern and Central Asia, North-East Asia, South-East Asia, North Africa and the Middle East.

The Australian Aboriginal and Torres Strait Islander Health Survey *[1412]* found that, in 2012–13, 26.5% Aboriginal and Torres Strait Islander adults had a vitamin D level lower than <50 nmol/L. This pattern was similar for both men and women. Vitamin D levels lower than 50 nmol/L were more common in remote areas (38.7%) than in non-remote areas (23.0%) and vitamin D levels varied considerably by season.

Observational studies in Australia have reported vitamin D status in a range of populations:

- at two antenatal clinics in the ACT and New South Wales, the prevalence of levels lower than 50 nmol/L was 35% in Canberra and 25.7% in Campbelltown *[1448]*
- in a largely low-risk antenatal population in rural Victoria, around 5% had levels lower than 25 nmol/L *[1453]*) and, at a Victorian metropolitan maternity service, 55% of women had vitamin D levels lower than 50 nmol/L *[1425]*
- among women booking for antenatal care in Cairns, there were no significant differences overall in women's vitamin D levels based on Indigenous status and all women had levels higher than 50 nmol/L *[1417]*
- among women attending for antenatal care in Kalgoorlie, 56% of Aboriginal women and 20% of non-Aboriginal women had vitamin D levels lower than 50 nmol/L *[1456]*
- among Indigenous women receiving antenatal care in the Northern Territory, mean maternal vitamin D level was 104 nmol/L during pregnancy (mean 32 weeks gestation) and 80 nmol/L at birth and mean cord blood level was 54 nmol/L *[1418]*
- compared to migrant women without a refugee background, vitamin D levels lower than 75 nmol/L were generally more common among refugee women *[1430][1431]*
- risk-based testing for vitamin D status in pregnancy (South Australian Perinatal Practice Guidelines, in which 'high-risk' groups are defined as veiled, dark-skinned and house-bound women) failed to detect over half of women with vitamin D levels lower than 60 nmol/L *[1427]*.

Vitamin D status and maternal and pregnancy outcomes

Recent studies have explored possible associations between vitamin D status in pregnancy and subsequent outcomes. This evidence is generally of low quality and heterogeneous (ie in definition of optimal level, timing of serum testing) and findings

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are inconsistent.

- *Gestational diabetes and glucose tolerance:* One cohort study *[1421]* suggested that women with vitamin D levels lower than 25 nmol/L may be more likely to experience gestational diabetes (aOR 2.2; 95%CI 0.8 to 5.5), while another found no clear difference (aOR: 1.08; 95% CI: 0.74 to 1.56) *[1452]*. A cross-sectional study suggested that, compared to vitamin D levels higher than 74 nmol/L in early pregnancy, levels lower than 50 nmol/L (p=0.008) or 50–74 nmol/L (p=0.005) increased the risk of gestational diabetes *[1425]*. Another cross-sectional study found that increases in maternal vitamin D were associated with decreases in fasting glucose (p=0.012) *[1441]*.
- *Pre-eclampsia*: The evidence was largely consistent in finding no association between vitamin D level and the risk of pre-eclampsia in cohort studies *[1419][1452] [1432]* and a case series *[1425]*.
- *Preterm birth*: No significant association between vitamin D level and preterm birth was found in a cohort study (p=0.09) *[1452]* and a case series (p=0.11) (*[1425]*.
- *Small for gestational age*: The frequency of small-for-gestational-age newborns in cohort studies was similar in women with vitamin D levels below or above 20 nmol/L *[1419]* or was increased with levels below 29.9 nmol/l (aOR 1.9 95%CI 1.4 to 2.7) *[1436]* or below 25 nmol/L (aOR 1.58 95%CI 1.06 to 2.35, compared to 50–75 nmol/L) *[1452]*.
- *Birth weight*: A cohort study *[1419]* and a case series *[1425]* found no association between maternal first trimester vitamin D levels and neonatal birth weight. Another cohort study *[1436]* found an association between maternal vitamin D levels below 29.9 nmol/L and lower birth weights (–64.0 g, 95%CI –107.1 to –20.9).
- *Macrosomia and infant growth*: A cohort study (Morales et al 2015) found that maternal vitamin D levels lower than 50 nmol/L were associated with increased risk of fetal macrosomia (abdominal circumference 90th centile; p=0.041) but not with rapid growth (p=0.11). Other cohort studies found an association between maternal vitamin D level below 29.9 nmol/L and accelerated growth *[1436]* or risk of overweight at age 1 year (p=0.03), but not at 4 years (p=0.721) *[1442]*.

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Vitamin D status in pregnancy

Current guidance in Australia *[1447][1450]*, New Zealand *[1445]* and the United States *[1414]* suggests that testing be considered for women at high risk of suboptimal vitamin D levels and supplementation advised for pregnant women with levels lower than 50 nmol/L. Guidance in Australia and New Zealand also suggests consideration of a daily dose of 400 IU for pregnant women at higher risk (without testing) *[1445][1450]*. In the United Kingdom, it is recommended that all women be advised early in pregnancy to take a supplement of 400 IU daily *[745]*.

Determinants of vitamin D status in pregnancy

The recent evidence on the determinants of vitamin D status in pregnancy is largely observational and of varying quality. While the definitions used varied across studies, the evidence was consistent that lower vitamin D levels in pregnancy are associated with:

- darker skin phototype *[1420][1434][1448][1424][1437][1440][1430][1431][1438][1422][1425]*
- increasing body mass index (BMI) *[650][1448][1416][1440][1425][1435]*
- season *[1420][1448][1416][1438][1446][1425]*.

Benefits and harms of vitamin D supplementation

The clinical utility of testing vitamin D status is reliant on there being evidence for benefits from supplementation. While numerous studies have investigated vitamin D supplementation with and without calcium compared to placebo or no treatment, the evidence on the harms and benefits of vitamin D supplementation remains unclear *[1433][1428]*.

- *Serum vitamin D levels*: Studies were consistent in finding that vitamin D supplementation increased vitamin D levels in women (low quality) *[1449][1451] [1428]* and newborns *[1449][1451]*. However, a Cochrane review noted that the clinical significance of increased maternal vitamin D concentrations remains unclear *[1428]*.
- *Maternal outcomes:* Evidence from the Cochrane review *[1428]* suggests a reduced risk of pre-eclampsia (RR 0.52; 95%CI 0.25 to 1.05; low quality) and gestational diabetes (RR 0.43; 95%CI 0.05 to 3.45; very low quality) among women supplemented with vitamin D compared to those receiving placebo or no treatment, though neither result was statistically significant. Among women supplemented with vitamin D plus calcium, there was a reduced risk of pre-eclampsia (RR 0.51; 95%CI 0.32 to 0.80; moderate quality) and the data suggest a reduced risk of gestational diabetes (data from a single study) (RR 0.33; 95%CI 0.01 to 7.84; low quality).
- *Birth outcomes:* The Cochrane review found a reduced risk of preterm birth compared to no treatment or placebo with vitamin D alone (RR 0.36; 95%CI 0.14 to 0.93; moderate quality) but an increased risk with vitamin D plus calcium (RR 1.57; 95%CI 1.02 to 2.43; moderate quality)*[1428]*, while a later RCT found no significant effect on gestational age at birth among women receiving vitamin D plus calcium (p=0.37) *[1415]*.

  The Cochrane review of studies comparing vitamin D supplementation alone with no supplement found a reduced risk of low birth weight (RR 0.4; 95%CI 0.24 to 0.67; moderate quality), a possible increase in infant length (mean difference [MD] 0.70, 95%CI –0.02 to 1.43) and head circumference (MD 0.43, 95%CI 0.03 to 0.83) and no clear difference in rates of caesarean section (RR 0.95; 95%CI 0.69 to 1.31), stillbirths (RR 0.35; 95%CI 0.06 to 1.99) or neonatal deaths (RR 0.27; 95%CI 0.04 to 1.67) *[1428]*. Another systematic review found that the evidence to support a relationship between maternal vitamin D status and birth weight is limited by its observational nature *[1433]*. A later RCT found no clear differences in birth weight (p=0.88), length (p=0.94), head circumference (p=0.13) or mode of birth (p=0.26) among newborns of women receiving vitamin D plus calcium and those receiving no intervention *[1415]*.

- *Infant outcomes:* A systematic review *[1433]* found that the evidence to support an association between maternal vitamin D status and infant bone mass was limited by its observational nature and that evidence on serum calcium concentrations was limited by risk of bias. RCTs found that, compared to women receiving no supplement, there was no clear difference in bone mineral content in newborns of mothers receiving vitamin D alone (p=0.21) *[1423]* or with calcium (p=0.63) *[1429]*.
- *Vitamin D dosage*: Studies were consistent in finding that vitamin D level increased with dose (low quality evidence) *[1426][1454][1443][1439][1455]*. Studies comparing doses of 1000–1200 to 2000 IU daily found no difference in birth weight (p=0.8) *[1443]* or adverse effects (p=0.5) (March et al 2015). One study comparing 4,000 IU to 2,000 IU daily *[1454]* found no clear difference in risk of hypertensive disorders of pregnancy (RR 2.16; 95%CI 0.68 to 6.90; low quality evidence), gestational diabetes (RR 1.53; 95%CI 0.71 to 3.28; moderate quality evidence) or preterm birth (RR 0.86;

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95%CI 0.51 to 1.45; moderate quality evidence) between groups. Adverse effects were not reported.

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Practice summary: vitamin D status

When: In the antenatal period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; pharmacist

- ☐ **Take a holistic approach:** Give women advice on the risks and benefits of sun exposure (see Section 47.4) and the dietary sources of vitamin D (dairy products, eggs and fish), taking cultural considerations into account.
- ☐ **Document and follow-up:** If a woman's vitamin D deficiency status is tested, note the results in her record. Have a system in place so that women who are found to be deficient in vitamin D are given ongoing follow-up and information about supplementation.

Do not routinely recommend testing for vitamin D status to pregnant women in the absence of a specific indication.

Approved by NHMRC in October 2017; expires October 2022

Consensus recommendation

If testing is performed, only recommend vitamin D supplementation for women with vitamin D levels lower than 50 nmol/L.

Approved by NHMRC in October 2017; expires October 2022

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Resources

Australian and New Zealand Bone and Mineral Society, the Australasian College of Dermatologists, Cancer Council Australia, Endocrine Society of Australia and Osteoporosis Australia (2016) Risks and Benefits of Sun Exposure.

NHMRC (2006) *Nutrient Reference Values for Australia and New Zealand*. Canberra: National Health and Medical Research Council.

10.9 Human papilloma virus

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Human papilloma virus testing aims to identify women who may have a cervical abnormality and require further diagnostic testing.

Background

Cervical cancer is one of the most preventable and curable cancers. Cells in the cervix show changes or 'abnormalities' before any progression to cancer, which takes around 15 years. Most low-grade abnormalities regress without treatment. High-grade abnormalities may occur after persistent infection with human papilloma virus (HPV), which is a sexually transmitted infection that generally has no symptoms and resolves within 2 years. In a small number of women, persistent infection with a high-risk type of HPV may eventually lead to cervical cancer *[1100]*. HPV 16 and 18 are high-risk types that are detected in 70–80% of cases of cervical cancer in Australia *[1100]*. A program of vaccination against HPV types 16 and 18 (as well as types 6 and 11, which have a lower risk of causing cancer but are associated with 90% of genital warts) was introduced in Australia in 2007 *[818]*.

Cervical cancer and screening in Australia

- *Prevalence of HPV infection:* An Australian study (before the introduction of the vaccination program) found that prevalence of HPV types 16 and 18 was similar for Aboriginal (9.4% and 4.1%) and non-Indigenous women (10.5% and 3.8%) *[1105]*. Prevalence of HPV infection is higher among women from developing countries, with regions of high prevalence including Africa (22.1%) and Central America and Mexico (20.4%) *[1104]*. In all world regions, HPV prevalence is highest among women younger than 35 years *[1104]*.
- *Other risk factors for cervical cancer*: The risk of progression of HPV-related abnormalities to cervical cancer is increased by immunodeficiency (such as that caused by HIV infection), higher number of pregnancies, tobacco smoking, co-infection with other sexually transmitted infections and long-term (>5 years) use of oral contraceptives *[1107]*.
- *Cervical cancer incidence and mortality*: Incidence of, and mortality from, cervical cancer in Australia have remained at historic lows of 9–10 new cases and 2 deaths per 100,000 women since 2002 *[1100]*. Incidence does not vary significantly with geographical region but mortality is higher in remote areas *[1100]*. In 2004–08, the incidence of cervical cancer was 2.8 times higher among Aboriginal and Torres Strait Islander women than among non-Indigenous women *[1100][1101]*, with data from 2006–10 showing that mortality was 4.4 times higher *[1100]*. Women from developing countries have an increased incidence, with the highest incidence (>45 per 100,000 women) found in Central and South America, eastern Africa, South and South-East Asia, and Melanesia *[1107]*.
- *Uptake of cervical screening:* In 2009–2010, 57% of women in the Australian screening population had Pap smears, with participation highest among women aged 40–54 years *[1100]*. While cervical screening among women aged 20–24 years is low and decreasing, Australia is one of the few countries that screen this age group *[1100]*. Participation in screening did not vary significantly by geographical region but was lower in areas of social disadvantage *[1100]*. Information on participation for Aboriginal and Torres Strait Islander women is not available, as Indigenous status of participants is not collected, although there is evidence that this population group is under-screened *[1103][1102]*.

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Testing for human papilloma virus

Current recommendations in Australia are that women be tested for HPV every 5 years.

Table F6: National Cervical Screening Program recommendations

Who	All women who have ever been sexually active, including women who have received HPV vaccination
What	Human papilloma virus testing of cervical samples and liquid-based cytology testing on samples testing positive
When	Starting from the age of 25 years, or 1-2 years after first sexual intercourse, whichever is later
How often	Every 5 years if human papilloma is not detected

Management of cervical abnormalities

There are few studies detailing the progression of low-grade abnormalities to cancer during pregnancy but this appears to be extremely rare *[1106]*. The NHMRC recommends investigation of abnormalities during pregnancy as follows *[1106]*:

- in general, women with a low-grade abnormality should have a repeat smear in 12 months
- women with high-grade abnormalities should be referred to a colposcopist experienced in assessing the pregnant cervix.

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Practice summary: cervical abnormalities

When: Early antenatal visit, if the woman has not had a cervical screen in the recommended time period

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; sexual health worker; women's health provider

- ☐ **Discuss the reasons for HPV testing**: Explain that 5-yearly tests for HPV are recommended for sexually active women to detect human papilloma virus infection, as persistent infection can cause cervical abnormalities.
- ☐ **Provide advice to women with a positive result**: Explain that the test is not diagnostic.
- ☐ **Take a holistic approach**: Provide advice to assist women in accessing services (eg pathology services that bulk bill). Explain that inclusion on the National Cancer Screening Register is confidential and automatic (unless a woman requests otherwise) and that the registries send reminders to women who are overdue for testing.
- ☐ **Document results and referrals**: If a woman has a cervical screening test, tell her the results and note them in her antenatal record. Also document inclusion on the national registry and any follow-up required.

Consensus recommendation

Offer women cervical screening as specified by the National Cervical Screening Program.

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Resources

NHMRC (2005) *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen-detected Abnormalities*. Canberra: National Health and Medical Research Council.

WHO (2014) *Comprehensive Cervical Cancer Control: A Guide to Essential Practice Second edition*. Geneva: World Health Organization.

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11. Fetal chromosomal anomalies

11.1 Chromosomal anomalies

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Tests are available that enable women, who choose to do so, to identify whether there is a high probability of them having a baby with a chromosomal anomaly. This refined probability estimate can inform decisions about whether to have diagnostic testing. The level of decision-making needed at all stages in this process requires sensitive engagement with women, partners and family members.

Chromosomal anomalies

Fetal chromosomal anomalies identified through antenatal testing include:

- trisomy 21 (Down syndrome), the most common chromosomal condition, which is characterised by distinctive facial features, some intellectual disability and heart or digestive tract problems
- trisomies 18 (Edwards syndrome) and 13 (Patau syndrome), which are characterised by distinctive facial features, severe intellectual disability and other physical problems.

Chromosomal anomalies in Australia

The National Perinatal Statistics Unit last reported on congenital anomalies in Australia in 2002–03 *[1517]*. Trisomy 21 was the most commonly reported chromosomal condition at birth (1.11 per 1,000 births) but there was a high proportion (60%) of fetal deaths and terminations. When terminations were included, the estimated rate was 2.63 per 1,000 pregnancies. Trisomies 18 and 13 were associated with a large number of fetal deaths or terminations. All conditions were more common among women aged 40 years or older.

More recent Victorian data on antenatal diagnoses of chromosome anomalies based on amniocentesis and chorionic villus sampling results from 2013–15 gives an estimated detection rate of trisomy 21 of 2.61 per 1,000 births (1 in 380) *[1542]*. Antenatal diagnoses of trisomies 18 and 13 were 0.5 (1 in 2,000) and 0.3 per 1,000 births (1 in 3,333) respectively *[1542]*. Rates of trisomies 21, 18 and 13 were reported as 1.4, 0.5 and 0.1 in Queensland in 2010 *[1541]*. New South Wales data from 2010 gives rates per 1,000 births (ie without terminations included) of 0.5 for trisomy 21 and 0.1 for trisomies 18 and 13 *[1527]*. In New South Wales, the number of reported terminations of pregnancy associated with chromosomal anomalies rose from 246 in 2004 to 323 in 2009 *[1527]*.

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11.2 Tests for probability of chromosomal anomalies

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Approaches to testing for high probability of chromosomal anomalies

A range of biochemical tests and ultrasound techniques has been developed that can significantly increase the identification of pregnancies with a high probability of chromosomal anomalies such as trisomy 21 (Down syndrome), trisomy 18 (Edwards syndrome) and trisomy 13 (Patau syndrome) (see Glossary). A high probability test result leads to the offer of a diagnostic test (chorionic villous sampling or amniocentesis) (see Section 11).

The suitability of any test depends on the gestational stage. Extensive pre- and post-test information and counselling are required, with consideration also being given to the woman's preferences, availability of testing facilities, costs to the woman and, for ultrasound, operator expertise.

Current practice in Australia is that testing for chromosomal anomalies is done in the first trimester. The combined first trimester test comprises:

- ultrasound measurement of fetal nuchal translucencythickness between 11 weeks and 13 weeks 6 days gestation (when the fetus has a crown-rump length of 45–84 mm) combined with
- maternal plasma testing of pregnancy-associated placental protein-A (PAPP-A) and free beta-human chorionic gonadotrophin (b-hCG) between 9 weeks and 13 weeks, 6 days gestation.

An emerging practice is the use of cell-free deoxyribonucleic acid (cfDNA) testing (also referred to as non-invasive prenatal testing [NIPT]). cfDNA testing can be performed for detection of fetal anomaly from 10 weeks gestation. The test involves sequencing DNA fragments in maternal serum, mapping each DNA sequence to a reference genome to determine its chromosome of origin, and counting the number of fragments arising from each chromosome. If the fetus is affected by trisomy, a greater than expected number of the relevant chromosome fragments will be present in maternal serum.

Cell-free DNA testing has been used as a first-tier test, as a second-tier test (with women with increased probability on combined first trimester screening offered cfDNA or diagnostic testing) or in a contingent model (where women with an intermediate probability on combined first trimester screening are offered cfDNA testing and those with a very high probability are offered diagnostic testing). Evaluations of the implementation of contingent cfDNA testing in national screening programs have found improved performance of the program *[1529][1535][1563]*. Use of cfDNA as a first-tier test may be appropriate for women with infections where an invasive procedure carries an increased risk of mother-to-child transmission.

Later in pregnancy (14 to 20 weeks), the triple test (maternal serum testing of a-fetoprotein [AFP], free b-hCG [or total hCG] and unconjugated estriol) or the quadruple test (which also includes inhibin A) is used to assess the risk of fetal chromosomal anomaly. While this is an important publicly funded option for women who present later in pregnancy or for whom specialist ultrasound is not available (eg in rural and remote areas) or who cannot afford cfDNA testing (until this becomes publicly funded), the evidence for these tests has not been reviewed as part of the development of these Guidelines. As cfDNA testing can be performed at any gestation from 10 weeks, it should be discussed along with second trimester serum screening for women who have missed the gestational age window for combined first trimester screening.

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Effectiveness of tests for probability of chromosomal anomaly

Offering testing for probability of fetal chromosomal anomaly to all women in the first trimester, regardless of maternal age, is recommended in the United Kingdom *[869]*, the United States *[1518]* and Australia *[1567]*.

Combined first trimester tests

The combined first trimester test identifies factors that are known to be associated with fetal chromosomal anomalies and that are independent of each other.

The probability of chromosomal and other anomalies and fetal and postnatal death increases with nuchal translucency thickness. Favourable outcomes have been observed in 92% of babies with nuchal translucency of 3.4 mm (95th centile) compared to 18% of those with nuchal translucency of ≥6.5 mm *[1524]*. In some situations, the ultrasound component of first-trimester testing may be difficult or impossible (eg due to high BMI, fetal positioning).

Combining nuchal translucency assessment with testing of maternal serum increases the predictive value *[1520]*. Recent evidence on the sensitivity of the combined test had the following findings.

- A systematic review (65 studies) found detection rates of 91.9% for trisomy 18 (false positive rate 3.5%), 83.1% for trisomy 13 (false positive rate 4.4%) and 70.1% for monosomy X (false positive rate 5.4%) *[1551]*.
- Cohort studies found detection rates of:
- 92.2% for trisomy 21 (false positive rate 8.0%) (n=675,332) *[1544]*.
- 91.3% for trisomy 21, 97.1% for trisomy 18, 92.3% for trisomy 13, 80% for sex chromosome aneuploidies and 87% for atypical aneuploidies (n=21,052) *[1543]*
- 87% for trisomy 21, 91.8% for trisomies 13 and 18, 86.0% for monosomy X, 8.1% for other sex chromosome aneuploidies, 89.3% for triploidy and 13.0% for other high-risk outcome (n=14,684) *[1573]*

The pooled rate of invasive procedures was 59 per 1,000 pregnancies tested *[1572][1573][1543]*.

As fetal nuchal translucency thickness increases with crown-rump length *[1564][1532]* and the detection rate in serum is influenced by maternal age *[1537]*, these factors are included in assessment algorithms. The inclusion of age in the calculation, either alone or in combination with serum test results, increases identification of the probability of chromosomal anomalies *[1575][1570][1528][1571][1533][1540][1569]*. The maternal serum variables are also influenced by gestational age, maternal weight, ethnicity, smoking, in vitro fertilisation, parity and diabetes, the background risk for each being calculated and then included in the algorithm with nuchal transluceny and maternal age. A history of a previous trisomy 21 pregnancy increases the chance of an abnormal test result for trisomy 21.

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Cell-free DNA testing

cfDNA testing has a higher detection rate for the more common trisomies than the combined first-trimester test: relative risk of detection 1.13 (1.08 to 1.18) for trisomy 21 and 1.22 (1.18 to 1.26) for trisomies 18 and 13 *[1565][1573][1539][1543][1544][1548]*. Fewer invasive procedures are required (10 per 1,000 women tested) *[1572][1573][1543]* and rates of procedure-related miscarriage are lower *[1552][1539][1550]*.

However, cfDNA testing may not detect less common chromosomal anomalies identified through ultrasound assessment: relative risk of detection 0.23 (0.16 to 0.33) for sex chromosome aneuploidies *[1573][1543][1548]* and 0.01 (0.00 to 0.04) for atypical aneuploidies *[1565][1573][1543]* if these are not included in the cfDNA test panel. As well, the economic costs of incorporating cfDNA testing for trisomy 21 as a first-tier test into Australian practice are currently higher than those for combined first trimester testing (costs associated with cfDNA testing for other chromosomal anomalies have not been investigated in Australia) *[1561][1524]*. However, its use as a contingent screen for trisomy 21 at specific thresholds may be more cost-effective than combined first trimester testing *[1547]*.

As cfDNA testing is available in Australia, health professionals need to have an understanding of the test, including that:

- the test may be conducted from 10 weeks onwards *[1534]*
- the test is not diagnostic; a positive result requires confirmation by invasive procedures *[1534][1549][1557][1548]*
- diagnosis of fetal structural or genetic anomalies may be delayed or missed if the 11–13 week ultrasound is not performed in conjunction with cell-free DNA testing *[1567]*
- although the false positive rate is lower than for combined first trimester testing, both false positives and false negatives occur *[1536][1545][1574]*
- low fetal fraction of DNA in the maternal circulation *[1526][1536][1557][1548]*, which is common among women with a

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BMI >30 kg/m^2 *[1526][1536][1557][1548]*, may yield an unreportable result; depending on the timing of the test, this may mean that women with a test failure miss the window for the combined first trimester test
- in rare circumstances, the test may raise suspicions of maternal or fetal conditions other than the fetal anomalies for which the test is being performed *[1568]*
- the test is not currently covered by Medicare or private health insurance; costs to women are $400–$500, depending on location.

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Discussing tests with women

At the first antenatal visit or as early as possible in pregnancy, the availability of testing for probability of chromosomal anomalies should be discussed and women given relevant written information or other appropriate materials (eg video, DVD) (see Section 53.1). Providing information is particularly important, due to the complexity of the process and the level of decision-making that may be required. A systematic review found levels of knowledge adequate for decision-making were at times not being achieved despite information leaflets and video having some effect *[1538]*. Studies in which knowledge about genetic testing is increased have not observed any corresponding increase in anxiety *[1538]*.

In discussing the tests so that women can give informed consent, it is important to talk in terms of 'probability' or 'chance' rather than 'risk' and to explain:

- it is the woman's/couple's decision whether any testing takes place
- the chromosomal anomalies for which testing is available and the differences between these conditions
- the different pathways for testing (ie combined first trimester test alone, cfDNA testing as first-tier or second-tier test or in a contingent model; see Section 50.1) and the risks and benefits of each approach
- the testing pathway, the decisions that need to be made at each point and their consequences
- the need for accurate assessment of gestational age so that tests are conducted at the appropriate time
- that results of these tests alone indicate a probability of fetal chromosomal anomaly but do not give a definitive diagnosis of any anomalies
- the sensitivity, specificity and positive predictive value for the woman's age of the test and a full explanation of the reporting format of the test (eg high probability/low probability, 1 in 10, 1 in 300, 1 in 1,000)
- the options for women who receive a high-probability result, including information about chorionic villus sampling and amniocentesis (see Section 51.2)
- a large nuchal translucency associated with normal chromosomes may indicate other anomalies which may be structural (eg diaphragmatic hernia, cardiac anomaly) or genetic (eg Smith-Lemli-Opitz syndrome, Noonan syndrome)
- factors that increase the probability of fetal chromosomal anomalies (advanced maternal age, family history of chromosomal anomalies)
- where and how tests can be accessed if the woman chooses to have them
- the availability of evaluated decision aids (eg the Ottawa Decision Framework) *[1522][1555][1556]* (see Section 53.1)
- the costs involved for the woman and the timeframe for receiving results.

Women may choose not to have a test or may choose to proceed directly to a diagnostic procedure instead (eg due to a preference to receive definitive information and/or concerns about the sensitivity of available tests). The choice a woman and her partner make about testing should not influence the subsequent care she receives.

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Care for women with a high probability of having a baby with a chromosomal anomaly

Following a result that suggests a higher probability of having a baby with a chromosomal anomaly, the offer of referral to a health professional (eg a genetic counsellor) is an important consideration.

Antenatal care for women with a high probability of having a baby with a chromosomal anomaly should be supportive and respectful of women's choices about continuation of pregnancy.

11.3 Diagnostic testing

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The suitability of diagnostic tests is determined by gestational stage. The tests are invasive and have previously been associated with a 1% increased risk of miscarriage. However, recent studies suggest the additional risk is not significant *[1519][1576]* and is related to the skill and experience of the person carrying out the test *[1525]*.

Diagnostic tests are based on chromosomal analysis of cells collected using:

- chorionic villus sampling (tissue from the villi of the chorion [part of the placenta]): testing takes place any time after 11 weeks pregnancy or
- amniocentesis (to sample fetal skin cells in the amniotic fluid): testing takes place after 15 weeks pregnancy.

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Timing of diagnostic tests

There is high quality evidence from a Cochrane review *[1521]* and a subsequent randomised trial (n=3,775) *[1566]* that amniocentesis before 15 weeks pregnancy increases the risk of miscarriage and procedure-related indicated terminations and the incidence of talipes equinovarus compared to chorionic villus sampling at that time. Transabdominal chorionic villus sampling is the method of choice for diagnosis of fetal chromosomal anomalies before 14 weeks pregnancy *[1566]*.

Some women may not have the option of chorionic villus sampling (eg if it is not feasible for the test to be conducted before 14 weeks pregnancy or due to placental positioning) and others may choose to wait for amniocentesis after 15 weeks gestation.

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Discussing diagnostic tests

So that women can give informed consent to diagnostic testing, it is important to explain:

- the chromosomal anomalies that may be diagnosed
- the available tests, the gestational stage at which they should be undertaken, the process of the procedure and the risks involved
- the possibility that the procedure may not be successful or the result may not accurately reflect the fetal status
- the possibility of other fetal anomalies that are not identified by the test
- the timeframe for receiving results and making further decisions if necessary
- options to consider if a chromosomal anomaly is identified (eg continuation of the pregnancy or termination where this is permitted under jurisdictional legislation), the need for additional care if the pregnancy continues (eg specialist management of the pregnancy and the baby) and options for adoption or alternative care arrangements
- the health and developmental outcomes for children diagnosed with this condition and the potential long-term considerations for the woman and her family
- the impact on a woman and her family of a false negative or false positive result (eg anxiety among women receiving false positives may remain *[1538]*
- costs involved and how they are to be met.

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Discussing diagnostic test results

When a woman has a diagnostic test and fetal chromosomal anomaly is detected, follow-up with an appropriate health professional should occur at the earliest opportunity. Appropriate health professionals include obstetricians, midwives experienced in genetic counselling, genetic counsellors and clinical geneticists.

Careful consideration should be given to the way diagnostic test results are conveyed and experienced interpreters should be used when this is necessary to enable effective communication. It is very important that there is no negative commentary on the condition diagnosed and that women do not feel pressured into any course of action. Accurate information about the chromosomal condition should be given and women offered information about relevant support organisations (see Section 53.1).

Women receiving a diagnosis of fetal chromosomal anomaly may be unable to absorb information for some time and follow-up support may require several consultations. Counselling should be sensitive to the nature of decisions to be taken, should respect individual decisions and allow time to reach decisions *[1560]*. Appropriate follow-up when an anomaly is detected may require referral to genetic counselling services, other professional services or support networks.

If a woman has a normal diagnostic test result, she should be advised of the residual probability of having a baby with a chromosomal anomaly as the diagnostic tests have a sensitivity of less than 100%.

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11.4 Other considerations in testing for fetal chromosomal anomalies

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Availability and uptake of testing

The range of tests available, policies for testing and uptake by women vary regionally *[1562]*. Overall, approximately 50% of pregnant women participated in nuchal translucency ultrasound in 2007–08 *[1559]*. A Victorian study found the uptake of combined first trimester screening to be 70–80% in recent years *[1542]*.

Studies in Victoria and Queensland have shown higher uptake of testing in metropolitan areas and in private health care and lower rates of diagnosis of Down syndrome in urban areas and public health care *[1554][1530]*. Lower rates of access to testing in rural areas may reflect lack of transport, low levels of support and income in these areas and women's attitudes. However, it has been suggested that low uptake of testing among women from low socioeconomic groups reflects lower rates of informed choice rather than women's attitudes *[1531]*.

A West Australian study found the lowest uptake of testing was among women who were Aboriginal (14.9%), living in remote areas (38.0%), under the age of 25 (40.2%), in the lowest socioeconomic group (41.6%) and with three or more children (48.4%). Logistic regression analysis showed all socio-demographic factors to be strongly associated with screening behaviour, with adjustment for ethnicity, socio-economic status, age, parity and area of residence *[1546]*.

A more recent study into testing for chromosomal anomalies among Aboriginal and Torres Strait Islander women *[1553]* has highlighted the importance of providing information about testing and identified challenges involved in offering testing, particularly in remote areas. These included late presentation in pregnancy, difficulties establishing accurate gestational age, limited consultation time to discuss the testing process, competing priorities in antenatal care, confusion about what needs to be done and when, and organisational logistics (eg women's travel, where to send blood, referral procedures).

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Health professional education

Health professionals caring for pregnant women should undertake continuing education regarding testing for probability of chromosomal anomalies and be aware of current tests available and the settings in which they can be implemented *[1567]*. This includes education about:

- the conditions being tested for, life outcomes, lived experiences of families and individuals with the condition and supports available for families and individuals with the condition
- delivery of 'challenging news' rather than 'bad news' with respect to chromosomal conditions.

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Accreditation of ultrasound operators

The ability to achieve a reliable measurement of nuchal translucency depends on appropriate training and adherence to a standard technique to achieve uniformity of results among different operators *[1558]*. Accreditation of ultrasound operators to conduct nuchal translucency measurement should be through the Nuchal Translucency – Ultrasound, Education and Monitoring Program administered through RANZCOG.

Info Box

Quality assurance

All laboratories used for testing must be accredited by the National Association of Testing Authorities (NATA). External and internal quality control measures should be in place.

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Practice summary: testing for chromosomal anomalies

When: At the first antenatal visit

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; genetic counsellor

- ☐ **Discuss the process of testing for chromosomal anomalies:** Explain the purpose, the process involved, the conditions for which testing is available and that it is the woman's choice whether any tests are carried out.
- ☐ **Consider timing:** For women who choose to have combined first trimester testing, make arrangements for the tests to be carried out before 13 weeks and 6 days pregnancy. If a woman elects to have cfDNA testing, this may be conducted from 10 weeks. For women who miss the window for combined first trimester testing and do not have access to cfDNA testing, consider advising maternal serum testing.
- ☐ **Offer women with a high-probability result referral to an appropriately trained health professional:** This may assist women in considering options and making decisions about diagnostic testing. If a diagnostic test is carried out and chromosomal anomaly diagnosed, referral for counselling should occur at the earliest opportunity.
- ☐ **Learn about locally available resources:** Available testing services and support organisations will vary by location. Be aware of local support groups and counselling services.

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Consensus recommendation

In the first trimester, give all women/couples information about the purpose and implications of testing for probability of chromosomal anomalies to enable them to make informed choices.

Approved by NHMRC in December 2011; expires December 2016

Consensus recommendation

If a woman chooses to have the combined test (nuchal translucency thickness, free beta-human chorionic gonadotrophin, pregnancy-associated plasma protein-A), make arrangements so that blood for biochemical analysis is collected between 9 weeks and 13 weeks 6 days gestation and ultrasound assessment takes place between 11 weeks and 13 weeks 6 days gestation.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Provide information about chromosomal anomalies and the tests used to identify their probability in a way that is appropriate and accessible to the individual woman.

Approved by NHMRC in December 2011; expires December 2016

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Weak recommendation

If a woman chooses to have a diagnostic test for chromosomal anomaly, base the choice of test on gestational age (chorionic villus sampling before 14 weeks pregnancy and amniocentesis after 15 weeks) and the woman's/couple's preferences.

Approved by NHMRC in December 2011; expires December 2016

Consensus recommendation

Offer rapid access to **appropriate counselling and ongoing support by trained health professionals** to women who receive a diagnosis of fetal chromosomal anomaly.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Refer women with a high-probability test result but negative diagnostic test for further specialist assessment because of the increased likelihood of other fetal anomalies.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Support all women to access testing for chromosomal anomalies in a timely manner.

Approved by NHMRC in December 2011; expires December 2016

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Resources

Health professional resources

Resources available to health professionals include websites and professional organisations, seminars, courses and printed materials, which are regularly revised and updated so that they reflect current practice. Pamphlets and other information are available from local genetic services and obstetric ultrasound/radiology practices.

> RANZCOG (2015) *[1567]* Prenatal screening and diagnosi of chromosomal and genetic abnormalities in the fetus in pregnancy C-Obs 59. Melbourne: Royal Australian and New Zealand College of Obstetricians and Gynaecologists.

Nuchal Translucency Online Learning Program

Resources for women and their families

Down Syndrome Australia

Centre for Genetics Education: *Screening tests for your baby*

Centre for Genetics Education: Fact sheet 27 *Non-invasive prenatal testing*

Centre for Genetics Education: Fact sheet 36 *Trisomy 21: Down syndrome*

Centre for Genetics Education: Fact sheet 37 *Trisomy 13: Patau syndrome*

Centre for Genetics Education: Fact sheet 38 *Trisomy 18: Edwards syndrome*

Centre for Genetics Education: Fact sheet 39 *Klinefelter syndrome*

Centre for Genetics Education: Fact sheet 40 *Turner syndrome*

Decision Aid for Prenatal Testing for Fetal Abnormalities —*Your Choice: Screening & Diagnostic tests in Pregnancy* Murdoch Children's Institute

Genetic Alliance

Ottawa Personal Decision Aid

Support After Fetal Diagnosis of an Abnormality (SAFDA): *When your unborn baby has a problem: how to manage the weeks ahead*

Support After Fetal Diagnosis of an Abnormality (SAFDA): *The impact, options and afterwards*

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12. Common conditions during pregnancy

New

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Download Health Professional Summary Sheet for this section *here*

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A number of conditions are common during pregnancy. While these conditions are not harmful to the pregnancy, they can be distressing or debilitating and women may seek advice about managing symptoms. Recommendations are based on evidence about the effectiveness of interventions in reducing symptoms.

Table H1 presents a summary of advice on common conditions during pregnancy considered a priority for inclusion in these Guidelines. Advice on other conditions, such as vaginal discharge and backache is included in the NICE Guidelines *[791]*.

Table H1: Summary of advice for women about common conditions during pregnancy

Common condition	Advice	Section
Nausea and vomiting	Although distressing and debilitating for some women, nausea and vomiting usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with pregnancy complications	54
	Discontinuing iron-containing multivitamins may be advisable while symptoms are present	
Constipation	Increasing dietary fibre intake and taking bran or wheat fibre supplements may relieve constipation	55
	Stimulating laxatives are more effective than preparations that add bulk but are more likely to cause diarrhoea or abdominal pain	
Reflux (heartburn)	Heartburn may be improved by having small frequent meals, and reducing foods that cause symptoms on repeated occasions	56
	Medications may also be considered for relieving heartburn	
Haemorrhoids	Haemorrhoids may be improved by increasing fibre in the diet and drinking plenty of water; standard haemorrhoid creams can be considered if symptoms continue	57
Varicose veins	Varicose veins will not generally cause harm to the woman or baby and usually improve after the birth	58
Pelvic girdle pain	Pregnancy-specific exercises, physiotherapy, acupuncture or use of a support garment may provide some relief from pelvic girdle pain	59
Carpal tunnel syndrome	There is little evidence on the effectiveness of treatments for carpal tunnel syndrome	60

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12.1 Nausea and vomiting

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Nausea and vomiting are common in pregnancy, particularly in the first trimester, with the severity varying greatly among pregnant women. A range of non-pharmacological and pharmacological interventions can be used to assist in managing nausea and vomiting in pregnancy. Women may find these interventions useful, although the evidence for their effectiveness remains inconclusive.

Background

Nausea and vomiting in pregnancy ranges from mild discomfort to significant morbidity (King & Murphy 2009). Symptoms generally start around 4–9 weeks of pregnancy *[516]*. Nausea and vomiting due to other conditions (eg gastrointestinal, metabolic, neurologic or genitourinary) should always be excluded, particularly in women who report nausea or vomiting for the first time after 10 weeks *[522]*.

The most severe form of nausea and vomiting in pregnancy is Hyperemesis gravidarum, which is intractable vomiting in early pregnancy, leading to dehydration and ketonuria severe enough to justify hospital admission and intravenous fluid therapy *[514]*.

The cause of nausea and vomiting in pregnancy is not known but is probably multifactorial *[515]*. The rise in human chorionic gonadotrophin during pregnancy has been implicated; however, data about its association with nausea and vomiting are conflicting *[529]*.

Nausea and vomiting in pregnancy

- *Prevalence*: Nausea is the most common gastrointestinal symptom of pregnancy, occurring in 80–85% of all pregnancies during the first trimester, with vomiting an associated complaint in approximately 52% of women *[530][516]*. Retching (or dry heaving, without expulsion of the stomach's contents) has been described as a distinct symptom that is increasingly measured separately to vomiting and nausea *[523]*.
- *Timing*: Most women report nausea and vomiting within 8 weeks of their LMP (94%), with over one-third (34%) reporting symptoms within 4 weeks of their LMP *[530][516]*. Most women (87–91%) report cessation of symptoms by 16–20 weeks of pregnancy. Although nausea and vomiting is commonly referred to as 'morning sickness', only 11–18% of women report having nausea and vomiting confined to the mornings *[516][530]*.
- *Hyperemesis gravidarum*: This condition is much less common, affecting 0.3–1.5% of women *[514]*. Symptoms typically start between 5 and 10 weeks pregnancy and resolve by 20 weeks. However, up to 10% of women will continue to vomit throughout the pregnancy. The hospital admission rate for the condition falls from 8 weeks onwards *[514]*.

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Impact of nausea and vomiting in pregnancy

Although distressing and debilitating for some women, nausea and vomiting do not appear to have a negative impact on pregnancy outcomes. A systematic review of observational studies found a reduced risk of miscarriage associated with nausea and vomiting (OR 0.36; 95%CI 0.32 to 0.42) and conflicting data regarding reduced risk for perinatal mortality *[529]*. No studies have reported an association between nausea and vomiting in pregnancy and teratogenicity *[521]*.

However, despite reassurance that nausea and vomiting do not have harmful effects on pregnancy outcomes, these symptoms can have a severe impact on a pregnant woman's quality of life. Two observational studies have reported on the detrimental impact that nausea and vomiting may have on women's day-to-day activities, relationships, use of healthcare resources and need for time off work *[526][512]*.

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Managing nausea and vomiting in pregnancy

The systematic review conducted to inform these Guidelines identified additional evidence that was consistent with the NICE guidelines. The highest quality study, a Cochrane review *[523]* examined 27 trials of interventions including acustimulation, acupuncture, ginger, vitamin B6 and several antiemetic medicines.

Systematic review of studies in this area is complicated by the heterogeneity of studies and limited information on outcomes *[523]*.

The available evidence suggests the following.

- *Ginger*: While small RCTs have found reduced severity of nausea and vomiting with ginger products (syrup or capsules) *[525][528][519]*, there is limited and inconsistent evidence of their effectiveness, although there is evidence that their use may be helpful to women *[523]*. Dosages of up to 250 mg four times a day appear to be safe *[528]*.
- *Acupressure, acustimulation and acupuncture*: While some evidence from systematic reviews of RCTs *[525][527]* supports the use of P6 acupressure and it appears to be safe in pregnancy *[526]*, the evidence on the effectiveness of P6 acupressure, auricular acupressure and acustimulation of the P6 point is inconsistent and limited and there appears to be no significant benefit of acupuncture (P6 or traditional) *[523]*.
- *Pyridoxine (vitamin B6)*: There is limited evidence to support the use of pyridoxine *[523]* and concerns about possible toxicity at high doses.
- *Antihistamines*: A meta-analysis of 12 RCTs that compared antihistamines ± pyridoxine with placebo or no treatment found a significant reduction in nausea in the treated group (OR 0.17; 95%CI 0.13 to 0.21) *[507]*. A systematic review of three RCTs (n=389) found that phenothiazines reduced nausea or vomiting when compared with placebo (RR 0.31; 95%CI 0.24 to 0.42) *[524]*, although different phenothiazines were grouped and one of the trials recruited women after the first trimester. The bulk of the evidence demonstrates no association between birth defects and phenothiazine use during pregnancy (n=2,948; RR 1.03; 95%CI 0.88 to 1.22) *[524][512]*.
- *Other pharmacological treatments:* Antiemetic medicines are more likely to have a place in treatment of severe symptoms and the intractable nausea and vomiting of Hyperemesis gravidarum than in the relief of mild or moderate nausea and vomiting *[523]*.

It is currently not possible to identify with certainty interventions for nausea and vomiting in early pregnancy that are both safe and effective *[523]*. As nausea and vomiting mostly resolves within 16 to 20 weeks with no harm to the pregnancy, prescribed treatment in the first trimester is usually not indicated unless the symptoms are severe and debilitating *[513]*.

Discontinuing iron

Iron supplementation may be an aggravating factor in nausea and vomiting. The systematic review conducted for these Guidelines identified a prospective cohort study *[517]* in which 63 of 97 (p=0.001) women with severe nausea qualitatively reported an improvement in symptoms after discontinuing iron-containing antenatal multivitamins. If multivitamins are discontinued, consideration should be given to ensuring folate and iodine intake remain sufficient.

Oral health

Nausea and vomiting have the potential to affect oral health and women should be given advice on how to minimise these effects (see Section 6).

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Practice summary: managing nausea and vomiting

When: At the first contact with all women and at subsequent contacts for women who report nausea and vomiting

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; dietitian; pharmacist

- ☐ **Inform women that nausea and vomiting is not associated with medium or long-term adverse effects:** Explain that nausea and vomiting is common in pregnancy, is not necessarily confined to the morning and is likely to lessen by week 16.
- ☐ **Provide lifestyle/diet advice :** Acknowledge that nausea and vomiting affects quality of life, and suggest tips on managing nausea and vomiting, including drinking plenty of fluids, eating little and often during the day, getting plenty of rest and avoiding fatty or spicy food. Avoiding iron-containing multivitamins while nausea and vomiting are present may also help.
- ☐ **Discuss non-pharmacological and pharmacological treatments:** If the woman asks about treatments for nausea and vomiting, suggest interventions that may help and are thought to be safe, beginning with non-pharmacological approaches. The safety and effectiveness of antiemetics should be discussed with women with more severe symptoms who choose to consider medication.

Good practice statement

Women who experience nausea and vomiting in pregnancy can be advised that, while it may be distressing, it usually resolves spontaneously by 16 to 20 weeks pregnancy and is not generally associated with a poor pregnancy outcome.

Approved by NHMRC in December 2011; expires December 2016

Good practice statement

Discontinuing iron-containing multivitamins for the period that women have symptoms of nausea and vomiting may improve symptoms.

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

Arsenault M-Y, Lane CA (2002)*The Management of Nausea and Vomiting of Pregnancy. Clinical Practice Guideline no.120.* Society of Obstetricians and Gynaecologists of Canada. *J Obstet GynaecolCan* 24(10): 817–23. *[The link non-functional]*

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See full reference list

This document has been released under the Freedom of Information Act 1982 (CTH) By the Department of Health, Disability and Ageing

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12.2 Constipation

Info Box

Constipation is a common gastrointestinal symptom in pregnancy, particularly in the first trimester. Guidance about increasing dietary fibre and appropriate use of laxatives may assist women to treat constipation and reduce the risk of further episodes.

Background

Constipation is the delay in the passage of food residue, associated with painful defecation and abdominal discomfort. Rising levels of progesterone in pregnancy can cause a reduction in gastric motility and increased gastric transit time. Poor dietary fibre intake can contribute to women experiencing constipation during pregnancy, as at any time of life. Iron supplementation, common during pregnancy, is also associated with constipation *[505]*. In Aboriginal and Torres Strait Islander communities with a high prevalence of anaemia, iron supplementation is common.

Constipation is generally defined by Rome II criteria: the presence of at least two of the following symptoms for at least one in four defecations: straining, lumpy or hard stools, sensation of incomplete evacuation, sensation of anorectal obstruction, manual manoeuvres to facilitate defecation, and fewer than three defecations per week.

Prevalence of constipation in pregnancy

Constipation is a commonly reported condition during pregnancy that appears to decrease as the pregnancy progresses.

- A case series study *[508]* found that 39% of pregnant women reported symptoms of constipation at 14 weeks, 30% at 28 weeks and 20% at 36 weeks; this study may have resulted in overestimates, as routine iron supplementation was recommended for all pregnant women in the United Kingdom at the time the study was conducted.
- Later studies have found that constipation affects up to 25% of women during pregnancy:
- a prospective case series study *[505]* found prevalence rates of 24% (95% CI 16–33%), 26% (95% CI 17–38%), 16% (95% CI 8–26%) in the first, second, and third trimesters, respectively. In multivariable longitudinal analysis, iron supplements (OR 3.5; 95% CI 1.04–12.10) and past constipation treatment (OR 3.58; 95% CI 1.50–8.57) were associated with constipation during pregnancy

a correlational study *[510]* found prevalence rates of 29.6%, 19% and 21.8% in the first, second and third trimesters respectively. This study also reported laxative use among pregnant women as 11% (95% CI 7–16), 15% (95% CI 10–21) and 13.5% (95% CI 8–19) in the first, second and third trimesters.

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Guidance on managing constipation

The first-line treatment for constipation is increasing dietary fibre and fluid intake. Dietary fibre intake can be improved by eating more wholegrain foods, fruit and vegetables, or through wheat or bran fibre supplementation. Where fibre supplementation does not alleviate symptoms, laxatives (stimulant, bulk-forming or osmotic) may be helpful in the short-term, although they can cause adverse side effects such as abdominal pain and diarrhoea.

Effectiveness of treatments

Findings are consistent across the NICE guidelines and the systematic review conducted to inform these Guidelines.

- *Increasing fluid intake*: while there are no RCTs or cohort studies in this area, there is some evidence to suggest that dietary factors such as water intake may play a role in preventing, or alleviating, bowel habit perturbations during and after pregnancy *[506]*. In spite of the lack of high-level evidence, increased fluid intake should be recommended as one of the first measures to relieve constipation in pregnancy. Increasing fluid intake is not expensive, is readily available and has several other beneficial effects during pregnancy *[511]*.
- *Dietary fibre supplementation:* Evidence from a Cochrane review *[507]* based on two RCTs (n = 215) supports the effectiveness of fibre supplementation in safely treating constipation in pregnancy. Fibre supplements were found to increase the frequency of defecation (OR: 0.18; 95% CI 0.05–0.67), lead to softer stools and appear to have no adverse effects.
- *Laxatives:* The same Cochrane review *[507]* found that when discomfort was not alleviated by fibre supplementation, stimulant laxatives were more effective than bulk-forming laxatives (Peto OR 0.30; 95% CI 0.14–0.61), although stimulants were associated with significantly more abdominal pain and diarrhoea. Preliminary evidence indicates that osmotic laxatives (eg polyethylene glycol or PEG) are effective and well tolerated during pregnancy *[509]* but currently there is insufficient evidence about potential effects on the fetus *[511]*.

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Info Box

Practice summary: constipation

When: At the first contact with all women and at subsequent contacts for women who report symptoms of constipation

Who: Midwife; maternal and child health nurse; GP; obstetrician; Aboriginal and Torres Strait Islander health worker; multicultural health worker; practice nurse; allied health professional; pharmacist

- ☐ **Advise about fluid intake**: Drinking more fluids has a range of benefits and may assist in easing constipation. Water is a good source of fluids as it hydrates without adding additional energy to the diet. Other drinks such as milks and fruit juices add variety and nutrients. Intake of fluids containing added sugars should be moderated.
- ☐ **Talk about dietary fibre**: Advise all women to eat a wide variety of nutritious foods, including plenty of vegetables, fruit, wholegrain cereals and breads, nuts, seeds and legumes. Bran or wheat fibre supplementation is safe and effective during pregnancy and may relieve symptoms. Fibre supplements should be introduced slowly and plenty of water consumed while they are being taken.
- ☐ **Discuss laxative use**: Laxatives can be used to relieve symptoms but should not be used long-term. Bulk-forming laxatives may cause fewer side effects than stimulant laxatives.

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Weak recommendation

Offer women who are experiencing constipation information about increasing dietary fibre intake and taking bran or wheat fibre supplementation.

Recommendation strength Grade C

Approved by NHMRC in December 2011; expires December 2016

Weak recommendation

Advise women who choose to take laxatives that preparations that stimulate the bowel are more effective than those that add bulk but may cause more adverse effects such as diarrhoea and abdominal pain.

Recommendation strength Grade C

Approved by NHMRC in December 2011; expires December 2016

Info Box

Resources

NHMRC (2013) *Australian Dietary Guidelines*. Canberra: Commonwealth of Australia.

References

See full reference list

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12.3 Reflux (heartburn)

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Info Box

Reflux (heartburn) is a common symptom in pregnancy. Most women can relieve mild symptoms by modifying their diet and lifestyle. Women with persistent or more severe symptoms may also require advice about specific treatments.

Background

Reflux (heartburn) is very common antenatally. While it is considered a normal part of a healthy pregnancy, symptoms may be frequent and distressing to women.

Reflux is generally a symptom of gastro-oesophageal reflux disorder (GORD), where some gastric contents are regurgitated into the oesophagus, causing discomfort and a burning sensation behind the sternum and/or throat. Acid regurgitation may also reach the pharynx, resulting in a bitter or sour taste in the mouth. While the exact causes of the increase in reflux during pregnancy are not clear, it is thought that hormonal effects on antireflux barriers in the lower oesophagus and on gastric function may play a part *[490][497]*. When symptoms persist, further investigation may identify other causes (eg bariatric surgery, stomach cancer and Helicobacter pylori infection *[503][491]* and treatment after the birth may be needed.

Incidence during pregnancy

- Reflux is estimated to occur in 30–50% of pregnancies, with the incidence up to 80% in some groups *[501][490]*. Symptoms tend to become both more severe and frequent as pregnancy progresses.
- Older women and those having second or subsequent pregnancies are more likely to experience heartburn *[494]*. There is also evidence suggesting that pre-pregnancy heartburn and weight gain during pregnancy increase the risk of heartburn during pregnancy *[500]*.

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Info Box

Discussing reflux

Reflux is not associated with adverse pregnancy outcomes and therefore treatment aims to relieve symptoms for women. There is limited evidence on the effectiveness and safety of current interventions. Generally, the first approach is advice on diet and lifestyle, either to reduce acid production or avoid reflux associated with postural change *[502]*.

Lifestyle approaches

Narrative reviews recommend lifestyle modifications for mild symptoms, including *[504][490]*:

- abstaining from alcohol, tobacco and medications that may increase symptoms (eg anticholinergics, calcium channel antagonists)
- having smaller more frequent meals
- avoiding lying down within 2–3 hours of eating
- elevating the head of bed by 10–15 cm.

Treatments

A range of medications affecting different physiological processes (eg antacids, histamine-2 [H2] receptor antagonists, proton pump inhibitors) may be used to relieve persistent or severe symptoms *[494]*.

RCT evidence on the safety of reflux medications during pregnancy is limited *[502]*. Available evidence from lower level studies suggests that the use of antacids, proton pump inhibitors and H2 blockers for reflux during pregnancy presents no known significant safety concern for either the mother or baby:

- antacids are considered safe in pregnancy and may be preferred by women as they give immediate relief; calcium-based formulations are preferable to those that contain aluminium *[504]*
- the use of proton pump inhibitors during pregnancy is not associated with an increased risk for major congenital birth defects, spontaneous miscarriage, preterm birth, perinatal mortality or morbidity *[493][495][496][499][497][498]*
- the use of H2 blockers in pregnancy is not associated with any increase in risk of spontaneous miscarriage, preterm birth or small-for-gestational-age baby *[496]*.

One small RCT (n=36) *[492]* found that the use of acupuncture in pregnancy may reduce reflux symptoms.

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Info Box

Practice summary: reflux

When: A woman is experiencing reflux

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian

- ☐ **Provide advice**: Advise women that the causes of reflux vary between individuals and avoiding the food and drinks that cause them reflux may reduce symptoms. Sleeping on the left side, raising the head of the bed, and not lying down after eating may also help. Reassure women that symptoms usually subside after pregnancy, but may recur in a subsequent pregnancy.
- ☐ **Discuss treatments**: Discuss any remedies the woman may be using to treat reflux. Advise women that if symptoms persist or become more severe, medication can be considered.
- ☐ **Take a holistic approach**: Assist women to identify food and drinks that may cause reflux and to find culturally appropriate alternatives. Consider costs if prescribing medication to treat reflux.

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Consensus recommendation

Offer women experiencing mild symptoms of heartburn advice on lifestyle modifications and avoiding foods that cause symptoms on repeated occasions.

Approved by NHMRC in June 2014; This recommendation is currently considered stable and no update is planned.

Weak recommendation

Give women who have persistent reflux information about treatments.

Recommendation strength Grade C

Approved by NHMRC in June 2014; expires June 2019

Info Box

Resources

Remote Primary Health Care Manuals (2017). Common discomforts of pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

References

See full reference list

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12.4 Haemorrhoids

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Info Box

Haemorrhoid symptoms are common in pregnancy, particularly in the second and third trimesters. Advice on avoiding constipation may assist women to prevent or lessen the effects of haemorrhoids. Topical products can be used to ease continuing symptoms.

Background

Haemorrhoids are enlarged, swollen veins around the anus that are characterised by anorectal bleeding, painful bowel movements, anal pain and anal itching. While the mechanism is not clear, this is thought to be a result of prolapse of the anal canal cushions, which play a role in maintaining continence. Constipation (see Section 12) is the major precipitating factor for haemorrhoids. Pregnancy also facilitates development or exacerbation of haemorrhoids, due to increased pressure in rectal veins caused by restriction of venous return by a woman's enlarged uterus *[438]*.

Incidence during pregnancy

- Haemorrhoids that were present previously may become symptomatic for the first time in pregnancy. Haemorrhoidal symptoms are most common in the second and third trimesters of pregnancy and after birth *[438]*.
- While estimates vary, it is thought that 25–35% of pregnant women are affected by haemorrhoids *[441][436]* . One observational study found that 8% of pregnant women (n=165) experienced thrombosed external haemorrhoids in the last 3 months of pregnancy *[437]* .

Diagnosis

Pain with bowel movements, bleeding and itching are often the first signs and symptoms of haemorrhoids. Diagnosis is made by examining the anus and anal canal, usually by inspection. Digital rectal examination and endoscopy (sigmoidoscopy and colonoscopy) may also be used. It is important to rule out more serious causes of bleeding *[438]*.

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Info Box

Discussing haemorrhoids

Effectiveness of treatments

Treatment during pregnancy aims mainly to relieve symptoms and control pain *[438]*.

Most evidence for the effectiveness of haemorrhoid treatments comes from studies of non-pregnant patients. Given the overall lack of evidence, there is consensus in clinical reviews for conservative management in pregnancy including avoiding constipation, dietary modification, dietary fibre supplementation and stool softeners *[438][440][442]*.

Topical products with analgesics and anti-inflammatory effects provide short-term local relief of symptoms. There is no evidence on the effectiveness or safety of creams used in pregnancy; however, the small doses and limited systemic absorption mean that they are unlikely to harm the baby when used in the third trimester *[441]*.

While surgical removal of haemorrhoids may be a consideration in extreme circumstances, surgery is rarely an appropriate intervention for pregnant women as haemorrhoidal symptoms often resolve spontaneously after the birth *[441]*.

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Info Box

Practice summary: haemorrhoids

When: A woman had haemorrhoids before pregnancy or has symptoms of haemorrhoids

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; accredited dietitian

- ☐ **Provide advice:** Advise women that avoiding constipation (see Chapter 55) is the best way to prevent and manage haemorrhoids during pregnancy and they should also try to avoid straining with bowel motions.
- ☐ **Discuss treatments:** Advise women that haemorrhoid creams can be used to further ease their symptoms.
- ☐ **Take a holistic approach:** Explore culturally appropriate, low cost ways for women to increase their fibre intake. Advise women who are increasing their fibre intake to make sure they drink adequate fluids.

Consensus recommendation

Offer women who have haemorrhoids information about increasing dietary fibre and fluid intake. If clinical symptoms remain, advise women that they can consider using standard haemorrhoid creams.

Approved by NHMRC in June 2014; This recommendation is currently considered stable and no update is planned.

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Info Box

Resources

NHMRC (2013) Australian Dietary Guidelines. Canberra: Commonwealth of Australia.

12.5 Varicose veins

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Info Box

Varicose veins occur often within the general population and are a common symptom during pregnancy. While there is little evidence to support any specific treatment, use of compression stockings may help to relieve symptoms.

Background

Varicose veins are caused by the pooling of blood in the surface veins as a result of inefficient valves that would normally prevent blood draining back down the leg. They can occur as blue swollen veins on the calves, the inside of the legs and the vulva, and may cause itching and aching. Feet and ankles can also become swollen.

In 70–80% of women who develop problems with varicose veins during pregnancy, the symptoms appear during the first trimester, often within 2 to 3 weeks of gestation *[446]*.

A family history of varicose veins, increasing number of full term pregnancies and increasing age have been found to be risk factors for the development of varicose veins *[447][448][445]*.

Factors influencing varicose veins in pregnancy

- *Elevated pressure*: Increased blood volume early in pregnancy, followed by fetal growth and weight gain, increase women's intra-abdominal pressure and central venous return, with the potential for the elevated pressure to lead to valve failure and development of varices *[445]*.
- *Hormones*: Hormonal fluctuations in early pregnancy strongly influence the development of varicose veins *[446][449]*.

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Info Box

Discussing varicose veins

There is a lack of evidence about treatments for varicose veins that are effective and safe in pregnancy. Existing systematic reviews are based on small RCTs with a high risk of bias (*[443][444]*. The evidence on vulval varices is too limited for conclusions to be drawn.

Given the overall lack of evidence, there is consensus in clinical reviews that advice to women should be based on reassurance, conservative management and symptom relief. Avoiding long periods of standing, use of compression stockings and elevating the feet have been found to improve symptoms in the general population *[446]*.

Treatments for varicose veins

- *Compression stockings*: A small RCT on preventing varicose veins in pregnancy with compression stockings (n=42) (Thaler et al 2001) found that compression stockings do not prevent or improve varicose veins, but do improve leg symptoms (pain, discomfort, cramps) (RR 0.74, 95% CI 0.59–0.93).
- *Surgery:* Surgical techniques including stripping and ligation, ablation or scleropathy, may be used to remove varicose veins when people remain symptomatic *[446]*. As symptoms of varicose veins often improve after the birth *[444]*, surgery is rarely considered an appropriate intervention for pregnant women.

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Info Box

Practice summary: varicose veins

When: A woman had varicose veins before pregnancy or has symptoms of varicose veins

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Provide advice:** Explain that varicose veins are common in pregnancy, especially in second and subsequent pregnancies and multiple pregnancies.
- ☐ **Discuss treatments:** Advise women that symptoms can be relieved by elevating the feet while resting and avoiding long periods of standing.
- ☐ **Take a holistic approach:** Women may not mention that they have varicose veins and they may not be visible to the health professional. Asking about itching or discomfort in the legs can assist in identifying varicose veins.

Consensus recommendation

Advise women that varicose veins are common during pregnancy, vary in severity, will not generally cause harm and usually improve after the birth. Correctly fitted compression stockings may be helpful.

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Info Box

Resources

Remote Primary Health Care Manuals (2017). Common discomforts of pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

References

See full reference list

12.6 Pelvic girdle pain

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Info Box

The severity of pelvic girdle pain (symphysis pubis dysfunction) during pregnancy varies widely. Advice should be aimed towards minimising pain.

Background

Pelvic girdle pain has been described as a collection of signs and symptoms of discomfort and pain in the pelvis and lower back (lumbopelvic) area, including musculoskeletal pain radiating to the upper thighs and perineum. Symptoms occur due to relaxation of the pelvic ligament and increased joint mobility in pregnancy. Symptoms vary from mild discomfort to severe and debilitating pain that can hinder mobility. Other causes of pain in the pelvic area (eg urinary tract infection, preterm labour) should be excluded *[475]*. Pelvic girdle pain usually resolves spontaneously after the birth (Elden et al 2008), although symptoms may recur during subsequent pregnancies *[477]*.

Incidence in pregnancy

- The true incidence of pelvic girdle pain in pregnancy is unknown and estimates from low-level evidence are contradictory, ranging from approximately 4% to 84% *[465][480][483][484]*. The wide variation can be attributed to various factors including the absence of a precise definition and diagnostic criteria, differences in study design and selection of the study population.
- The incidence of pelvic girdle pain has been found to be higher in late pregnancy *[474][478][486][483][476]* and among women with a higher BMI *[476]*.
- There is currently no evidence regarding the incidence of pelvic pain in specific population groups.

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Factors influencing pelvic girdle pain

Low-level evidence indicates that *[480][463][468][466]* :

- pelvic pain is more common in women with a previous history of low back pain *[463][467]*) or trauma of the back or pelvis *[463]*
- risk factors for developing pelvic pain include: increased number of previous pregnancies *[467][463][483]*); physically demanding work *[479][467]*; high BMI *[463][468][467]*; emotional distress *[467]* smoking *[463][466]*.

The evidence on age as a risk factor for pelvic pain in pregnancy is inconsistent *[467][468]*.

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Info Box

Discussing pelvic girdle pain

NICE (2008) *[103]* found little evidence on which to base clinical practice. Subsequent evidence is limited by the heterogeneity and low quality of studies and the inconsistency of findings.

Treatments for pelvic pain

Systematic reviews into interventions for women with pelvic girdle pain have found low-level evidence:

- women receiving acupuncture or physiotherapy reported less intense pain in the morning or evening than women receiving usual antenatal care and acupuncture was more effective in reducing evening pain than physiotherapy *[481]*
- acupuncture was more effective than standard treatment, physiotherapy, or stabilising exercises *[469]*
- exercise, pelvic support garments and acupuncture improved functional outcomes *[482]*
- exercise during pregnancy may decrease pelvic girdle pain (Schiff Boissonnault et al 2012).

RCTs have found benefits from a multimodal approach (manual therapy, stabilisation exercises, patient education) *[473]* and no reduction of pain with exercise *[470][485]*.

Lower level evidence supports acupuncture as an effective intervention *[471]*. No serious adverse effects were reported (minor side effects included bruising, pain on needle insertion, bleeding, haematoma and fainting).

Advice on managing pelvic girdle pain

There is consensus from low-level evidence and clinical reviews about providing advice on minimising pain, including *[487][477][464]*:

- wearing low-heeled shoes
- seeking advice from a physiotherapist regarding exercise and posture
- reducing non-essential weight-bearing activities (eg climbing stairs, standing/walking for long periods of time)
- avoiding standing on one leg (eg by sitting down to get dressed)
- avoiding movements involving hip abduction (eg taking care getting in/out of cars, baths or squatting)
- applying heat to painful areas.

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Info Box

Practice summary: pelvic girdle pain

When: A woman has pelvic girdle pain

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist

- ☐ **Provide advice:** Reassure the woman that pelvic girdle pain will not harm her or her unborn child, and is likely to resolve after the birth. Advise the woman about steps she can take to minimise pain.
- ☐ **Take a holistic approach:** Consider possible barriers to women being able to make changes to minimise their pain (eg work requirements, cultural attitudes to exercise, costs of allied health services).

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Weak recommendation

Advise women experiencing pelvic girdle pain that pregnancy-specific exercises, physiotherapy, acupuncture or using a support garment may provide some pain relief.

Strength of recommendation Grade C

Approved by NHMRC in June 2014; expires June 2019

Info Box

Resources

Remote Primary Health Care Manuals (2017). Common discomforts of pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

References

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12.7 Carpal tunnel syndrome

Info Box

Carpal tunnel syndrome is common during pregnancy, particularly in the third trimester. There is little evidence to support intervention in pregnancy and symptoms are likely to resolve after the birth.

Background

Carpal tunnel syndrome results from compression of the median nerve within the carpal tunnel in the hand. It is characterised by tingling, burning pain, numbness and a swelling sensation in the hand that may impair sensory and motor function.

Incidence during pregnancy

- Due to differences in methods of diagnosis between studies (eg neurophysiologically confirmed, clinically diagnosed, patient-reported), there is great variability in estimates of the incidence of pregnancy-related carpal tunnel syndrome; estimates range from approximately 2% to 72% *[453][454][451][457][459]*.

Factors influencing carpal tunnel syndrome

- In non-pregnant populations, carpal tunnel syndrome has been reported to occur more frequently in occupations that involve repetitive activity, forceful work or vibration *[460]*.
- In pregnancy, likely causes of carpal tunnel syndrome are hormonal changes and oedema *[461][450]*.
- Carpal tunnel syndrome is more common in the third trimester *[462][451]*.
- Pre-existing or gestational diabetes may also contribute due to generalised slowing of nerve conduction*[450]* but impaired median nerve conduction also occurs in pregnant women without diabetes *[453][451]*.

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Info Box

Discussing carpal tunnel syndrome

Effectiveness of treatments

The recent evidence on interventions to treat carpal tunnel syndrome during pregnancy is limited to small case series studies (n=20–30) that found reduced symptoms associated with night splinting *[454]* or steroid (dexamethasone) injections *[458][456]*.

Activity modification, avoiding positions of extreme flexion or extension of the wrists and avoiding exposure to vibration have been suggested as adjuncts to splinting *[455][452][450]* but there is no evidence that these are effective for carpal tunnel syndrome.

While carpal tunnel syndrome usually resolves after the birth *[461]*, persistence of symptoms has been reported in more than 50% of women after 1 year and in about 30% after 3 years *[459]*.

Info Box

Practice summary: carpal tunnel syndrome

When: A woman has symptoms of carpal tunnel syndrome

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker; physiotherapist; occupational therapist

- ☐ **Provide advice**: Explain that carpal tunnel syndrome is common due to increased fluid retention during pregnancy and may resolve after the birth.
- ☐ **Discuss treatments**: Explain that there is a lack of research about treatments for carpal syndrome during pregnancy and give advice on avoiding movements that may exacerbate symptoms (eg using a splint to keep the joint straight overnight).
- ☐ **Consider referral**: Women with persistent and severe symptoms of nerve compression should be referred for specialist evaluation.
- ☐ **Take a holistic approach**: For women whose occupations involve repetitive activity or vibration advise frequent breaks or a temporary change in role where possible.

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Consensus recommendation

Advise women who are experiencing symptoms of carpal tunnel syndrome that the evidence to support either splinting or steroid injections is limited and symptoms may resolve after the birth.

Approved by NHMRC in June 2014; expires June 2019

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Info Box

Resources

AAOS (2007) *Clinical Practice Guideline on the Diagnosis of Carpal Tunnel Syndrome.* Rosemont IL: American Academy of Orthopaedic Surgeons.

AAOS (2007) *Clinical Practice Guideline on the Treatment of Carpal Tunnel Syndrome*. Rosemont IL: American Academy of Orthopaedic Surgeons. *[URL link non-functional]*

Remote Primary Health Care Manuals (2017). Common discomforts of pregnancy. In: *Women's Business Manual* (6th edition). Alice Springs, NT: Centre for Remote Health.

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13. Clinical assessments in late pregnancy

New

Info Box

Download Health Professional Summary Sheet for this section *here*

Info Box

This section discusses the evidence for aspects of care during late pregnancy. At this stage, antenatal care becomes more frequent and includes planning and preparing for the birth. Some situations will require additional discussion, and women should be given advice and information to help them make informed decisions about options for interventions and birth. For example, identifying the presentation of the baby (eg breech) from 35 weeks allows for timely discussion, planning and referral if necessary. For women who have prolonged pregnancy, the longer the pregnancy the more complex the decisions may become, as the risks to the baby increase.

Recommendations are based on the evidence for interventions that aim to reduce the need for unnecessary induction or unplanned caesarean section. Decisions about women's care are made after considering the benefits and possible risks, always taking the woman's preferences into account. When there is a high risk of adverse outcomes, discussion with specialists (eg obstetrician, neonatologist, paediatrician) is advisable.

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13.1 Fetal presentation

Info Box

Identifying fetal presentation and discussing management options with women who have a malpresentation late in pregnancy enables informed planning for the birth.

Background

Fetal presentation refers to the part of the baby that is overlying the maternal pelvis. Fetal lie refers to the relationship between the longitudinal axis of the baby with respect to the longitudinal axis of the mother (longitudinal lie, transverse lie, oblique lie).

Most babies present with the crown of the head at the cervix (vertex presentation). Less optimal situations are when the presenting part is the face or brow; the buttocks (breech presentation); or foot or feet (footling presentation). Babies that are in a transverse lie may present the fetal back or shoulders, arms or legs, or the umbilical cord (funic presentation). In an oblique lie, generally no palpable fetal part is presenting. This lie is usually transitory and occurs as the baby is moving.

Fetal presentation can be identified by palpation of the maternal abdomen, and confirmed by ultrasound if there is any doubt.

Fetal presentation at birth

Among women who gave birth in Australia in 2010, most fetal presentations were vertex (94.4%). Malpresentations included breech (3.9%), face or brow presentation (0.2%) and shoulder/transverse and compound presentations (0.7%) *[552]*.

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Info Box

Abdominal palpation

Abdominal palpation is accurate in identifying presentation, especially if carried out by an experienced health professional *[554]*. In Australia, it is recommended that all health professionals providing antenatal care be experienced in palpation of the pregnant abdomen including identification of the presenting part *[553]*. While the positive effects of abdominal palpation are difficult to quantify, no risks have been identified and it provides a point of engagement with the mother and baby. Assessment of presentation by abdominal palpation before 36 weeks is not always accurate.

Where there is any doubt as to the presenting part, obstetric ultrasound should be used to confirm the palpation findings. Ultrasound can also exclude fetal anomaly, low-lying placenta, hyperextension of the baby's head and the presence of umbilical cord around the fetal neck *[553]*.

Info Box

Breech presentation

Breech presentation is common in mid pregnancy, with incidence decreasing as the pregnancy approaches term. Turning the baby (eg using external cephalic version [ECV]) reduces the number of babies who are breech at term, thereby improving the chance of a vaginal birth.

The optimal mode of birth for women who have a baby in the breech position is the subject of much controversy. Following the initial findings of the Term Breech Trial of fewer adverse outcomes among babies following planned caesarean section than planned vaginal birth *[580]*, breech birth is now more likely to occur by caesarean section. Rates of singleton vaginal breech births in Australia fell from 23.1% in 1991 *[610]* to 4.0% in 2010 *[61]*.

However, several studies have shown that with careful selection criteria and involvement of experienced health professionals in centres that are supportive, vaginal breech birth can be successful in 49–83% of women, with rates of morbidity equal to that of birth by caesarean section and higher success rates among multiparous women *[609][556][594][602][612][593][613][573][567][583][587]*.

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Evidence into neonatal or maternal outcomes associated with mode of breech birth is inconsistent:

- *Risks to the infant*: Some cohort studies *[594][569][596]* found no differences in mortality and morbidity between vaginal births and caesarean sections, while others found higher rates of morbidity following vaginal birth *[572][581][607][567][583][611]* and one found a higher risk of neonatal mortality among babies of 1,000–1,500 g following vaginal birth but no significant difference in neonatal mortality above these weights *[568]*. An observational study found that the risk of adverse perinatal outcomes following vaginal birth was increased among babies with a birthweight below the 10th percentile and a gestational age of less than 39 weeks *[557]*. A systematic review of cohort studies found a lower risk of developmental dysplasia of the hip following caesarean section compared with vaginal birth *[603]*. Importantly, the follow-up study from the babies born in the Term Breech Trial showed that risk of death or developmental delay at 2 years of age did not differ with mode of birth *[617]*.
- *Risks to the mother*: Some studies have found lower rates of maternal morbidity following vaginal birth *[594][602][583][611]*, while another found a lower risk of maternal complications following caesarean section *[592]*.

Identifying breech presentation at around 36 weeks gestation enables timely discussion of ECV and referral as required (eg to a health professional with expertise in ECV) or referral to a health professional and centre with expertise in vaginal breech birth.

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External cephalic version

Offering ECV when clinically appropriate is recommended in the United Kingdom *[604]*, the United States *[555]* and Australia *[553]*.

Effectiveness

The reported success rate of ECV is in the range of 36.7–72.3% *[584][571][600][597][570][616][576][590][608][559][560][574][601][558][563][564]*.

A spontaneous reversion rate of 3–14% has been reported after 36 weeks *[597][570][559][563]*.

Benefits and risks

Successful ECV reduces the rate of caesarean sections, with vaginal birth following ECV being successful in 71–84% of women *[570][559][574][558][606]*.

ECV is a safe procedure when performed in a setting where an urgent caesarean section can be performed *[597][576][574][558][563]*. In a systematic review, the most frequently reported complications of ECV were transient abnormal cardiotocography patterns (5.7%), persisting pathological cardiotocography (0.37%), vaginal bleeding (0.47%) and placental abruption (0.12%) *[565]*. Caesarean section was performed in 0.43% of all procedures and perinatal mortality was 0.16%.

Small studies have shown that the moderate degree of pain associated with ECV is well tolerated by the majority of women because of its short duration *[571]* and that most women rate ECV as a good experience, whether it is successful (94%) or unsuccessful (71%) *[608]*.

Factors influencing success of ECV

Factors predicting successful ECV include posterior placental location, complete breech position, amniotic fluid index >10, unengaged presenting part, maternal weight <65 kg and thicker fundal myometrium on ultrasound *[585][589][591][559][560][601][558][561][563]*. ECV is also more successful in multiparous (57–78% than primiparous (27–53%) women *[597][570][590][608][560][563]*, and if the health professional performing the ECV is experienced. ECV at 34–35 weeks versus ≥37 weeks increased the likelihood of cephalic version but did not decrease the rate of caesarean section *[586]*.

The use of tocolytics (uterine relaxants) to facilitate ECV has been shown to increase cephalic presentations (RR: 1.38; 95% CI: 1.03–1.85) and reduce the rate of caesarean sections (RR: 0.82; 95% CI: 0.71–0.94) in both nulliparous and multiparous women *[564]*. The available evidence supports the use of beta mimetics for tocolysis *[588][618][564]*.

A small non-randomised study suggested that clinical hypnosis combined with tocolysis before ECV may increase success rates *[605]*.

Other interventions

- *Acupoint stimulation*: The evidence for the effectiveness and safety of moxibustion (a Chinese medicine treatment that involves burning of *Artemisia argyi* close to the skin at an acupuncture point) is inconsistent and largely based on small studies, many of which are of poor quality with high heterogeneity. Some systematic reviews *[614][595][615]*, RCTs *[579][598]* and a cohort study *[575]* have reported a higher rate of cephalic version with moxibustion and other acupuncture point stimulation methods, while others have found no beneficial effect *[562][578]*. Although small studies have not observed significant maternal or fetal side effects associated with moxibustion *[577][599]*, a recent Cochrane review identified a need for further evidence on its safety and effectiveness *[566]*.
- *Posture*: A Cochrane review (n=417) found insufficient evidence to support the use of posture management to turn a breech baby *[582]*. Combined with moxibustion, postural techniques may reduce the number of non-cephalic presentations at birth (RR: 0.73; 95% CI: 0.57–0.94) *[566]*.

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Discussing fetal presentation

If a woman has a baby that is in the breech position, she should be given information in a calm, reassuring manner using appropriate terminology so that she can decide which options are most suitable to her situation. Points for discussion include that:

- for babies in the breech position, ECV may be offered (this involves a health professional using his or her hands on the woman's abdomen to gently turn the breech baby and is successful in approximately half of women, with success more likely if medications to relax the uterus are used)
- ECV is not appropriate in some situations (eg when there is vaginal bleeding, a low level of amniotic fluid or fetal or uterine anomalies)
- ECV has low complication rates but should be carried out where there are facilities for emergency caesarean section
- other interventions to turn a breech baby (posture and acustimulation) are less effective than ECV and the evidence on their safety is limited
- if a woman chooses not to have ECV, the procedure is unsuccessful or the baby returns to breech position, vaginal birth may still be possible depending on the individual situation.

Info Box

Practice summary: fetal presentation

When: At around 36 weeks gestation

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the risks associated with malpresentation:** Explain that, while most babies turn to present with the crown of the head before labour, the birth process can be complicated if this does not occur.
- ☐ **Discuss ECV with women with a breech baby:** Explain that turning the baby before the birth reduces the need for caesarean section. Discuss the benefits and risks of the procedure and where it would take place.
- ☐ **Discuss plans for the birth:** Explain the risks and benefits associated with planned vaginal birth and caesarean section.
- ☐ **Take a holistic approach:** Encourage women to attend with family members to discuss plans for ECV and birthing options.

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Weak recommendation

Assess fetal presentation by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth.

Strength of recommendation Grade C

Approved by NHMRC in June 2014; expires June 2019

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Good practice statement

Suspected non-cephalic presentation after 36 weeks should be confirmed by an ultrasound assessment.

Approved by NHMRC in June 2014; expires June 2019

Weak recommendation

Offer external cephalic version to women with uncomplicated singleton breech pregnancy after 37 weeks of gestation.

Approved by NHMRC in June 2014; expires June 2019

Consensus recommendation

Relative contraindications for external cephalic version include a previous caesarean section, uterine anomaly, vaginal bleeding, ruptured membranes or labour, oligohydramnios, placenta praevia and fetal anomalies or compromise.

Approved by NHMRC in June 2014; expires June 2019

Good practice statement

External cephalic version should be performed by a health professional with appropriate expertise.

Approved by NHMRC in June 2014; expires June 2019

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Info Box

Resources

ACOG (2018) *Mode of term singleton breech delivery. ACOG Committee Opinion No. 745*. American College of Obstetricians and Gynecologists. Obstet Gynecol 2018;132:e60–3.

RANZCOG (2016) *Management of Breech Presentation at Term (C-obs 11)*. Melbourne: RANZCOG.

RCOG (2017) *External Cephalic Version and Reducing the Incidence of Term Breech Presentation. Guideline no. 20a.* London: Royal College of Obstetricians and Gynaecologists.

13.2 Prolonged pregnancy

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Info Box

Prolonged pregnancy requires careful monitoring and management to reduce the risk of adverse consequences for mother and baby.

Background

For the purposes of these Guidelines, 'term' is defined as 37^0 to 41^6 weeks gestation and 'post-term' or 'prolonged pregnancy' as $\geq 42^0$ weeks *[550]*.

However, pregnancy length may differ depending on the woman's ethnicity, which has implications for monitoring in late pregnancy. A Victorian study found that the average natural onset of labour occurred at 39 weeks in women born in South Asian countries compared to 40 weeks in women born in Australia and New Zealand *[537]*.

Identification of prolonged pregnancy relies on accurate estimation of date of birth, which is discussed in Section 13 of the Guidelines. The agreed due date should not be changed without the advice from another health professional with considerable experience in antenatal care.

Incidence and causes of prolonged pregnancy

In 2016, 91.7% of Australian babies were born at 37^0 to 41^6 weeks and 0.6% were born post-term (AIHW 2018a):

- for term births, labour was spontaneous in 48.8% of women and induced in 31.2% of women and 20% of women had no labour
- for post-term births, labour was spontaneous in 35.02% of women and induced in 59.8% of women and 5.1% of women had no labour.

While the aetiology of post-term birth is not well elucidated *[543]*, risk factors such as obesity, nulliparity and maternal age greater than 30 years have been associated with an increased risk of post-term birth *[533][536][542][548]*. Placental senescence may play a role in the pathophysiology of post-term birth *[543]*, and genetic/epigenetic factors have also been implicated *[549]*.

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Risks associated with prolonged pregnancy

In a study from the Norwegian Birth Registry *[540]*, the perinatal death rate was 0.018% at day 287 (41 weeks) and 0.51% at day 302+ (>43 weeks). These findings are important in that, even in a setting where early booking allows accurate assessment of gestational age and antenatal services are accessible for most women, post-term pregnancy constitutes a high-risk situation, especially for the baby. In another Norwegian study of nearly two million births from 1967 to 2006, the risk of post-term infant death was strongly associated with fetal growth restriction (OR 3.1; 95%CI 2.5 to 4.0 for non-small-for-gestational-age post-term infants vs OR 4.9, 95%CI 3.8 to 6.4 in small-for-gestational-age post-term infants) *[545]*.

Among babies born post-term in Australia in 2016 *[551]*:

- 52% were born vaginally, 31% were born by caesarean section and 17% were instrumental vaginal births (among babies born at 37-41 weeks, 54% were born vaginally, 33% by caesarean section and 13% were instrumental vaginal births)
- 5.9% weighed more than 4,500 g (compared with 1.3% of babies born at 37 to 41 weeks)
- 1.9% had Apgar scores lower than seven at 5 minutes (compared with 1.4% of babies born at 37 to 41 weeks).

The perinatal death rate was 2.2 per 1,000 births (compared to 1.5 per 1,000 births for babies born at 37 to 41 weeks) (AIHW 2018b).

Potential risks for the mother associated with post-term pregnancy include prolonged labour, postpartum haemorrhage and perineal tears. It is likely that some of these outcomes result from intervening when the uterus and cervix are not ready for labour *[535]*. Women may also experience anxiety, particularly if the woman perceives her prolonged pregnancy as high risk *[531][539]*.

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Options in prolonged pregnancy

Policies vary on intervening in low-risk prolonged pregnancies. Offering labour induction after 41^0 weeks is recommended in the United Kingdom *[546]* and the United States *[532]*. Factors to be considered include the results of fetal assessment, the woman's Bishop's score, gestational age and the woman's preferences, after discussion of available alternatives and their risks and benefits *[531][547]*.

Sweeping the membranes

Procedures for cervical ripening, such as membrane sweeping, may be of benefit in preventing prolonged pregnancy, particularly in first pregnancies *[543]*. Membrane sweeping involves the health professional introducing a finger into the woman's cervical os (the opening of the cervix into the vagina) and 'sweeping' it around the circumference of the cervix during an vaginal examination, with the aim of separating the fetal membranes from the cervix and triggering the release of prostaglandins *[546]*.

A Cochrane review (n=2,797) *[534]* found an association between membrane sweeping, and reduced frequency of pregnancy continuing beyond 41 weeks (RR: 0.59; 95%CI: 0.46 to 0.74) and 42 weeks (RR: 0.28; 95%CI: 0.15 to 0.50). The strength of the review was limited by small sample sizes and heterogeneity of the studies and possible publication bias for some outcomes.

A more recent systematic review found that membrane sweeping is a safe, effective and inexpensive method of labour induction *[541]*. Membrane sweeping can be performed in Group B Streptococcus-positive women with studies showing no increase in adverse outcomes *[541]*. However, there are no data concerning women with HIV or hepatitis infection.

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Induction of labour to prevent prolonged pregnancy

Induction of labour for prolonged pregnancy is widely practised with the aim of preventing stillbirth and reducing perinatal morbidity (eg shoulder dystocia in large babies).

Among Australian women (of all gestations) whose labour was induced in 2016, 60.7% had a vaginal birth, 18.6% had an assisted vaginal birth (forceps or vacuum extraction) and 20.8% had a caesarean section *[551]*.

A recent Cochrane review assessed the evidence on induction of labour for improving birth outcomes for women at or beyond term *[435]*. The timing of induction in the trials in the Cochrane review varied and, in some trials, women were induced before pregnancy was prolonged.

For the purposes of these Guidelines, subgroup analysis was conducted for inductions at 41^0 to 41^6, at 42^0 to 42^6 weeks and mixed timing crossing 41 and 42 weeks. Trials in which induction occurred before 41 weeks were not included. An RCT published subsequent to the Cochrane review *[538]* was not included in the analysis as women were induced at 39^0 to 39^4 weeks (ie before pregnancy was prolonged).

There were no clear differences between subgroups for any outcome. Compared with expectant management, labour induction at 41^0 to 42^6 weeks was associated with:

- fewer (all-cause) perinatal deaths (RR 0.37, 95% CI 0.10 to 0.87; 15 RCTs, n=8,408, moderate certainty)
- fewer babies with an Apgar score lower than seven at 5 minutes (RR 0.67, 95% CI 0.46 to 0.98; 12 RCTs, n=7,913, low certainty)
- fewer babies with macrosomia (RR 0.65, 95% CI 0.53 to 0.79, 8 RCTs, n=4,736, low certainty), with a higher reduction among women induced at 41^0 to 41^6 weeks (RR 0.50, 95% CI 0.37 to 0.66, 6 RCTs, n=1,225)
- fewer caesarean sections (RR 0.90, 95%CI 0.83 to 0.98; 17 RCTs, n=8,803, moderate certainty).

There were no clear differences between expectant management and induction groups for stillbirth (RR 0.34, 95% CI 0.09 to 1.24, 15 RCTs, n=8,404, low certainty), neonatal death (RR 0.37, 95% CI 0.10 to 1.38, 15 RCTs, n=8,408, low certainty) or rates of admission to neonatal intensive care (RR 0.88, 95% CI 0.76 to 1.01, 9 RCTs, n=7,397, low certainty).

The Cochrane review concluded that the optimal timing of offering induction of labour to women at or beyond term warrants further investigation, as does the risk profiles of women and their values and preferences *[435]*.

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Monitoring of women with prolonged pregnancy

Increased fetal and maternal monitoring aims to identify risk of adverse outcomes and ensure timely induction of labour if indicated (eg fetal compromise or oligohydramnios). Definitive recommendations for fetal monitoring are hampered by the absence of RCTs demonstrating that fetal monitoring decreases perinatal morbidity or mortality between 41 and 42 weeks or in post-term pregnancies *[532]*.

After 42 weeks, increased antenatal monitoring may include twice-weekly cardiotocography and ultrasound estimation of maximum amniotic pool depth *[546]* although the evidence to support this practice is not strong. Specialist referral or consultation is likely to be required.

Info Box

Discussing prolonged pregnancy

When a woman is approaching prolonged pregnancy, discuss her preferences and provide information on the risks and benefits of different management options.

This may include that:

- most women go into labour spontaneously by 42 weeks
- there are risks associated with pregnancies that last longer than 42 weeks
- women with prolonged low-risk pregnancies may be offered membrane sweeping to 'trigger' labour, which involves the health professional separating the membranes from the cervix as part of a vaginal examination; it is safe but may cause discomfort and vaginal bleeding
- if pregnancy is prolonged, additional monitoring and management plans will be offered following specialist consultation, to reduce the risk of adverse outcomes
- the importance of contacting a health professional promptly if they have any concerns about changes in fetal movements (including decreases, absence or unusually increased) (see Section 7 of the Guidelines).

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Info Box

Practice summary: prolonged pregnancy

When: At antenatal visits from 39 weeks onwards

Who: Midwife; GP; obstetrician; Aboriginal and Torres Strait Islander Health Practitioner; Aboriginal and Torres Strait Islander Health Worker; multicultural health worker

- ☐ **Discuss the likelihood of prolonged pregnancy**: Explain to the woman that pregnancy beyond 42 weeks is unlikely if dating is accurate.
- ☐ **Discuss why interventions may be offered**: Explain that the risk of complications increases from 42 weeks pregnancy. Decisions about management are made after considering the risks and benefits and taking the woman's preferences into account.
- ☐ **Discuss the need for fetal monitoring**: Explain that increased fetal monitoring is necessary from 41 weeks, to ensure that there are no risks to the baby from the pregnancy continuing.
- ☐ **Take a holistic approach**: As well as the potential for women to experience anxiety if pregnancy is prolonged, consider practical difficulties (eg when the woman has travelled to give birth or arranged additional support around the estimated date of birth) and provide advice on relevant community supports (eg available financial assistance).

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Discuss options, including induction of labour, with a woman who is nearing prolonged pregnancy.

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Info Box

Resources

ACOG (2014) Practice bulletin no. 146: Management of late-term and postterm pregnancies. *Obstet Gynecol* 124(2 Pt 1): 390-96.

Gardener G, Daly L, Bowring V et al (2017) *Clinical practice guideline for the care of women with decreased fetal movements*. Brisbane: The Centre of Research Excellence in Stillbirth.

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14. Health Professional Summary Sheets

New

Info Box

Health professional summary sheet: Core practices in pregnancy care

Health professional summary sheet: Clinical assessment in pregnancy

Health professional summary sheet: Social and emotional well-being

Health professional summary sheet: Routine maternal health tests

Health professional summary sheet: Targeted maternal health tests

Health professional summary sheet: Common conditions during pregnancy

Health professional summary sheet: Clinical assessments in late pregnancy

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15. Appendix 1: Methods for the 2020 Australian Clinical Practice Guidelines: Pregnancy Care

About the development of the 2020 Australian *Pregnancy Care Guidelines*

New

Info Box

Further details of the methods for the development of the 2020 Guidelines are available in the following attachments:

1. Administrative report
2. Economic analysis
3. Linking evidence to recommendations

Info Box

Previous editions of the Australian *Pregnancy Care Guidelines* were released in two stages: in 2012 (Module I) (Australian Health Ministers' Advisory Council 2012); and in 2014 (Module II) (Australian Health Ministers' Advisory Council 2014). The Modules were developed in collaboration with State and Territory governments and sponsored by the Maternity Services Inter-Jurisdictional Committee (MSIJC), a subcommittee of the Community Care Population Health Principal Committee (CCPHPC) of the Australian Health Ministers' Advisory Council (AHMAC). In 2015–16, the MSIJC received funds through AHMAC to review certain topics in the Guidelines. The Australian Government Department of Health managed the review of the Guidelines on behalf of MSIJC and took responsibility for the project following the conclusion of MSIJC on 30 June 2016.

The development of the guidelines followed the key principles and processes outlined in *Procedures and Requirements for Meeting the 2011 NHMRC Standard for Clinical Practice Guidelines* (NHMRC 2011). This involved convening a multidisciplinary committee, the membership of which included a range of health professionals with expertise in providing, developing and researching antenatal care, a consumer representative with experience of antenatal care and a methodology expert. Input was also sought from a Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care and a Working Group for Migrant and Refugee Women's Antenatal Care. The content of the Guidelines was developed by these groups and was not influenced by the funding body.

The recommendations in the Guidelines were developed by the Expert Advisory Committees (EACs) (from 2008 to 2014) and then the Expert Working Group (EWG) (from 2016 to 2020) based on systematic reviews of the available evidence. Sets of systematic reviews were conducted in 2010–2011, 2012–2013, 2016–2017 2018-2019 and 2019-20.

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Publication approval

Publication approval



Australian Government

National Health and Medical Research Council

Content drawn from the 2020 Guidelines was approved under Section 14A of the *National Health and Medical Research Council Act 1992* at different times. NHMRC approval is valid for a period of 5 years and the relevant approval period is noted in the recommendations.

In approving guideline recommendations, NHMRC considers that they meet the NHMRC standard for clinical practice guidelines and is satisfied that the guideline recommendations are systematically derived, based on the identification and synthesis of the best available scientific evidence, and developed for health professionals practising in an Australian health care setting.

This publication reflects the views of the authors and not necessarily the views of the Australian Government.

15.1 Membership of the committees

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Info Box

Membership of the pregnancy guideline development groups from 2008 to 2020 are listed below. For a list of current members, please visit the LEAPP website.

A Membership of the committees

Module I – 2008-2011

Name	Discipline and affiliation/s
Expert Advisory Committee (EAC) Executive	
Professor Jeremy Oats Co-Chair	Chair Victorian Consultative Council on Obstetric and Paediatric Mortality and Morbidity Medical Co-Director, Integrated Maternity Services, Northern Territory Women's Hospitals Australasia
Professor Caroline Homer Co-Chair	Professor of Midwifery Centre for Midwifery, Child and Family Health, Faculty of Nursing, Midwifery and Health University of Technology Sydney
Dr Anne Syed Williams Co-Chair Screening and Monitoring Working Group	Director, Perinatal and Infant Mental Health, Children Youth and Women's Health Service, South Australia Australasian and New Zealand College of Psychiatrists
Professor Sue McDonald Co-Chair Clinical Working Group Chair Implementation Working Group	Professor of Midwifery and Women's Health La Trobe University, Victoria
Mr Bruce Teakle[23] Co-Chair Social and Lifestyle Group (until end December 2009)	Consumer representative National committee member of Maternity Coalition
Ann Catchlove[26] Co-Chair Social and Lifestyle Group Member of Implementation Working Group	Consumer representative President, Victorian Branch of The Maternity Coalition (from January 2010)
Professor Warwick Giles Co-Chair Clinical Working Group	Senior Staff Specialist, Maternal Fetal Medicine; Conjoint Professor Northern Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Dr Henry Murray Co-Chair Screening and Monitoring Group	Fetomaternal Specialist, Acting Director of Obstetrics, John Hunter Hospital, Newcastle, NSW
Associate Professor Ruth Stewart Co-Chair Social and Lifestyle Group Member of Implementation Working Group	Director of Parallel Rural Community Curriculum, Faculty of Health, Medicine, Nursing and Behavioral Science School of Medicine, Deakin University Australasian College of Rural and Remote Medicine
Dr Jenny Hunt Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Public Health Medical Officer Aboriginal Health and Medical Research Council
Dr Marilyn Clarke Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Obstetrician and gynaecologist
EAC Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	
Dr Jenny Hunt Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Public Health Medical Officer Aboriginal Health and Medical Research Council

[23] Consumer representatives were identified through advertisements placed in Consumer Health Forum Publications for consumers with an interest in national guidelines.

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Name	Discipline and affiliation/s
Dr Marilyn Clarke Co-Chair Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	Obstetrician and gynaecologist
Associate Professor Katie Panaretto	Population Health Medical Officer, Centre for Indigenous Health, University of Queensland, Queensland Aboriginal and Islander Health Council
Prof Sue Kildea	Chair of Midwifery, Australian Catholic University and Mater Mother's Hospital Australian College of Midwives
Ms Francine Eades	Senior Research Officer, Kulunga Research Network
Ms Mary Buckskin (until January 2011)	Chief Executive Officer, Aboriginal Health Council of South Australia
Ms Sue Hendy	Director of Women's, Children's & Youth Health, Western Sydney and Nepean Blue Mountains Local Health Networks
Ms Gwen Wallenburg	Community Midwife, Thursday Island
Ms Leshay Maidment	Branch Manager, Congress Alukura, and Acting Deputy Chief Executive Officer, Central Australian Aboriginal Congress
Ms Stephanie Bell (until April 2011)	Chief Executive Officer, Central Australian Aboriginal Congress
Ms Simone Andy	Koori Maternity Strategy, Victorian Aboriginal Community Health Organisation
Ms Nicole Randriamahefa (until January 2011)	Tasmanian Aboriginal Centre National Aboriginal Community Controlled Health Organisation
EAC Clinical Working Group	
Prof Warwick Giles Co-Chair Working Group	Senior Staff Specialist, Maternal Fetal Medicine; Conjoint Professor Northern Clinical School University of Sydney Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Professor Sue McDonald Co-Chair Working Group	Professor of Midwifery and Women's Health La Trobe University, Victoria
Dr Andrew Bisits Member of Implementation Working Group	Lead Clinician, Birthing Services, Royal Hospital for Women, Sydney
Dr John Overton	Obstetrician, Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Jenny Gamble	Associate Professor of Midwifery, Deputy Head of School (Logan campus) Griffith University, Qld Australian College of Midwives
Ms Chris Cornwell	Service Manager, Women's and Children's Hospital Adelaide, SA
Dr Elizabeth Boyd	General Practitioner, Royal Australian College of General Practitioners
Ms Nellie Vagana[24]	Consumer representative
Ms Terri Barrett	Midwifery Director, Statewide Obstetric Support Unit, King Edward Memorial Hospital, Department of Health WA

[24] Consumer representatives were identified through advertisements placed in Consumer Health Forum Publications for consumers with an interest in national guidelines.

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Name	Discipline and affiliation/s
EAC Screening and Monitoring Group	
Dr Anne Sved Williams Co-Chair Working Group	Director, Perinatal and Infant Mental Health, Children Youth and Women's Health Service, South Australia Australasian and New Zealand College of Psychiatrists
Dr Henry Murray Co-Chair Working Group	Fetomaternal Specialist, Nepean Clinical School University of Sydney Australian and New Zealand College of Obstetricians and Gynaecologists
Associate Professor Jenny Fenwick	Associate Professor of Midwifery, University of Technology, Sydney, NSW Australian College of Midwives
Professor Jane Fisher	Key Centre for Women's Health in Society, University of Melbourne
Associate Professor Elizabeth Sullivan	Director, AIHW National Perinatal Statistics Unit
Professor Michael Permezel	Head of Department, University of Melbourne, Mercy Hospital for Women Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Ms Tanya Farrell	Director, Maternity Services, Royal Women's and Children's Hospital, Melbourne, Victoria
Dr Sandra Eades	Senior Research Fellow, Baker IDI Heart and Diabetes Institute, Melbourne
Ms Kay Hyde	Director, Professional Governance Nurses and Midwives Board of WA
Prof Marie-Paule Austin	Consultant Psychiatrist, St John of God Chair of Perinatal and Women's Mental Health School of Psychiatry, University of NSW
Dr Helen Roxborough	General Practitioner
EAC Social and Lifestyle Group	
Ann Catchlove[25] Co-Chair Working Group	Consumer representative from January 2010
Mr Bruce Teakle[28] Co-Chair Working Group	Consumer representative from January 2009 to December 2009
Louise Hartley[28]	Consumer representative August 2008 to December 2008
Associate Professor Ruth Stewart Co-Chair Working Group	Director of Clinical Studies, Integrated Model of Medical Education in Rural Settings (formerly Parallel Rural Community Curriculum), Faculty of Health, Medicine, Nursing and Behavioral Science School of Medicine, Deakin University Australasian College of Rural and Remote Medicine
Professor Maralyn Foureur	Professor of Midwifery, University of Technology, Sydney Australian College of Midwives
Mr Scott Wilson	State Director, Aboriginal & Drug Council (SA) Inc National Indigenous Drug and Alcohol Committee
Ms Robyn Collins	Chief Executive Officer, Nurses and Midwives Board of WA
Dr Ted Weaver	Obstetrician and gynaecologist, Past President, Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Professor Anne Buist	National Program Director, *beyondblue*
Ms Susan Stratigos	Policy Advisor, Rural Doctors Association of Australia, National Rural Women's Coalition
Ms Debra Oag	Policy Officer, Smokefree Pregnancy Project (until July 2010)
Ms Noelle Mason	Group President, Country Women's Association

[25] Consumer representatives were identified through advertisements placed in Consumer Health Forum publications for consumers with an interest in national guidelines.

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Name	Discipline and affiliation/s
Project Officers / Systematic Literature Reviewers	
Dr Stuart Barrow	Project Officer until 2010
Ms Glenda McDonald	Project Officer until 2010
Ms Wendy Cutchie	Midwifery Project Officer from 2010
Ms Vanessa Watkins	Midwifery Project Officer from June 2010
Dr Andrea Gordon	Pharmacologist, Research Fellow, Sansom Institute for Medical Research University of South Australia (contracted to project from November 2010)
Dr Antonina Mikocka-Walus	Research Fellow, School of Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Dr Rasika Jayasekara	Registered Nurse, Lecturer, School of Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Dr Lois McKellar	Lecturer, Nursing & Midwifery, University of South Australia (contracted to project from November 2010)
Ms Penny Williamson	Research Assistant (contracted to project from November 2010)
Ms Dianne Gall	Research Assistant (contracted to project from November 2010)
Methodological Consultants	
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Module II — 2011-14

Name	Discipline and affiliation/s
Expert Advisory Committee (EAC)	
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Dr Steve Adair	Director, The Canberra Hospital Obstetric Department
Ms Ann Catchlove	Consumer representative President, Victorian Branch of The Maternity Coalition
Dr Marilyn Clarke	Obstetrician and gynaecologist, New South Wales
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Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care	
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Associate Professor Katie Panaretto	Population Health Medical Officer, Centre for Indigenous Health, University of Queensland Queensland Aboriginal and Islander Health Council
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Working Group for Migrant and Refugee Women's Antenatal Care	
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2016-17 review

Expert Working Group Members	Discipline/expertise/special Interest	Position and organisation	Location
Co-chairs			
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Professor Caroline Homer AO	Midwifery	President, Australian College of Midwives Distinguished Professor of Midwifery, University of Technology Sydney	NSW
Members			
Dr Martin Byrne	GP Obstetrics	GP & Chair, GP Obstetric Advisory Committee, RANZCOG	QLD
Ms Ann Catchlove		Consumer representative	VIC
Ms Lisa Clements	Midwifery, Migrant & Refugee Women	Practice Nurse/Midwife & Primary Health Care Manger; Companion House Medical Service	ACT
Dr Anthony Hobbs	GP Obstetrics	Commonwealth Deputy Chief Medical Officer, Department of Health	ACT
Ms Tracy Martin	Midwifery	Chair, Maternity Services Inter-Jurisdictional Committee, Principal Midwifery Advisor, Nursing and Midwifery Office, WA Health	WA

Expert Working Group Members	Discipline/expertise/special Interest	Position and organisation	Location
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Assoc Prof Philippa Middleton	Perinatal Epidemiology	Principal Research Fellow, SA Health and Medical Research Institute/The University of Adelaide	SA
Professor Michael Permezel	Obstetrics & Gynaecology	RANZCOG (former RANZCOG President)	VIC
Professor Steve Robson (from July 2017)	Obstetrics & Gynaecology	President RANZCOG	ACT
Adjunct Professor Debra Thoms	Midwifery	Commonwealth Chief Nursing and Midwifery Officer, Department of Health	ACT

Australian Government Department of Health (Project management and secretariat)	
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Mr Louis Young	Director, Chronic Disease Management Section, Health Services Division, Department of Health
Ms Samantha Diplock	Assistant Director, Maternity Policy Team, Chronic Disease Management Section, Health Services Division, Department of Health
Ms Anita Soar	Policy/Project Officer, Maternity Policy Team, Chronic Disease Management Section, Health Services Division, Department of Health

Methodologists

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The Department of Health and the Expert Working Group would also like to acknowledge the following people who contributed their expertise to the review:

- Professor Greg Dore, Head, Viral Hepatitis Clinical Research Program, Kirby Institute for infection and immunity in society, The University of New South Wales
- Associate Professor Lisa Hui, Department of Obstetrics and Gynaecology, University of Melbourne, Department of Perinatal Medicine, Mercy Hospital for Women, Public Health Genetics group, Murdoch Childrens Research Institute
- Associate Professor Janet Vaughan, Consultant Obstetrician and Obstetrics and Gynaecology Ultrasound Subspecialist, Obstetrics Plus, Sydney.

The EWG is also grateful to the organisations and individuals who commented on the draft Guidelines through the public consultation process.

2017-19 review

Expert Working Group Members	Discipline/expertise/special interest	Position and organisation	Location
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Professor Caroline Homer AO	Midwifery	Co-Director Maternal and Child Health Program, Burnet Institute Distinguished Professor of Midwifery, University of Technology Sydney	NSW
Members			
Dr Martin Byrne	GP Obstetrics	GP & Chair, GP Obstetric Advisory Committee, RANZCOG	QLD
Ms Ann Catchlove (Jorgensen)		Consumer representative	VIC
Dr Marilyn Clarke	Aboriginal and Torres Strait Islander representative	Obstetrics and Gynaecology specialist, Grafton	NSW
Ms Leah Hardiman		Consumer representative	QLD
Ms Tracy Martin	Midwifery	Chair, Maternity Services Inter-Jurisdictional Committee, Principal Midwifery Advisor at the Nursing and Midwifery Office WA Health	WA
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Assoc Prof Philippa Middleton	Perinatal Epidemiology	Principal Research Fellow, Healthy Mothers, Babies and Children SA Health and Medical Research Institute/The University of Adelaide	SA
Ms Natalija Nesvadba	Migrant and refugee women representative	Manager, Multicultural Services, Mercy Hospitals	VIC
Professor Michael Permezel	Obstetrics & Gynaecology	RANZCOG (former RANZCOG President)	VIC
Adjunct Professor Debra Thoms	Midwifery	Commonwealth Chief Nursing and Midwifery Officer, Department of Health	ACT
Ms Cindy Turner	Midwifery	Australian College of Midwives	NT

Australian Government Department of Health (Project management and secretariat)	
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Methodologists

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Technical writer

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The Department of Health and the Expert Working Group would also like to acknowledge the Syphilis Enhanced Response Antenatal Care Advisory Group for their contribution to reviewing the topic of syphilis.

The Expert Working Group is also grateful to the organisations and individuals who commented on the draft Guidelines through the public consultation process.

2019-2020 Review

Expert Working Group Members	Discipline/expertise/special Interest	Position and organisation	Location
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Members			
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Ms Ann Catchlove (Jorgensen)		Consumer representative	VIC
Dr Marilyn Clarke	Aboriginal and Torres Strait Islander representative	Obstetrics and gynaecology specialist, Grafton and Coffs Harbour	NSW
Ms Leah Hardiman		Consumer representative	QLD
Ms Tracy Martin	Midwifery	Midwifery Director Statewide Obstetric Support Unit, Women and Newborn Health Service, WA Department of Health	WA
Adjunct Professor Sue McDonald	Midwifery, Perinatal Health	Professor of Midwifery, La Trobe University	VIC
Associate Professor Philippa Middleton	Perinatal Epidemiology	Principal Research Fellow, Women and Kids, SA Health and Medical Research Institute/The University of Adelaide	SA
Ms Natalija Nesvadba	Migrant and refugee women representative	Manager, Multicultural Services, Mercy Health	VIC
Professor Michael Permezel	Obstetrics & Gynaecology	RANZCOG (former RANZCOG President)	VIC
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Expert Working Group Members	Discipline/expertise/special Interest	Position and organisation	Location
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Australian Government Department of Health (Project management and secretariat)	
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Ms Anita Soar	Policy/Project Officer, Maternity Policy Team, Chronic Disease Management Section, Health Services Division, Department of Health

Methodologists

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Ms Jenny Ramson	Ampersand Health Science Writing

Technical writer

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15.2 Terms of reference

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Info Box

Modules I and II

Expert Advisory Committee

The Expert Advisory Committee will convene to:

1. provide advice, expertise and direction on the appropriateness of the guidelines to promote optimal care for pregnant women across Australia.
2. supervise the parties that are commissioned to:
   a. consult with a number of advisory groups to draft and review evidence-based guidelines as well as national and international literature on antenatal care with specific attention to the health needs of Aboriginal and Torres Strait Islander pregnant women and their families, migrant and refugee women their families and other vulnerable groups
   b. consult widely to develop evidenced based guidelines that will function as a useful resource for health professionals and will be of interest and relevance to pregnant women and their families in a variety of Australian health care contexts
   c. undertake analysis of harms and benefits in the Australian context and determine the costs/benefits and cost effectiveness of proposed interventions in accordance with available literature
   d. produce a dissemination plan for the implementation and determine a process for ongoing monitoring of clinical uptake of the guidelines
3. ensure the guidelines are developed in accordance with the National Health and Medical Research Council (NHMRC) protocols and are approved by the NHMRC.

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Working Group for Aboriginal and Torres Strait Islander Women's Antenatal Care

The Working Group will:

1. provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for Aboriginal and Torres Strait Islander pregnant women across Australia
2. review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of Aboriginal and Torres Strait Islander pregnant women
3. identify additional questions and appropriate sources of evidence
4. identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources)
5. provide advice and draft practice points, where relevant
6. provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document
7. in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues relevant to antenatal care for Aboriginal and Torres Strait Islander women
8. provide advice regarding the implementation of the Guidelines in settings where Aboriginal and Torres Strait Islander women receive pregnancy care
9. identify areas and topics for future guideline documents
10. provide ideas for making guidelines as practical as possible.

Working Group for Migrant and Refugee Women's Antenatal Care

The Working Group will:

1. provide advice, expertise and direction on the appropriateness of the Guidelines to promote optimal care for migrant and refugee pregnant women across Australia
2. review draft evidence-based Guidelines and provide advice to ensure relevance and applicability of the Guidelines to the cultural and health needs of migrant and refugee pregnant women
3. identify additional questions and appropriate sources of evidence
4. identify appropriate sources of evidence relevant to guideline topics, additional to those identified in formal literature searches (this may include grey literature and other unpublished sources)
5. provide advice and draft practice points, where relevant
6. provide advice to the technical writer regarding appropriate terminology and language used throughout the guideline document
7. in consultation with the technical writer contribute to the drafting of a separate guidance around cultural and other issues

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relevant to antenatal care for migrant and refugee women
8. provide advice regarding the implementation of the Guidelines in settings where migrant and refugee women receive pregnancy care
9. identify areas and topics for future guideline documents
10. provide ideas for making guidelines as practical as possible.

2016–17, 2017-19 and 2019-20 reviews

The Expert Working Group will oversee the review and revision of the National Evidence-based Clinical Practice Guidelines — Antenatal Care (incorporating both Modules I and II of the Guidelines). The role of the Expert Working Group will include:

- providing advice, expertise and direction in relation to the combining of the two modules, and the review of the Guidelines to promote optimal care for pregnant women across Australia;
- reviewing the existing Guidelines to identify topics and guidelines that require updating;
- advising on the review of national and international literature on antenatal care to inform amendments required to the existing Guidelines;
- identifying any new topics and drafting new evidence-based guidelines for inclusion in the Guidelines;
- developing a plan and strategies to promote and disseminate the finalised Guidelines to ensure clinical uptake of the Guidelines;
- advising on the development of a consultation strategy (in the event that the review results in major changes to the existing Guidelines or the inclusion of new guidelines); and
- ensuring the review is conducted in accordance with the National Health and Medical Research Council's (NHMRC) protocols and submitted to the NHMRC for approval.

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16. Acronyms and abbreviations

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Info Box

25-OHD	25-hydroxyvitamin D
AACR	Australasian Association of Cancer Registries
AAFP	American Academy of Family Physicians
AAOS	American Academy of Orthopaedic Surgeons
AAP	American Academy of Pediatrics
AAS	Abuse Assessment Screen
ABS	Australian Bureau of Statistic
ACOG	American College of Obstetricians and Gynecologists
ACSQHC	Australian Commission on Safety and Quality in Health Care
ADA	American Diabetes Association
ADIPS	Australasian Diabetes in Pregnancy Society
AFBP	Aboriginal Family Birthing Program
AFP	a-fetoprotein
AGREE	Appraisal of Guidelines Research and Evaluation
AHMAC	Australian Health Ministers' Advisory Council
AHMC	Australian Health Ministers' Conference
aHR	adjusted hazard ratio
AIDS	acquired immunodeficiency syndrome
AIFS	Australian Institute of Family Studies
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AMGPP	Aboriginal Maternity Group Practice Program
AMIHS	Aboriginal Maternal and Infant Health Service
ANMC	Australian Nursing and Midwifery Council
ANZBMS	Australian and New Zealand Bone and Mineral Society
ANZSA	Australian and New Zealand Stillbirth Association
AOM	Association of Ontario Midwives
aOR	adjusted odds ratio
APA	American Psychiatric Association
APHDPC	Australian Population Health Development Principal Committee
aPR	adjusted prevalence ratio
APTT	activated partial thromboplastin time
ARBD	alcohol-related birth defects
ARND	alcohol-related neurodevelopmental disorders

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aRR	adjusted relative risk
ASHA	Australiasian Sexual Health Alliance
ASHM	Australasian Society for HIV Medicine
ATAGI	Australian Technical Advisory Group on Immunisation
ATAPS	Access to Allied Psychological Services
AusDiab	Australian Diabetes, Obesity and Lifestyle Study
AWHN	Australian Women's Health Network
AWST	Women Abuse Screen Tool
BASHH	British Association for Sexual Health and HIV
BMA	British Medical Association
BMI	body mass index
BPD	biparietal diameter
CARPA	Central Australian Rural Practitioners Association
CATSINaM	College of Aboriginal and Torres Strait Islander Nurses and Midwives
CBR	consensus-based recommendation
CBT	cognitive behaviour therapy
CCPHPC	Community Care and Population Health Principal Committee
CDAF	California Dental Association Foundation
CDC	Centers for Disease Control and Prevention (United States)
CDNA	Communicable Disease Network Australia
CDSMC	Community and Disability Services Ministers' Conference
CEE	Centre for epidemiology and Evidence (NSW)
CEH	Centre for Culture Ethnicity and Health
CER	Centre for Epidemiology and Research
cfDNA	cell-free deoxyribonucleic acid
CGE	Centre for Genetics Education (NSW Health)
CHF	Consumers' Health Forum
CHWS	Child Health and Wellbeing Subcommittee
CI	confidence interval
CIE	Centre for International Economics
CMACE	Centre for Maternal and Child Enquiries
COAG	Council of Australian Governments
CPS	Canadian Paediatric Society
CRL	crown–rump length
CTFPHE	Canadian Task Force on the Periodic Health Examination

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D&C	dilatation and curettage
DAME	Diabetes and Antenatal Milk Expression (Study)
DFAT	Department of Foreign Affairs and Trade
DHA	docosahexaenoic acid
DNA	deoxyribonucleic acid
DoHA	Department of Health and Ageing
dTpa	diphtheria-tetanus-acellular pertussis
DTRS	Department of Transport and Regional Services
EAC	Expert Advisory Committee
EBR	evidence-based recommendation
ECCI	European Congenital Cytomegalovirus Initiative
ECV	external cephalic version
EIA	enzyme immunoassay
EPA	eicosapentaenoic acid
EPDS	Edinburgh Postnatal Depression Scale
EWG	Expert Working Group
FAS	fetal alcohol syndrome
FASD	fetal alcohol spectrum disorders
FGM	female genital mutilation
FGM/C	female genital mutilation/cutting
FSANZ	Food Standards Australia and New Zealand
FTA-abs	fluorescent treponemal antibody-absorbed test
GAR	Guidelines Assessment Register
GORD	gastro-oesophageal reflux disorder
GP	general practitioner
GRADE	Grading of Recommendations, Assessment, Development and Evaluation
HAPO	Hyperglycaemia and Adverse Pregnancy Outcome (study)
HARK	Humiliation, Afraid, Rape, Kick
HbA1c	glycated haemoglobin
HbsAg	hepatitis B surface antigen
HC	head circumference
hCG	human chorionic gonadotrophin
HDL	high density lipoprotein
HGSA	Human Genetic Society of Australasia
HITS	Hurt, Insult, Threaten, Scream

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HIV	human immunodeficiency virus
HoRSCHA	House of Representatives Standing Committee on Health and Ageing
HPV	human papilloma virus
HT	head and trunk volume
IADPSG	International Association of Diabetes and Pregnancy Study Groups
IARC	International Agency for Research on Cancer
ICER	incremental cost-effectiveness ratio
IDF	International Diabetes Federation
Ig	immunoglobulin
IOM	Institute of Medicine (US)
IU	International unit
IUSTI	International Union against Sexually Transmitted Infections
IVF	in vitro fertilisation
LGR	ligase chain reaction
LIFE	Living Is For Everyone
LLETZ	large loop excision of the transformation zone
LMP	last menstrual period
LSD	lysergic acid diethylamide
MBS	Medicare Benefits Schedule
MCH	mean corpuscular haemoglobin
MCV	mean corpuscular volume
MD	mean difference
MDMA	methylenedioxymethamphetamine
MJSO	Multijurisdictional Syphilis Outbreak Working Group
mmHg	millimetres of mercury
mmol/mol	millimoles per mole
MSAC	Medical Services Advisory Committee
MSHR	Menzies School of Health Research
MSIJC	Maternity Services Inter-Jurisdictional Committee
NAAT	nucleic acid amplification test
NAATI	National Association of Accreditation for Translators and Interpreters
NACCHO	National Aboriginal Community Controlled Health Organisation
NACOH	National Advisory Committee on Oral Health
NAHSWP	National Aboriginal Health Strategy Working Party
NATA	National Association of Testing Authorities

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NCHECR	National Centre for HIV Epidemiology and Clinical Research
NCSP	National Cervical Screening Program
NHMRC	National Health and Medical Research Council
NICE	National Institute of Health and Clinical Excellence
NIPT	non-invasive prenatal testing
nmol/L	nanomoles per litre
NNDSS	National Notifiable Diseases Surveillance System
NNS	number needed to screen
NPS	National Prescribing Service (UK)
NRHA	National Rural Health Association
NRT	nicotine replacement therapy
NT DHCS	Northern Territory Department of Health and Community Services
NT-UEMP	Nuchal Translucency – Ultrasound, Education and Monitoring Project
NZ MoH	New Zealand Ministry of Health
NZCM	New Zealand College of Midwives
OR	odds ratio
PAPP-A	pregnancy-associated placental protein-A
PBS	Pharmaceutical Benefits Scheme
PCR	polymerase chain reaction
PEG	polyethylene glycol
PHAC	Public Health Agency of Canada
PHLS	Public Health Laboratory Service (United Kingdom)
PIGF	placental growth hormone
pmol/L	picomoles per litre
PP	practice point
PT	prothrombin time
QEBR	qualified evidence-based recommendation
RACGP	Royal Australian College of General Practitioners
RADIUS	Routine Antenatal Diagnostic Imaging with Ultrasound
RANZCOG	Royal Australian and New Zealand College of Obstetricians and Gynaecologists
RCOG	Royal College of Obstetricians and Gynaecologist (UK)
RCT	randomised controlled trial
RNA	ribonucleic acid
RPR	rapid plasma reagin
RR	relative risk

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sFlt-1	soluble fms-like tyrosine kinase-1
SIDS	sudden infant death syndrome
SIGN	Scottish Intercollegiate Guidelines Network
SMD	standardised mean difference
SOGC	Society of Obstetricians and Gynaecologists of Canada
square	Suicide, Questions, Answers and Resources
SUDI	sudden and unexpected death in infancy
TGA	Therapeutic Goods Administration
TPHA	Treponema pallidum haemagglutination assay
TPPA	Treonema pallidum particle agglutination
TSH	thyroid-stimulating hormone
US DHHS	United States Department of Health and Human Services
USPSTF	United States Preventive Services Task Force
VCCCVM	Victorian Community Council on Crime and Violence Management
VDRL	Venereal Diseases Research Laboratory
WHA	Women's Hospitals Australasia
WHO	World Health Organization
WSDH	Washington State Department of Health
β-hCG	beta-human chorionic gonadotrophin

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17. Glossary

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Info Box

Aboriginal and Torres Strait Islander peoples: It is recognised that there is no single Aboriginal or Torres Strait Islander culture or group, but numerous groupings, languages, kinships, and tribes, as well as ways of living. Furthermore, Aboriginal and Torres Strait Islander peoples may currently live in urban, rural or remote settings, in urbanised, traditional or other lifestyles, and frequently move between these ways of living.

Acupressure: Acupressure is a noninvasive variation of acupuncture that involves application of constant pressure to specific points or areas.

Acustimulation: Mild electrical stimulation to specific points or areas.

Amniocentesis: A diagnostic test for chromosomal anomalies, such as trisomy 21 (Down syndrome), where an ultrasound guided needle is used to extract a sample of the amniotic fluid.

Antiretroviral treatment: the use of medicines to reduce growth of retroviruses, primarily HIV.

Auscultation: The detection of the fetal heart using Doppler or a Pinard stethoscope.

Cardiotocography: A technical means of recording the fetal heart rate and uterine contractions.

Chorionic villus sampling (CVS): diagnostic test for chromosomal anomalies such as trisomy 21 (Down syndrome) where an ultrasound guided needle is used to extract a sample of the placenta.

Cleft lip and/or palate: variations of a congenital abnormality caused by non-fusion of embryonic facial lobes.

Cognitive-behavioural therapy: Psychological therapy based on the assumption that faulty thinking patterns, maladaptive behaviours and "negative" emotions are all inter-related. Treatment focuses on changing an individual's thoughts (cognitive patterns) or maladaptive behaviours in order to change emotional states. Cognitive-behavioural therapy integrates the cognitive restructuring approach of cognitive therapy with the behavioural modification techniques of behavioural therapy.

Ectopic pregnancy: a pregnancy in which implantation of the fertilised egg takes place outside the uterus, usually in a fallopian tube. Ectopic pregnancies usually result in miscarriage but can cause rupture of the fallopian tube and severe internal bleeding.

Edinburgh Postnatal Depression Scale (EPDS): The EPDS was developed and validated as a screening tool for depression in the postnatal period. It has subsequently been validated for use in pregnant women and is therefore appropriate for use throughout the perinatal period.

Educational and motivational interviewing strategies: Education strategies given to all members of the intervention group. Counselling delivered by a number of means: through primary carer, medical professional, professional counsellor, targeted printed material etc.

External cephalic version: A procedure in which a health professional uses his or her hands on a woman's abdomen to turn a breech baby.

First antenatal visit: The first visit specifically for antenatal care following confirmation of the pregnancy.

First contact: The visit in which a woman attends to confirm pregnancy, seek antenatal care or make arrangements for the birth.

Herbal medicines: Preparations such as tablets, tinctures and infusions that are made from plant parts. These preparations are usually formulated based on traditional uses of Western or Chinese herbs.

Induction of labour: A procedure to artificially start the process of labour by way of medical, surgical or medical and surgical means.

Interventions based on stages of change (smoking cessation):Similar to cognitive behavioural and education strategies, except that these interventions were grouped separately as they involve assessment of "readiness" to change and exposure to the intervention may be more selective.

Low birth weight: Birth weight of less than 2,500 g.

Macrosomia: Birth weight higher than 4,000 g.

Maternal serum screening: A blood test performed during pregnancy to detect markers of chromosomal anomaly, such as trisomy 21 (Down syndrome).

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Migrant and refugee women: The term 'migrant and refugee' is used in these Guidelines to refer both to women who are voluntary migrants and women who come to Australia as refugees, humanitarian entrants or asylum seekers.

Miscarriage: the spontaneous end of a pregnancy at a stage where the embryo or fetus is incapable of surviving independently, generally defined in humans as before 20 weeks.

Neonatal abstinence syndrome: A withdrawal syndrome occurring among newborns exposed to opiates (and some other substances) in utero.

Nuchal translucency thickness assessment: An ultrasound scan performed between 11 and 13 weeks of pregnancy that measures the thickness of the nuchal fold behind the baby's neck – a marker of chromosomal anomaly, such as trisomy 21 (Down syndrome).

Oligohydramnios: A deficiency of amniotic fluid.

P6 (or Neiguan) point: an acupuncture point located on the anterior aspect of the forearm near the wrist.

Passive smoking: The inhalation of smoke, called second-hand smoke or environmental tobacco smoke, from tobacco products used by others.

Perinatal period: For the purposes of these guidelines, 'perinatal' is defined as the period covering pregnancy and the first year following pregnancy or birth. It is acknowledged that other definitions of this term are used for data collection and analysis. The definition used here broadens the scope of the term perinatal in line with understanding of mental health in pregnancy and following birth.

Pernicious anaemia: An autoimmune condition that results in an inability to absorb vitamin B_{12}.

Pharmacotherapies (smoking cessation): Studies cited in Lumley et al 2009 used nicotine replacement therapy, as patches, gum or lozenge. Other studies considered bupropion or other pharmacological agents.

Placenta praevia: An obstetric complication in which the placenta is attached to the uterine wall close to or covering the cervix.

Placental abruption: A potentially life-threatening obstetric complication in which the placental lining separates from the uterus of the mother.

Polyhydramnios: Accumulation of excess amniotic fluid during pregnancy.

Preterm birth: Birth at less that 37 weeks gestation.

Proteinuria: The presence of an excess of serum proteins in the urine.

Psychological preparation: In the context of these Guidelines, this is defined as using psychological approaches (eg focusing on coping skills, cognitive restructuring, problem-solving and decision-making) to assist women and their partners to be prepared for parenthood.

Psychosocial support (smoking cessation)*:* Includes discussion groups, provision of support materials (unless CBT-based), provision of telephone support etc.

Psychosocial: In the context of these Guidelines, this refers to social factors that have the potential to affect a woman's emotional well-being.

Pyelonephritis: An ascending urinary tract infection that has reached the pyelum (pelvis) of the kidney.

Rewards and incentives (smoking cessation)**:** Intervention group provided rewards or incentives (payment; one study provided a lottery for participants), usually based on smoking status evaluated by biochemical markers.

Singleton breech: A single baby whose buttocks (rather than head) is overlying the maternal pelvis.

Stillbirth: The birth of a baby that has died in the uterus after 20 weeks of pregnancy or reaching a weight of more than 400 g if gestational age is unknown.

Sudden and unexpected death in infancy: The sudden death of an infant that is unexpected by history and remains unexplained after a thorough forensic autopsy and a detailed death scene investigation.

Trisomy 13: A genetic disorder in which a person has three copies of genetic material from chromosome 13, instead of the usual two copies. Also referred to as Patau syndrome or trisomy D.

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Trisomy 18: A genetic disorder caused by the presence of all or part of an extra 18th chromosome. Also referred to as Edwards syndrome or trisomy E.

Trisomy 21: Chromosomal anomaly due to an additional chromosome 21. Also referred to as Down syndrome.

Woman-focused communication skills: These involve techniques and attitudes that indicate respect for the woman, a willingness to listen to her perspectives, values and current life circumstances around antenatal concerns, and not direct the woman into any particular course of action. Woman-centred communication skills can include giving appropriate information, but always includes communication that views the woman as a capable and responsible person, and creates a respectful, supportive and effective alliance between the woman and the health professional.

Methodological terms

Confidence interval: An interval describing the range of values within which there is reasonable certainty that the true effect lies. Uncertainty increases with the width of the interval.

Consensus-based recommendation: Recommendations based on systematic review of the literature where evidence is found to be limited or lacking.

Mean difference: The absolute difference between the mean value in two groups in a clinical trial, which estimates the amount by which the intervention changes the outcome on average compared with the control.

Odds ratio: the ratio of the likelihood of an event occurring in one group to that of it occurring in another group. An odds ratio of 1 indicates that the condition or event under study is equally likely to occur in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely to occur in the first group and an odds ratio less than 1 indicates that the condition or event is less likely to occur in the first group.

Practice point: For the purposes of these Guidelines, these cover areas of antenatal care that were beyond the scope of the literature reviews but where the EAC/EWG determined there was a need for advice. These points are based on best practice clinical judgement.

Randomised controlled trial: A study in which participants are allocated at random to receive one of several clinical interventions. One of these interventions is the standard of comparison or control. The control may be a standard practice, a placebo or no intervention at all.

Recommendation: Evidence-based action statement developed through systematic review of the literature.

Relative risk: The ratio of the risk (rate) of an outcome in an exposed group (eg to a specific medicine) to the risk (rate) of the outcome in an unexposed group in a specified time period.

Sensitivity: The proportion of people with the condition who have a positive test result.

Specificity: The proportion of people without the condition who have a negative test result.

Systematic literature review: A systematic review of evidence focused on a research question(s) that aims to identify, appraise, select and synthesise all high quality research evidence relevant to that question.

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s22

From: s22
Sent: Monday, 20 October 2025 4:05 PM
To: s47E(d)
Cc: Nutrition
Subject: FW: Enquiry to the Department of Health, Disability and Ageing CCEMS:06790000168 [SEC=OFFICIAL]

Hiya s22
Suggested response prepared by NPS below.
Thx
s22

****

To: s47F @gmail.com
Bcc: s47E(d) @health.gov.au; s47E(d) @health.gov.au; s47E(d) @health.gov.au; s47E(d) foodstandards.gov.au

Do not reply to this email. This inbox is not monitored. Follow up enquiries should be sent to ***enquiries@health.gov.au***.

Dear s47F

Thank you for your enquiry to the Department of Health, Disability and Ageing regarding vitamin B12 requirements and food sources of Vitamin B12.

Vitamin B12 is an essential nutrient involved in the production of red blood cells, DNA function and the function of the central nervous system.

The National Health and Medical Research Council establishes the Nutrient Reference Values for Australia and New Zealand through a rigorous evidence-based process. This includes consideration of international evidence of nutrient requirements. Full details on the evidence that informed the vitamin B12 nutrient reference values is available here. As you mention in your email, the recommended dietary intake (RDI) for a 20 year old male is 2.4ug per day. An RDI is the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97–98 per cent) healthy individuals in a particular life stage and gender group.

Vitamin B12 is found almost exclusively in animal products such as meats, eggs, poultry, seafood and dairy foods. For those following a vegetarian or vegan diet, choosing foods fortified with vitamin B12, or consuming a supplement is recommended to avoid deficiency.

The Australia New Zealand Food Standards Code (the Code) permits the voluntary addition of vitamins and minerals, including vitamin B12, to specific product categories for fortification purposes. These categories include:

- Extracts of meat, vegetables or yeast
- Analogues derived from legumes, including beverages, analogues of meat, analogues of yoghurt and dairy desserts, analogues of ice cream and analogues of cheese
- Analogues derived from cereals, nuts, seeds, or a combination of those ingredients, including beverages
- Formulated beverages
- Formulated supplementary foods

This document has been released under the Freedom of Information Act 1982 (CTH) By the Department of Health, Disability and Ageing

- Formulated supplementary food for young children
- Formulated supplementary sports foods
- Formulated caffeinated beverages.

The Code requires the mandatory addition of vitamin B12 to special purpose foods intended as a sole or principal source of nutrition for specific population groups. Such foods include infant formula products, formulated meal replacements, food for special medical purposes represented as sole source of nutrition and very low energy diets. These products must be specifically formulated to meet the nutritional needs of the intended users. As an essential micronutrient, vitamin B12 must be included at adequate levels.

To support consumers to make informed choices about the foods they eat and purchase, the Code also requires a statement of ingredients to be declared on food labels so consumers can identify ingredients in the food such as added vitamin B12.

The policy principles for mandatory food fortification outline a range of considerations to take into account in deciding whether mandatory fortification of foods is required in the Australia and New Zealand food supply. One of these principles is that mandatory fortification is required only in response to demonstrated significant population health need, taking into account both the severity and prevalence of the health problem to be addressed. While there is further work underway by the Australian Bureau of Statistics to compare Australians' nutrient intakes against recommendations in the NRVs, initial evidence from the 2023 National Nutrition and Physical Activity Survey indicates that Australians' average intakes of Vitamin B12 are sufficient.

You may find the information in Food Standards Australia New Zealand's Australian Food Composition Database helpful in building your understanding of the nutrient composition of the foods you eat. However, if you are unsure about whether you are consuming enough vitamin B12, it is recommended that you discuss your concerns with your General Practitioner or an Accredited Practicing Dietitan (APD). You can locate APDs in your area through the Dietitian's Australia website.

We trust this information is of assistance.

Kind regards

This document has been released under the Freedom of Information Act 1982 (Cth) By the Department of Health, Disability and Ageing

Population Health Division

Primary and Community Care Group
Australian Government Department of Health, Disability and Ageing
The Department of Health and Aged Care acknowledges the Traditional Custodians of Australia and their continued connection to land, sea and community. We pay our respects to all Elders past and present.

---------- Original Message ----------
From: Enquiries <enquiries@health.gov.au>;
Received: Fri Oct 10 2025 22:51:31 GMT+1100 (Australian Eastern Daylight Time)
To: Enquiries <enquiries@health.gov.au>; Enquiries-Queue <enquiries@health.gov.au>;
Subject: health.gov.au - Complaints

Submitted on Fri, 2025-10-10 22:51
Submitted by: Anonymous

Complaint:

Hello, to whom ever may read this.

Ive just read this paper, on the effects of b12 nutritional deficiencies in vegetarians and vegans.
https://pmc.ncbi.nlm.nih.gov/articles/PMC10030528/

The calculator https://www.eatfrhealth.gov.au/nutrition-calculators/daily-nutrient-req…, gave shockingly low B12 recommendations, far lower than international peers. Im a 6"2 20 year old, 2.4 µg/day* is recklessly low, for my demographic.

from the paper:
"Within the European Union, the estimated average requirement (EAR) is 4 µg/day for adults and increases for pregnant and lactating women to 4.5 and 5 µg/day, respectively [49]... Evidence from clinical studies shows that healthy individuals require a daily intake of approximately 6 µg/day to optimize all biomarkers of vitamin B12 deficiency [51, 52].... Thus, a recommendation of 4–20 µg/day is more appropriate to prevent B12 deficiency across the life-course [51, 54–56]."

Why is Australia's Recommendation so shockingly low as compared to international peers? why do milk substitutes not have mandatory fortification?
given that B12 is water soluble, the risk of over-consumption seems minimal?

Anyway you could assuage my confusion would be helpful.

thanks, s47F

Email:

s47F gmail.com

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Scanned by Office 365 Email Gateway at Food Standards ANZ.

s22

From: Nutrition
Sent: Monday, 21 February 2022 2:45 PM
To: s47E(d)
Cc: s47E(d)
Subject: FW: ENQUIRY Vitamin B12 Deficiency CCEMS:06400007030 [SEC=OFFICIAL]

Categories: Filed to TRIM, Completed coord

Hi s22

Please see director cleared enquiry response below for you to send out.

Kind regards
s22

s22
Nutrition Policy Section

Population Health Division | Primary and Community Care Group
Preventive Health Policy Branch
Australian Government Department of Health
T: 02 6289 s22 | E: s22 @health.gov.au
GPO Box 9848, Canberra ACT 2601, Australia

The Department of Health acknowledges the Traditional Custodians of Australia and their continued connection to land, sea and community. We pay my respects to all Elders past and present

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To: s47F @gmail.com
Bcc: s47E(d) health.gov.au; enquiries@health.gov.au; s47E(d) health.gov.au; s47E(d) health.gov.au;

Do not reply to this email. This inbox is not monitored. Follow up enquiries should be sent to ***enquiries@health.gov.au***.

Good afternoon

Thank you for your enquiry of 5 February 2022 seeking information on Australian protocols and guidelines for medical professionals on Vitamin B12 deficiency and pernicious anaemia.

The Australian Government Department of Health understands the importance of high quality guidelines and protocols to support medical professionals. The Department's overarching purpose is to support the Government to lead and shape Australia's health and aged care systems through evidence based policy, well targeted programs and best practice regulation. The National Health and Medical Research Council (NHMRC) issues some guidelines to support high-quality clinical and research practice and assists other researchers and clinicians to develop guidelines in their areas of expertise.

Clinical practice guidance for vitamin deficiency diagnosis is the responsibility of the appropriate medical professional body. The Royal Australian College of General Practitioners (RACGP) is the leading voice for general practitioners (GPs) in Australia and supports GPs and medical practitioners through developing resources and guidelines. You may like to contact the RACGP with your query regarding guidance on Vitamin B12 deficiency and

pernicious anaemia. The RACGP can be contacted on 1800 4RACGP (1800 472 247) or by email at racgp@racgp.org.au.

You may also be interested to know that the government has developed nutrient reference values (NRVs) which are a set of recommendations for nutritional intake based on currently available scientific knowledge. This includes recommendations for Vitamin B12 to prevent deficiency. The Department supports the NRVs being up to date and based on current evidence, with the National Health and Medical Research Council responsible for developing and revising recommendations. You can access the specific NRVs for Vitamin B12 on the NRV website at https://www.nrv.gov.au/nutrients/vitamin-b12.

I trust this information has been of assistance.

Kind regards

Population Health Division

Primary and Community Care Group
Australian Government Department of Health
The Department of Health acknowledges the Traditional Custodians of Australia and their continued connection to land, sea and community. We pay our respects to all Elders past and present.

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---------- Original Message ----------
From: Enquiries@health.gov.au <enquiries@health.gov.au>;
Received: Sat Feb 05 2022 18:13:36 GMT+1100 (Australian Eastern Daylight Time)
To: Enquiries@health.gov.au <enquiries@health.gov.au>; Enquiries-Queue <enquiries@health.gov.au>;
Subject: health.gov.au - Enquiries

Saturday, February 5, 2022 - 18:13

_____

What type of enquiry do you have?:

_____

What best describes your enquiry?:

What are the Australian protocols/Guidelines for VitaminB12 Deficiency and Pernicious Anemia that Medical professionals have to follow.

_____

Email:

s47F @gmail.com

_____

Response to Front Desk Inquiry – 29 January 2008

Hi s47F

The Australian Government through the Department of Health and Ageing and the National Health and Medical Research Council have developed Nutrient Reference Values (NRVs) for Australia and New Zealand. An NRV has been developed for each essential nutrient and can be described as a level of intake considered to meet the known nutritional values of healthy people.

The NRVs recommend that girls/women consume 2.4 micrograms per day. This increases to 2.6 micrograms in pregnant women, and 2.8 micrograms in lactating women.

Foods providing significant amounts of Vitamin B12 include: beef, lamb's liver, sardines, oysters, fish, and cheese, milk and other dairy products.

This information is aimed at the general population only. For advice and assistance in designing a healthy eating plan for your individual requirements, you should consult an Accredited Practising Dietitian. To find a dietitian in your area, please contact your local Community Health Service or the Dietitian's Association of Australia by visiting www.daa.asn.au or by telephone on (02) 6163 5200.

For further information on Vitamin B12 and other essential nutrients, you may wish to visit:
http://www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/vitamins-minerals.

I hope that this information has been of assistance.

This document has been released in part under the Freedom of Information Act 1982 (Cth) By the Department of Health, Disability and Ageing

I have just found out from a blood test that my B12 is quite low….it is 97 (the normal range is 133-680)…

Can you please tell me what B12 containing foods I need to have? The first thing I need to do is see my doctor obviously
for a B12 Injection but if I could eat these particular foods as well then it would be beneficial.

Your help would be appreciated…

Many thanks

s47F