Australian Government
Department of Health

Topic 4

Future directions in health care delivery

Literature reviews to support the Independent Review of Nursing Education – Educating the Nurse of the Future

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UOW AUSTRALIA
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All contributors are individually listed in Appendix 1 of this document.

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Abbreviations

Abbreviation	Definition
ABF	Activity Based Funding
ABS	Australian Bureau of Statistics
ACN	Australian College of Nursing
ACT	Assessment Criteria Template
AI	Artificial Intelligence
AIHW	Australian Institute of Health and Welfare
ACSQHC	Australian Commission on Safety and Quality in Health Care
ANMAC	Australian Nursing and Midwifery Accreditation Council
ANMF	Australian Nursing and Midwifery Federation
CINAHL	Cumulative Index of Nursing and Allied Health Literature
COAG	Council of Australian Governments
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EHR	Electronic Health Record
EN	Enrolled Nurse
FOAM	Free Open Access Medical Education
FOANed	Free Open Access Nursing Education
G2NA	Global Genomics Nursing Alliance
HEE	Health Education England
ICN	International Council of Nurses
IHPA	Independent Hospital Pricing Authority
LGBTI	Lesbian, Gay, Bisexual, Transgender, Intersex
MBS	Medicare Benefits Schedule
MOOC	Massive Open Online Course
NBN	National Broadband Network
NCSBN	National Council of State Boards of Nursing
NDIS	National Disability Insurance Scheme
NHS	National Health Service (referring to the UK National Health Service)
NMBA	Nursing and Midwifery Board of Australia
NP	Nurse Practitioner
OCW	Open Courseware
OECD	Organisation for Economic Co-operation and Development
PBS	Pharmaceutical Benefits Scheme
PESTEL	Political, Economic, Social, Technological, Environmental, Legal
PREM	Patient Reported Experience Measure
PROM	Patient Reported Outcome Measure
RN	Registered Nurse
WHO	World Health Organization

Key messages

The current and emerging issues influencing the education and training of health care professionals internationally are also evident in Australia with some national contextual variation. The future directions in health care delivery emerge from the confluence of political, economic, social, technological, environmental and legal / regulatory influences on the health care environment. Technology is likely to have the most significant impact in the next 15 years both in terms of clinical practice and the delivery of education.

Future directions in health care delivery

- The current and emerging issues described will affect all future Australian nurses, recognising that this will be to varying degrees depending on the nursing designation and associated scope of practice.
- The changing burden of disease (particularly relating to non-communicable diseases), is reflected in national policies that are driving new models of care with a shift from higher cost acute settings to primary and community based care.
- The economic impact of the growing demand for health care is already creating supply challenges with workforce shortages evident, balancing the drivers of access, quality and cost is essential to ensuring a sustainably funded health system.
- Social trends, such as ageing, are fuelling the growing demand for health care and nurses skilled in the care of older people.
- Internationalisation has produced a much more mobile nursing workforce. Nurses of the future will continue to need strong teamwork skills, cultural competence and ideally graduate with skills and attributes that are portable across institutions, settings of care and potentially nations.
- Greater engagement of consumers in their health care, fuelled by increasing access to web-based health information, virtual networks and the growth of personal monitoring devices mean that nurses must have the skills to communicate, educate and engage patients in person-centred care, self-management and lifestyle modification.
- The rise in workplace aggression, with nurses exposed to violence in the workplace from patients, family and carers, and issues relating to bullying and incivility within the workplace, mean that nurses require the skills and resilience to address these issues.
- Technology is one of the most significant influences on the education and training of all health care professionals in the future, primarily because of its impact on clinical practice including the use of telehealth, telepresence and mobile technology.
- Big data is predicted to have a transformational impact on the delivery of health care. For example, the use of predictive analytics, based on patterns derived from big data to identify patients at risk of a particular condition or to prevent hospital readmission.
- Robotics and artificial intelligence will impact the health care environment, including robots providing social assistance to patients through to AI influencing roles in patient administration, clinical decision support, patient monitoring and health care interventions.
- The nurse of the future will increasingly be exposed to genomics, precision medicine and personalised care. While medical genomics and genetic counselling require specialised

skills, RNs will progressively interact with patients requiring information and advice about genetic testing, particularly the genetic influence on disease.

- The rise of social media and health applications is providing a cheap and accessible way for patients, their carers and families to interact, particularly those with common conditions. This requires nurses to be equipped to respond to more informed consumers and understand the consequences of providing information and advice that may quickly be shared world-wide. Additionally, nurses need to consider their role in 'prescribing' health applications to support patient self-management.
- The environmental consequences of climate change for nurses include addressing direct impacts (such as heat waves), the health consequences arising from vector-borne diseases increasing and the health consequences of displaced communities.
- Equipping nurses to work to their full scope of practice, providing appropriate training for advanced nursing roles and ensuring nurses have the capacity to integrate lesser skilled or unregulated roles appropriately into the care team is the key legal / regulatory issue in the future.
- All nurses should be educated about the intersection between skill mix, nursing staffing and patient safety.
- Appropriate prescribing practices have an important influence on prescription opioid use and the increasing access to medicinal cannabis. NPs and nurse prescribers in particular, must remain abreast of legislative or regulatory changes relating to their use.

Implications for future nursing skills and attributes

- Australia's changing health needs, evolving roles of nurses and imperative to adapt to workforce change all contribute to an ongoing demand for inclusion of new topics in the nursing curricula.
- The increasing volume and complexity of health care being delivered in primary care and community settings necessitates review of current acute care focussed nursing curricula to better prepare graduates for the realities of practice outside the hospital setting.
- The demand for additional content areas inevitably raises the possibility of a four year undergraduate degree. While this may bring undergraduate nursing courses in-line with several other health professions, there is no evidence of the impact of an increased volume of learning on the skills, knowledge or work readiness of graduates and little agreement about the additional content.
- Investing in post-graduate education that allows nurses to advance their skills and career in directions that meet the needs of both communities and employers is also necessary.

Implications for the system of nursing education

- Changes in nursing curricula are being driven by increasing technology, improved access to online education and information, changing learning needs, fiscal imperatives, the size of student cohorts and resource availability, including clinical placement opportunities.
- Developing and delivering high quality, innovative and contemporary curricula that prepares graduates for the workplace requires high quality nurse academics. There is a growing shortage of nurse academics in Australia and internationally.

1 Introduction

The Australian Government, Department of Health announced an 'Independent Review of Nursing Education – Educating the Nurse of the Future' (the Review) as a measure in the 2018/19 Federal Budget in May 2018. It will examine how current educational preparation in Australia equips nurses to meet the future needs of the Australian community.[1] The Review is scheduled for completion in 2019 and this project represents an important initial phase.

The Department of Health commissioned a team from the Centre for Health Service Development and School of Nursing, University of Wollongong to complete a series of literature reviews on particular topics identified as highly relevant to the Review.

1.1 Aims and objectives

This is the final of four literature reviews, Topic 4, to inform the national 'Independent Review of Nursing Education – Educating the Nurse of the Future' in Australia.

Each topic has research questions that have been specified by the Department of Health. The results of these literature reviews are presented to prompt and inform discussion and conversation about particular issues that in summary relate to:

1. Fitness for purpose, work readiness and transition to practice,
2. Nursing as a career choice,
3. Clinical skill development, and
4. Future directions in health care delivery.

These are important issues for policy development and decision-making about the future of nursing education in Australia. The aim of nursing education is that it adequately prepares nurses of all levels and endorsement, to safely and competently perform their roles; it is from this perspective that these reviews have been framed.

The three nursing designations in-scope for these literature reviews are: Enrolled Nurses (ENs), Registered Nurses (RNs) and Nurse Practitioners (NPs).

1.2 Project governance and implementation

The project governance structure is outlined in Figure 1. To ensure an appropriate breadth and depth of nursing expertise a national working group of nursing educators and clinicians was established and complemented by an international nursing education advisory team. The national nursing education working group comprises exceptional nursing educators and clinicians drawn from across Australia. The members of this working group have reviewed the search strategy and topic maps, advised on literature selection, in several instances contributed with analysis, synthesis and write-up of sections and reviewed and commented upon the draft version of each literature review.

An international advisory team comprising three esteemed experts in nursing education from the US and UK has facilitated exploration of the international context. These international team members have been actively engaged and provided advice on issues arising during the course

of the project. They have also reviewed and commented upon the draft version of each literature review prior to their final submission to the Department.

The work of producing the literature reviews has occurred through four topic teams which included academic staff from the University of Wollongong, University of Sydney and Western Sydney University. Project leadership was provided by the Centre for Health Service Development and critical review and revision of the draft literature reviews supported by the School of Nursing, University of Wollongong. All personnel contributing to this project are acknowledged in Appendix 1.

Figure 1 Project governance and implementation framework

1.3 Topic 4 Future directions in health care delivery

The literature review for Topic 4 addresses two questions:

1. What are the current and emerging issues across the health care landscape influencing the education and training of health care professionals? Consider national and international contexts.
2. How will these trends influence the key skills and attributes required of RNs, ENs and NPs in the next 15 years?

These questions have a future orientation therefore this literature review has drawn heavily from the grey literature as this is where the most contemporary material about current and emerging issues was found. Of necessity it is almost a hybrid between a literature review and environment scan. The peer-reviewed literature has been essential to explore the implications of these issues or trends for the key skills and attributes required by Australian nurses in the next 15 years and the implications for the system of nursing education.

2 Methods

The short timeframe for implementation of this project (approximately six weeks), necessitated a focused and robust methodology flexible enough to adapt to emerging issues and requirements.

Through these literature reviews the current state and future directions for nursing education are reported, as interpreted from careful analysis of international literature reviews, primary Australian research papers and the grey literature. The literature reviews have uncovered a large quantity of publications on each of the four topic areas. It is not intended to present a detailed analysis of the totality of literature available, as might be the case with a systematic review. Instead, a purposeful narrative review of existing literature is provided, with focus on the implications of key issues for contemporary nursing education in Australia.

These reviews recognise both the technical components of educational preparation as well as the non-technical and philosophical emphasis on nursing as a caring profession. At the heart of nursing and nursing education is the therapeutic relationship between nurse and patient which is built upon the delivery of safe, kind and compassionate nursing.[2]

2.1 Conducting a literature review

There are multiple forms of literature review which are distinguished by their characteristics and associated methodologies. Grant and Booth developed a typology of 14 review types and concluded that '…few review types possess prescribed and explicit methodologies and many fall short of being mutually exclusive. The term 'literature review' is generic'.[3, p 91]

In nursing and health care, common forms of literature review include the systematic review, integrative review and narrative review. It is important to discriminate between these forms of review. Systematic reviews are used to answer highly specific questions about an intervention or aspect of clinical practice,[4] particularly where high levels of evidence may be required. Systematic reviews report in detail on individual studies using explicit criteria and critically evaluate the level of evidence using an accepted hierarchy or classification system.[5] The completion of a systematic review usually requires a substantial timeframe. Integrative reviews are used in nursing research to create and organise a body of literature. They are frequently preferred as they allow the combination of diverse methodologies and aim to provide an in-depth understanding of the topic under study.[6]

Where the purpose of the review is to explore broad or complex issues, deepen understanding through integration of findings and critically reflect on the literature a narrative review is preferred,[7] which is the approach adopted for this review. The value of expert-led narrative review for policy-makers lies in a '… meaningful synthesis of research evidence relevant to such complex situations that incorporates a broad range of sources and multi-level interpretation and critique'.[8, p 2] The completeness of searching is determined by time/scope constraints, there may be no formal quality assessment or appraisal of each paper, the synthesis can be tabular with narrative commentary and the analysis uses key features to characterise the quantity and quality of literature.[3]

An effective literature review requires an appropriate understanding of the issue or topic of focus; defined parameters and boundaries; a clear search and selection strategy; intelligent

critical analysis and synthesis that leads logically to conclusions that address the original research question(s); good structuring to enhance flow and readability and accurate referencing to identify relevant sources.

2.2 General methods

For all four literature review topics common search parameters were established with appropriate limits and exclusions. The short project timeframe led to a focus on both international and Australian peer reviewed academic literature retrieved from a specific range of databases: Scopus, CINAHL Plus, Medline and Health Source (Nursing / Academic edition). Database searching was supplemented with snowball searching (pursuing references of references and tracking citations forward in time).

Each topic team was supported by a research librarian from the University of Wollongong who advised on database selection and search term combinations. The research librarians assisted with preliminary searches and prepared reports on journal impact on the basis of the final sources selected for inclusion in each literature review.

Every effort was made to enhance the efficiency of searching by seeking out systematic reviews, meta-analyses, meta-syntheses and other literature reviews. This often provides a prompt overview of the spectrum of issues relevant to the particular topic. If the search results did not generate appropriate or adequate reviews then additional peer reviewed literature was identified.

Searching the academic and grey literature focused on literature from Australia and other English-speaking countries, specifically; the United Kingdom (UK), Ireland, the United States (US), Canada, and New Zealand. These countries were selected as their experiences in nursing education are more likely to be generalisable to the Australian context.

2.3 Topic specific methods

The breadth of Topic 4 resulted in a two stage approach to the search strategy.

Stage 1: The initial searching of academic and grey literature aimed to answer the first research question 'What are the current and emerging issues across the health care landscape influencing the education and training of health care professionals? Consider national and international contexts'. Priority was given to searching for reviews of the literature that provided an international perspective about issues impacting the education and training of health professionals (several included Australian studies).

This search stage generated the current and emerging issues that formed the sub-topics for the second stage of searching. In many instances the sources identified through this first stage of searching included evidence and information relevant to the second research question.

Stage 2: The second round of searching referred to as 'supplementary' searches were purposeful and contributed to answering the second research question 'How will these trends influence the key skills and attributes required of RNs, ENs and NPs in the next 15 years?' These searches aimed to identify relevant reviews, studies (both Australian and from the other in-

scope countries) or grey literature that provided insights into the skills and attributes required of nurses.

In both Stage 1 and 2 'snowball searching' was undertaken using the reference lists of included papers or tracking the citations of particularly useful papers forwards in time. Additional supplementary searches were required on sub-topics and sources are included in the PRISMA flow diagram (Figure 2).

2.3.1 Search strategy

The EBSCO electronic databases Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus, Medline, Health Source (Nursing/Academic edition) in addition to Scopus and Google Scholar were searched from January 2014 – February 2019. All Stage 1 searches were completed in late February 2019 with Stage 2 searches extending across the months of March/April. Search strategies used keywords that were identified in collaboration with a research librarian including terms such as nursing education, nursing training, medical education, allied health, trend, future, innovation, plan, forecast, curricula and curriculum (refer to Appendix 2).

Hand searching of specific journals occurred in addition to snowball searching. In agreement with Greenhalgh and Peacock,[9] the most fruitful searches were not from formal electronic databases, but occurred through checking reference lists, and citation searching.

The grey literature was sourced through:

- Using search terms with .gov, .edu and .org (or appropriate limiters according to the country) for the in-scope countries via the Google search engine.
- Searching additional websites recommended by national and international advisors e.g. World Health Organization (WHO) and the International Council of Nurses (ICN).

2.3.2 Inclusion and exclusion criteria

The future-oriented focus resulted in limited 'reviews' specific to current and emerging issues influencing the education and training of health care professionals. This resulted in inclusion of peer-reviewed studies, commentaries and editorials. Standardised criteria were used to guide the selection of sources by reviewers. One reviewer initially reviewed title and where necessary abstract for the academic literature gathered in Stage 1. Several reviews were identified that initially appeared tangential to the primary research questions but addressed quite complex nursing education material. Each of these sources underwent secondary review and were discussed with two nursing education experts, with reviewer discrepancies debated until consensus was reached about inclusion or exclusion.

The sources procured through Stage 2 were diverse. Many of the primary studies concentrated on the implementation and/or evaluation of educational strategies; or experimentation with different forms of curriculum design or content development in quite specific areas, such as nutrition education for osteopathy students,[10] these were mostly excluded. Each retained article was read to determine whether it met the inclusion criteria and had relevance to the issues and sub-topics identified in Stage 1. If the first reader was unsure if an article should be excluded it was reviewed by a second reader. The final consensus about inclusion for Stage 2 sources was reached through discussion between readers.

In addition to meeting the general inclusion criteria relating to time period; in-scope countries English-language and the research questions; grey literature sources were included if they provided a national or strategic perspective and were perceived to be highly relevant to one of the identified trends. The exclusion criteria are summarised in Appendix 3.

The current and emerging issues identified through preliminary Stage 1 searches were listed in the 'Search strategy and topic map' sent to the national nursing education working group and international nursing education advisory team. Members were asked to confirm that the trends identified were relevant and appropriate and/or suggest further inclusions.

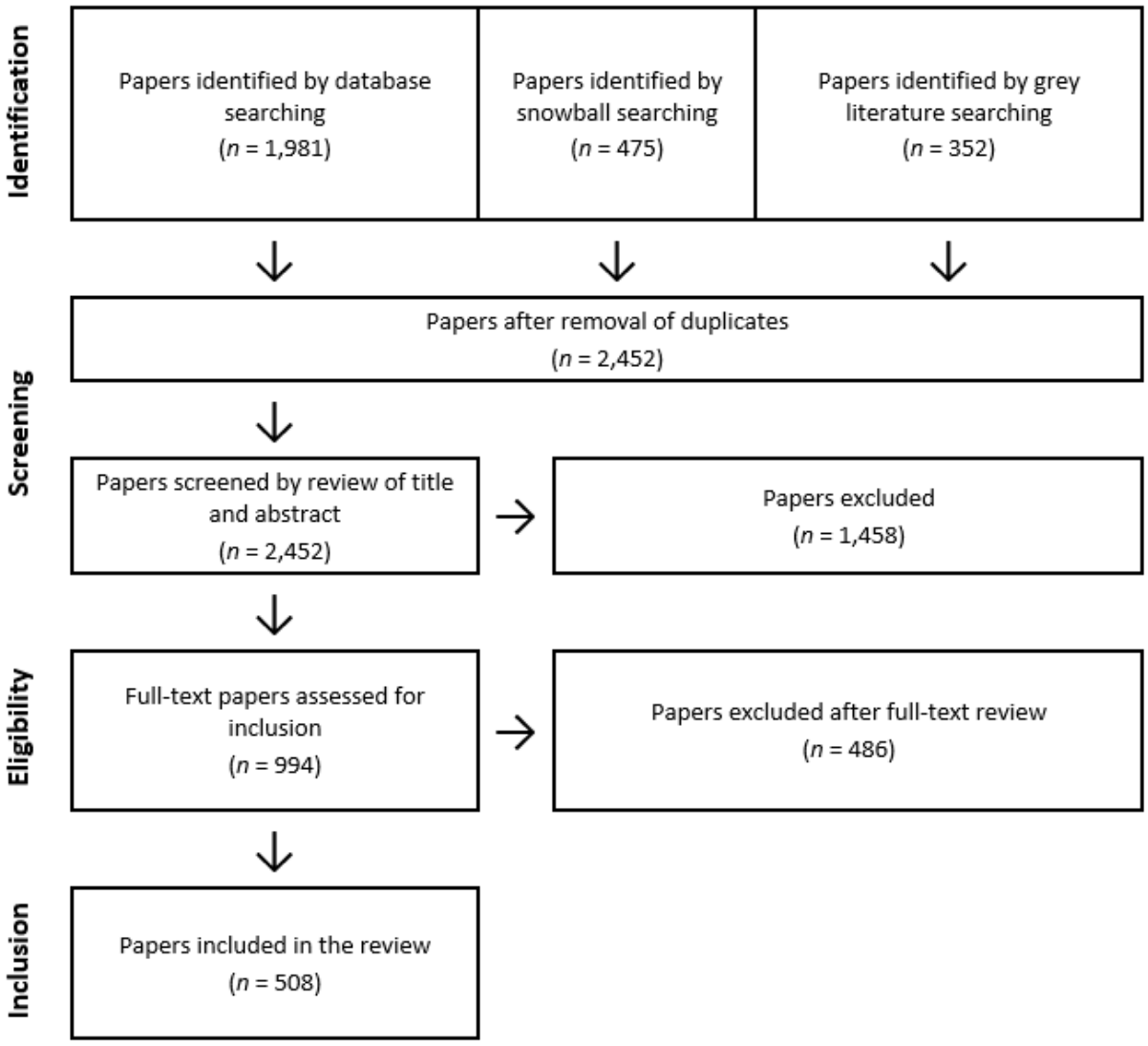
2.3.3 Data analysis and synthesis

The decision not to use a standardised data extraction tool is discussed in Section 2.4.1. This does not mean that the process of data extraction was not systematic or robust. For example, the reviews identified from searches of the academic literature particularly relevant to the first research question (current and emerging issues) were tabulated using Microsoft Excel to facilitate a systematic approach to data extraction.

2.3.4 PRISMA flow diagram

The flow diagram (Figure 2) summarises the results of searching the academic and grey literature.

Figure 2 Flow diagram



2.4 Methodological quality

2.4.1 General issues

At the outset of the literature reviews in this series it was difficult to predict the volume of relevant and available literature for each topic. The process of sifting through what may be a very large volume of literature can be aided by using an evidence hierarchy that clearly explains the differing levels and quality of evidence. 'Levels of evidence' are often represented as a pyramid with the highest levels of evidence at the top that is, systematic reviews and randomised controlled trials. This makes sense when assessing, for example the efficacy of an intervention. It can be challenging when conducting narrative reviews to apply this hierarchy as a substantial proportion of useful literature may not have been derived from these higher levels of evidence.

While initially it was anticipated that this process could be aided through using an appropriate critical appraisal tool to describe each of the included studies it soon became apparent that this would not be possible within the available timeframe. Throughout each literature review

summaries and syntheses of key sources are provided in tabular form, however these are deliberately not exhaustive. In collaboration with the Department of Health a decision was made that the available time was better invested in comprehensive analysis and intelligent synthesis of findings.

2.4.2 Topic specific issues

The methodological quality of the literature was variable. This may be related to the future-orientation of this topic and because the focus was not on interventions but rather current and emerging issues across the health care landscape and their impact on the education and training of health care professionals. The grey literature is highly relevant in a future-oriented review as it is often more contemporary than the peer-reviewed literature. It is difficult to assess the quality of the grey literature. Consequently, publications from government, national and professional organisations were relied upon. Supplementary searching of the peer-reviewed literature was also undertaken to look for evidence that might anchor trends identified in the grey literature, with priority given to reviews of the literature.

There were several limitations in this review. For example, the decision to exclude sources focused on European countries may have resulted in useful material being overlooked. The time period from 2014 to 2019 was driven by the contemporary focus of the topic however, a small range of sources were included from earlier years if they materially added to the analysis of a particular issue.

When searching of the literature commenced the intention was to include sources from medical and allied health education, with a view to learning from the developments in undergraduate curricula in other health professional groups. There are several reviews and studies relevant to these professional groups included. However, the volume of literature was so extensive and with a six-week timeframe to produce the review, inevitably nursing education sources became the primary focus. The journal impact report for included papers is provided as Appendix 10.

All health professionals require a life-long commitment to learning and ongoing professional development. This literature review is focused on education to enter practice as an EN, RN or NP. Consequently, consideration of other post-graduate, specialty education programs and training initiatives supporting ongoing professional development was outside the scope of this review.

3 Introduction to the presentation of results

3.1 Outline

The results or findings of this literature review are presented in two parts. Firstly, the current and emerging issues are identified and discussed in terms of the international and national context. The intention is to provide a broad overview of these issues to orient the reader to the 'strategic environment' that is influencing the changing requirements of nurses of the future. The implications of these issues and trends for nursing skills and attributes are discussed (as presented in Section 4). Although some issues referenced the need for advanced practice or more autonomous roles, rarely did the available literature distinguish amongst the implications for ENs, RNs and NPs. A summary of results is provided in Section 5. The broader implications for the system of nursing education, particularly issues pertinent to curricula are outlined in Section 6. The final section of this literature review, Section 7, aims to critically reflect on the major findings and discusses how best to equip the nurse of the future.

There are dynamic relationships between the broad range of structural and societal issues identified. In reality the impact of trends is rarely singular or linear but rather several trends converge to irrevocably change the health care environment. For example, advancing technologies can drive new models of nursing care which result in changing skill requirements that in combination present significant implications for future nursing education and training.

3.2 Organising framework

There are many strategic management tools that facilitate the analysis of change and the forces that drive it. A PESTEL analysis has a long history of use in the field of business and strategic management.[11] The acronym refers to the political, economic, social, technological, environmental and legal or regulatory influences external to an organisation or entity. It is used in environmental scanning and has been applied in analyses of diverse industries to capture both international and national trends.[12] A PESTEL analysis is an effective tool to consider external environmental influences and their potential impact upon the strategic context in which government, institutions and organisations plan for the future and craft policy decisions.[13]

This kind of analysis has been widely used in the field of health care to support contextual analysis of diverse issues including: managing quality improvement in health care[14]; effective outbreak management interventions and epidemic control[15]; and understanding environmental factors influencing Australian pharmacists capacity to implement patient-focused models of professional practice.[16] A PESTEL analysis has also been employed in analyses of trends in higher education. For example, most notably in a review of the curriculum content of current Australian pre-registration nursing curricula[17] and in a recent text explaining the application of this analysis when planning online educational programs.[18] A major limitation of generic frameworks such as the PESTEL framework and others, is that they present static categories that do not capture the dynamic interplay of factors in the real world.[19] The macro orientation of the framework can also result in too much abstraction which may limit insights.[20]

4 Identification of current and emerging issues

4.1 Overview

In identifying potentially relevant issues, the net has been cast widely and includes consideration of political, economic, social, technological, environmental, legislative and regulatory trends. For example issues include: international and national policy developments driving new models of care; the economic influences arising from increasing health care costs; the impact of generational change on workplaces; technological advances such as artificial intelligence and robotics in health care; environmental issues such as climate change and its associated public health implications; and legal and regulatory influences on nursing arising from changing health needs. In most instances, the issues or trends emerging internationally are mirrored in Australia, albeit to varying degrees. However, our unique national context influences the impact of these trends upon the Australian health system. Consequently, a small range of issues of particular relevance to the future skills and attributes required of Australian RNs, ENs and NP are highlighted and briefly discussed under the sub-heading 'national'.

In recent years, several other countries and entities have undertaken reviews related to the future of nursing. Many address common themes including considering whether nurse education remains fit for purpose, how to improve leadership and motivation, and the relationship of nurses to other health professionals.[21-24]

Several current issues that would appear to be highly relevant may appear to be missing from this analysis. For example, the relationship between skills, knowledge and attributes and nursing graduates that are 'fit for purpose' is the focus of Topic 1 – Fit for purpose / work ready / transition to practice. Similarly, the potential impact of gender balance and greater diversity on nursing workforce shortages is addressed in Topic 2 – Nursing as a career choice. Inter-professional education, clinical placements and simulation are highly important issues influencing nurse education. These issues and the trends and interventions utilised to develop clinical skills in pre-registration nursing programs and nurse practitioner programs are addressed within the literature review on Topic 3 – Clinical skill development.

4.1.1 Identification of issues

The first step in constructing the PESTEL analysis was to identify current sources specific to 'in-scope countries' that provided a 'general overview' of current and emerging issues influencing the education and training of health care professionals. Literature that provided breadth rather than depth was sought to quickly provide an understanding of the spectrum of possible issues for inclusion. The process of issues identification is outlined below.

Step 1: As outlined in the search strategy, the initial intention was to procure reviews however within the timeframe available for searching no systematic or integrative review that broadly addressed the research questions was identified. Two peer-reviewed articles were sourced. An article by Ralph[17] was the most useful as it addressed the Australian context and reported on the results of an environmental scan and survey specifically in relation to nursing education. An older article[25] provided a broader strategic picture of the issues influencing nursing education in the US. This paper was included despite its age as there were so few sources of this type.

Most documents of relevance came from the grey literature, the highest quality sources were mostly produced by government bodies, research institutions and/or professional associations. The largest number were drawn from the UK (Appendix 4), followed by the US and Canada (Appendix 5) and to a much lesser extent Australia and New Zealand (Appendix 6). There was limited current information available from Canada. However two documents were included relating to workforce trends (one from NZ and one from Canada) as they included references to nurse education and workforce issues. Two documents from WHO were also included based on recommendations by national advisors, however their focus is global (Appendix 7).

Health-related strategic planning resources from in-scope countries were identified however, not initially included as while they discussed future health care issues, rarely if ever, were these issues linked to nursing education.

Step 2: The next step in issue identification was searching of the peer-reviewed literature for 'reviews' relevant to Topic 4. These reviews included issues relevant to nursing, medical and allied health care professionals. The intent was to draw where relevant from issues impacting other health professionals. Most reviews related to medicine or nursing with very view specific to allied health. The majority of these reviews addressed a specific current or emerging issue, for example mobile technology in undergraduate nursing education.[26] Of the 53 reviews retrieved, 49 related to specific issues or sub-topics (for the full listing of included reviews refer to Appendix 8). Of these 49 sources, 23 were systematic reviews, 11 integrative reviews, 5 scoping reviews and the remaining 10 a mix of review types, for example umbrella review and critical review (refer to Table 1).

Step 3: Searching for reviews relevant to medical, nursing and allied health curricula was undertaken as it seemed reasonable to accept that recent changes or innovations in curricula, in response to current and emerging issues, would be described in the literature. A total of 13 reviews were retrieved and 4 retained. The issues arising from these reviews were compared with those sourced from Step 2. The reviews, as would be expected, investigated their issue of focus in far more depth than any of the grey literature sources. The reviews excluded predominantly had a specific focus on medical education (a sample of excluded reviews is included as Appendix 9).

Step 4: As a final check of the developing list of sub-topics arising from this PESTEL analysis, several recent strategic planning resources (formerly identified and referred to as the last action in Step 1) were cross-checked.

This resulted in the final list of 23 current and emerging issues populating the PESTEL analysis summarised in Figure 3.

4.1.2 Summary of included reviews

All 53 reviews were summarised in tabular format. The majority (49) informed the PESTEL analysis and their distribution across PESTEL categories is evident in Table 1. The high number of reviews relating to technological issues is an indication of interest in this field. These reviews were supplemented with a wide-range of international and Australian studies and extensive recourse to the grey literature.

Table 1 Summary of reviews relating to current and emerging issues

Review type	Political	Social	Technological	Environmental	Legal / Regulatory	Curriculum	Total
Systematic	4	4	13	1	1	2	**25**
Integrative	6	3	1	0	1	0	**11**
Not stated	2	0	3	1	1	0	**7**
Scoping	0	2	2	0	1	1	**6**
Critical	1	0	0	0	0	0	**1**
Meta-review	0	0	1	0	0	0	**1**
Narrative	0	0	1	0	0	0	**1**
Umbrella	0	0	0	0	0	1	**1**
Total	**13**	**9**	**21**	**2**	**4**	**4**	**53**

A sample of the 49 reviews used in the PESTEL analysis is included in Table 2, to demonstrate the spectrum of issues considered. Where possible contemporary reviews were sourced that addressed the issue of interest, for example, the inclusion of LGBTI health issues within undergraduate health care education and professional training programmes.[27] Frequently reviews were more general, for example the review on disaster preparedness was not specifically focused on undergraduate nurse requirements.[28] In Table 3 are examples of reviews relevant to curriculum issues that were used in combination with international and Australian studies to inform Section 6.

Table 2 Examples of reviews relating to PESTEL categories

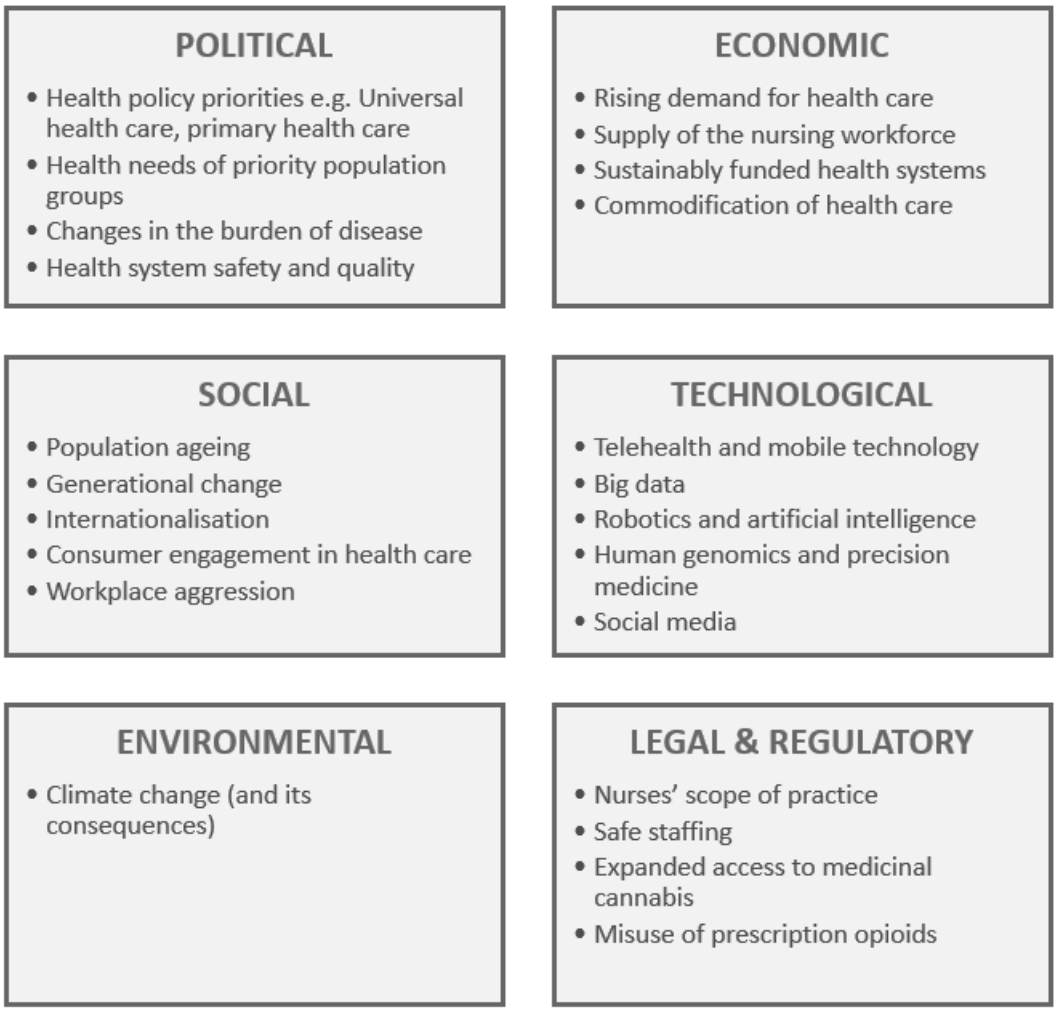
Author / title	Type of review	Description of the review / included studies	Findings
Barr et al., 2018. Current practice for genetic counselling by nurses: An integrative review.[29]	Integrative	Examined current practice of genetic counselling by nurses. Studies evaluated using the Critical Appraisal Skills Programme (CASP) and 10 studies were included in the review.	Some nurses do engage in genetic counselling, but how they engage is not consistent, nor is there consensus about what should be the scope of practice. The authors recommend further investigation into credentialing, role recognition support and education for nurse genetic counselling.
Birks et al., 2016. Registered nurse scope of practice in Australia: an integrative review of the literature.[30]	Integrative	Reviewed literature relating to the scope of practice of the Australian registered nurse published between 2007 and 2014. Twenty-nine publications were included in the review.	The significant influence of local context on nursing scope of practice may limit attempts to develop a standardised conceptual definition. Clearly articulated and consistent scopes of practice are necessary for the various categories of nursing work and for the many forms of advanced practice specialisations.
Christiansen et al., 2018. Is it time to consider a four year Nursing Bachelor Degree in Australia? A discussion paper.[31]	Scoping	Examined the debate about the appropriate duration of nursing degrees and the need for four year nursing degrees, identifying examples internationally and examining key arguments for their adoption in Australia.	Considering the competencies required of future nurses, the authors conclude the call for nursing degrees of this duration are credible. An increase in duration of nursing degrees should be accompanied by an increase in practice hours to facilitate sufficient exposure to clinical practice.
Lee et al., 2018. Mobile technology in undergraduate nursing education: A systematic review.[26]	Systematic	Explored the use of mobile technology in nursing education. Seven RCTs and seven quasi-experimental studies were identified.	Concluded that implementation of mobile technology into nursing education is at an early stage due to implementation issues and inconsistent research conclusions relating to the application of mobile technology. Called for more rigorous primary empirical studies to further evaluate the effective use of mobile devices in nursing education.
McCann and Brown, 2018. The inclusion of LGBT+ health issues within undergraduate health care education and professional training programmes: A systematic review.[27]	Systematic	Examined the education and training requirements of undergraduate students and health professionals regarding the inclusion of LGBT+ health issues. Twenty-two articles were included in the review (15 from the US).	Concluded that the inclusion of LGBT+ health-related issues within the health curriculum is highly important, as is continuing professional development programmes with implications for education and training, clinical practice and research.
Rokkas et al., 2014. Disaster preparedness and response: Challenges for Australian	Not stated	Examined issues currently facing disaster nursing focusing on the challenges for Australian public health nurses responding to and preparing for disasters within Australia. The number of articles	Disaster education within nursing is ad hoc in Australia, with a lack of consistent and accessible programs and no disaster education in the undergraduate nursing curriculum. With a lack of research in disaster nursing, it is difficult to make

Author / title	Type of review	Description of the review / included studies	Findings
public health nurses – A literature review.[28]		included is not stated, but they came from a variety of sources including grey literature.	recommendations regarding specific competencies, roles, and functions. More research is required in this area.
Rozendo et al., 2017. A critical review of social and health inequalities in the nursing curriculum.[32]	Critical	Examined how social and health inequalities have been addressed in the nursing curriculum. Twenty articles included in the review (15 from the US).	Highlighted that nurses need critical knowledge of how to confront the root causes of inequalities so they can tackle them. Whilst nursing education initiatives align with WHO recommendations to address disparities, there is a need to identify existing conceptual and practical content on inequalities in the nursing curriculum through future research.
Talwar et al., 2017. Genetics/genomics education for nongenetic health professionals: A systematic literature review.[33]	Systematic	Summarised and evaluated the existing genetics/genomics education programs for nongenetic health professionals. Forty-four studies were included.	The majority of studies adopted a pre/post-test design and lacked follow-up data collection. Most studies reported participants' improvements in one or more of the following areas: knowledge, attitudes, skills, intention, self-efficacy, comfort level, and practice. The authors call for an enhancement in methodological quality to strengthen education initiatives in the area of genetics/genomics education programs.
Zhu et al., 2019. Nursing students' experiences with faculty incivility in the clinical education context: A qualitative systematic review and meta-synthesis.[34]	Systematic	A synthesis of the evidence on the experiences and perceptions of incivility during clinical education of nursing students. Eighteen studies were included in the meta-synthesis.	Concluded that hospitals and universities should have an immediate response person or system to help nursing students to confront incivility and create an open communication environment. However, confidence in the synthesised findings was low.

Table 3 Examples of reviews relating to curriculum

Author / title	Type of review	Description	Findings
Al-Shorbaji et al., 2015. eLearning for undergraduate health professional education: A systematic review informing a radical transformation of health workforce development.[35]	Systematic	This systematic review, conducted by the Global eHealth Unit at Imperial College London and commissioned by departments of the WHO, evaluated the effectiveness of eLearning (specifically non-networked computer-based and internet and local area network-based eLearning) for undergraduate health professional education. 49 studies published between 2001 and 2013 were included.	Computer-based and web-based eLearning has similar learning outcomes (in terms of knowledge and skill acquisition) to traditional learning, however attitudes and satisfaction of students regarding these types of eLearning is unclear. Reported advantages by learners included accessibility and flexibility, portability, and improved interaction with teachers and peers. Disadvantages included the time-consuming nature of such formats, lack of student-teacher interaction and tutor support, and feelings of isolation. Although eLearning presents benefits such as monetary savings and scalability of educational materials, further research is required to understand educational outcomes and impact for health care professionals.
Changiz et al., 2019. Curriculum management/monitoring in undergraduate medical education: a systematized review.[36]	Systematic	Explored different approaches medical schools have to undergraduate medical education curriculum management or monitoring in order to provide a basis for curriculum managers. 21 papers, predominantly from the US and Canada, were included, categorised by focus: developing computerised tools (12), surveying curriculum stakeholders and reviewing curriculum documents (4) and introducing managerial structure (5).	The most common approaches to undergraduate medical education curriculum management identified were managerial structures and computerised tools, due to large number of faculty members with responsibility for curriculum delivery and the considerable volume of complex curriculum information. Systems to share curriculum information between medical schools are important in improving curriculum development.
Onyura et al., 2016. Evidence for curricular and instructional design approaches in undergraduate medical education: An umbrella review.[37]	Umbrella	This umbrella review, or meta-systematic review, synthesised evidence from systematic reviews on the efficacy of a range of educational approaches in undergraduate medical education, with a focus on learning outcomes. Included 36 papers published between 1993 and 2013. Quality of reviews appraised using the AMSTAR instrument.	A broad range of educational approaches are used in medical education; these were grouped into eight broad categories: cross-cultural exchanges, early clinical and community experience, e-learning, inter-professional education, portfolios, problem-based learning, scholarly concentrations and self-directed learning. Critical knowledge gaps exist concerning the efficacy of diverse curricular and instructional design approaches in medical education.

Figure 3 PESTEL analysis – current and emerging issues



4.2 Political issues

4.2.1 Health policy priorities

4.2.1.1 International context

Health policy priorities signal what is important to society, and therefore government, and provide focus and direction for the collective action of health professionals, policy makers and the broader health system. The WHO identifies the major threats to health world-wide as non-communicable diseases, antimicrobial resistance, inadequate primary health care, vaccine objection, high-threat pathogens, influenza pandemic, air pollution and climate change.[38] Current health policy priorities for governments internationally are: universal health coverage, preparedness for public health emergencies (pandemics), addressing gender gaps through a focus on the health of women, children and adolescents, and mitigating against health impacts of climate change.[39]

Universal health coverage improves equity of access to quality health care and reduces financial barriers for those who may otherwise not be able to afford health care. The goal of achieving universal health coverage, coupled with demographic and technological changes, has resulted in health now being one of the key sectors of the international economy. Indeed health expenditure is increasing faster than gross domestic product.[40] Sustained inequalities in health present a challenge for both health care professionals and policy-makers. Action to reduce poverty and address the social determinants of health is fundamental to 'improving the circumstances in which people live and work'.[41, p 1099]

4.2.1.2 National context

National health policy drives new models of care, for example shifts to primary and ambulatory care and the improved management of chronic conditions in the community. Policy developments can also support new ways of working through encouraging a focus on patient-centred care and personalised long-term care. One of the most important contributions of policy in health care is its capacity to drive broader system improvements in access, quality and the cost of care.

Health care in Australia is a complex system, funded and administered by Commonwealth, state and territory governments, as well as local government, non-government and private providers. Medicare is the funding model for universal health care. The increasing demand for health care is driven by both an ageing population and the prevalence of chronic and complex disease.[42-44] A critical concern for government is maintaining a sustainably funded health system.[45] Achieving a balance between the national commitment to universal health care, increasing demands, providing safe and high quality patient care and controlling health care costs, is a key political challenge for all jurisdictions.

There are several areas for action to improve the effectiveness of future health care delivery:

- expanding health care delivery models such as chronic disease self-management and patient centred care
- shifting the emphasis from hospital based care to community and home based interventions

- increasing the effective use of technology by patients
- changing and expanding the roles of health professionals
- engaging consumers more actively in their care.[42-44,46]

The Council of Australian Governments (COAG), the peak intergovernmental forum in Australia, sets the national health reform agenda via the 2020 – 2025 national health agreement. The COAG strategic priorities are, as would be expected, aligned with the challenges and opportunities facing the Australian health system.[47] These include: improving efficiency and ensuring financial sustainability; delivering safe, high quality care in the right place at the right time; prioritising prevention and helping people manage their health across their lifetime; and driving best practice and performance using data and research. Reform in other key policy areas such as the National Disability Insurance Scheme[48] and Australia's National Digital Health Strategy[47] are underpinned by COAG intergovernmental agreements.

The Australian Government Department of Health outlines priorities for health reform annually through the Department's Corporate Plan,[49] reflecting the directions contained in the Portfolio Budget Statements 2019 – 20.[50] These are currently: guaranteeing Medicare and the Pharmaceutical Benefits Scheme; supporting hospitals; prioritising mental health and preventive health; medical research; ageing and aged care reform; and rural health. Policy implementation is supported through a wide array of national health plans, frameworks and strategic documents.

4.2.1.3 Implications

The policies and priorities of government influence not only health care delivery but also the education and training of health care professionals. Nurses are the largest professional group in the health care workforce and play a significant role in the development and delivery of health services. They are represented by peak professional organisations such as the Australian Nursing and Midwifery Federation (ANMF) and the Australian College of Nurses (ACN), who work to influence health policies in Australia relating to developing health issues; current and future health workforce demands and the education and training of nurses.

The nurse of the future must be equipped to respond to new and emerging health priorities and evolving models of care. This means that graduate nurses should be able to reflect on the interface between policy and everyday practice assessing the implications for existing and new nursing roles. The undergraduate nursing curriculum must address the current policy context in which nurses' work. Nurses need to be prepared to work in different health settings and capable of adapting to shifts from hospital to community based settings. They will be expected to implement existing and emerging models of care such as the *Innovative Care for Chronic Conditions Framework*[51] and contribute to health promotion and preventive health programs that assist patients to manage chronic disease. The communication and counselling skills required to effectively engage patients in their own health care must continue to be incorporated into undergraduate nurse education. As nurses move ahead in their careers and undertake post-graduate study this knowledge of health policy becomes crucial in ensuring nurse leaders are well positioned to contribute to national health policy debates.

4.2.2 Health needs of priority population groups

4.2.2.1 International context

Policy can direct focus to priority population groups, particularly where health inequities are evident. Persistent inequalities in income and wealth have been identified by the World Economic Forum as the single most significant trend that will shape future global development, this is contributing to policy debates about universal health care and health care delivery for marginalised or priority population groups.[52] Marginalised groups are discriminated against, have higher morbidity and mortality rates, and have less access to health services than other community groups.[53] In particular, internationally there are current and unmet health needs experienced by people with disability, refugees, LGBTI communities and Indigenous peoples.

Persons with a physical and / or intellectual disability generally have poorer health and are less likely to access preventative health services compared to the general population.[54-56] A documented barrier to health care for people with disability is the negative attitudes of health care professionals[57] including nurse educators.[58] Refugees have unique and complex physical, social and mental health needs.[59] Many have not been exposed to preventative health care, and may suffer from malnourishment, cultural shock, and post-traumatic stress disorder. Mental health issues experienced by refugees may be long-standing and have lasting effects on future generations.[60] LGBTI communities experience substantial health inequities leading to a higher risk of illness and disease.[61] They are also less willing to seek health care due to fear of discrimination and stigmatisation.

4.2.2.2 National context

Within Australia the persistent inequalities experienced by Aboriginal and Torres Strait Islander peoples led to the *Closing the gap* policy initiative that was launched in 2008 to deliver better health, education and employment outcomes for Aboriginal and Torres Strait Islander people. In December 2018, the COAG announced a formal partnership agreement with Aboriginal and Torres Strait Islander peak organisations and the creation of a new 'Joint Council on Closing the Gap'. This initiative aims to promote shared decision-making and recognises that only through authentic engagement with Aboriginal and Torres Strait Islander peoples will the gap in life outcomes between Indigenous and non-Indigenous Australians be addressed.[62]

The National Disability Insurance Scheme (NDIS) has increased the focus on the health and social care of people with disabilities. This initiative is managed through the Australian Government Department of Social Services.[63] This development demonstrated a significant policy shift to individualised care which is also extending to aged care. Instead of organisations being funded to provide services, consumers receive a funding allocation based on an assessment of their needs. The individual then has much greater choice and control as to how this funding is used and their care needs are met.

In Australia, the health of refugees remains an issue of concern for government and health professionals alike. The health needs of refugees are complex and substantially different to those experienced by the general population.[64] Within Australia the rights of same-sex couples has been a political issue for several years and one that has mobilised broader community debate about the legal recognition of same-sex relationships. In addition increasing awareness

about discrimination on the basis of gender has seen an increased focus on the health needs of the LGBTI community.[65]

4.2.2.3 Implications

Through understanding the health issues affecting priority population groups and the impact of social and health inequalities, nurses can more effectively contribute to health care and disparities in health outcomes.[32] The attitudes of undergraduate health care students are influenced by their knowledge of and experience in caring for people with physical and intellectual disabilities.[66] More positive attitudes were portrayed by those who had greater exposure to caring for people with disabilities.[66] This, coupled with health professionals' lack of knowledge about the health needs of people with disabilities[67] suggests further specific education is required in order to provide appropriate health care.[55] Within Australia, although the NDIS has increased the focus on the health and social care of people with disabilities, this is not currently a focus within nursing education. An audit of Australian nursing curriculum content, found that over half of the schools of nursing offering pre-registration courses offered no content on intellectual disability.[68] Similarly, a documentary analysis of programs available to nursing students and registered nurses in New South Wales and Tasmania, found content on intellectual disability had disappeared from curricula.[69] The lack of contact between nursing students and people with intellectual disability means that students are missing out on acquiring sufficient knowledge to be confident in delivering care.[70]

Despite the growing number of refugees in Australia, a paucity of contemporary Australian research is available to inform nurses and nursing curricula in the provision of patient-centred care for refugee groups. Some of the unique challenges of providing health care to refugees include difficulties with communication, unusual presenting problems and managing trauma. Issues with communication are not limited to obvious language barriers but include issues such as cultural competency, medical terminology and diagnoses. Nurses are required to explain other unfamiliar concepts such as immunisation and health checks. As many refugees have been traumatised, nurses require knowledge and skills in identifying and managing trauma when providing health care to them. A study that explored cultural competence among nurse practitioners working with asylum seekers, identified the ability to sensitively inquire about traumatic experiences as a key competency in providing health care to refugees.[71]

Research exploring the knowledge, beliefs and attitudes of nurses and midwives about the health care needs of LGBTI patients revealed a wide spectrum of attitudes and that a prevailing culture of heteronormativity prevented LGBTI patients from receiving patient centred care.[72] Nursing has been slow to address LGBTI issues compared to other health disciplines.[73] A recent systematic review explored the education and training requirements of undergraduate students and health professionals around LGBTI patients. Findings reported that education and training was insufficient in nursing programs at all levels to produce culturally competent clinicians.[27] This resonates with research that reported nursing students lacked knowledge about LGBTI communities and showed a reluctance to provide care for them.[74,75] The deficit in nursing students' knowledge may also be explained by findings which suggest that faculty do not feel competent teaching the content.[73-75] This highlights the importance of well-prepared nurse academics to deliver quality education.

The Australian Nursing and Midwifery Accreditation Council (ANMAC) mandates content regarding Indigenous history, culture and health be included in undergraduate nursing programs. However, the effectiveness of this in producing culturally competent nurses is

questionable due to the disparities in curricula and the modes of delivery.[76] There is significant variability in the ways in which Indigenous health content has been presented and incorporated into nursing programs, and nursing students' experiences of Indigenous health education.[77] It can be argued that knowledge may not necessarily translate to cultural competence.[77] However, there have been examples of programs where cultural competence has been achieved. For example, following their subject dedicated to Indigenous health, Hunt et al. demonstrated enhanced student knowledge and respect for Indigenous cultures, increased confidence in working with Aboriginal and Torres Strait Islander peoples and the development of cultural competence.[78] Additionally, Power et al. developed an educational initiative collaboratively with Aboriginal and non-Indigenous staff that evaluated the inherent graduate attribute, Indigenous cultural respect, using an assessment criteria template (ACT).[79] Assessments were developed across all three years of the undergraduate nursing program to ensure the graduate attribute was met by all graduates.[79]

Nurse educators need to review curricula to determine where content specific to the health needs of people with disability, refugees, LGBTI groups and Indigenous people can be embedded.[68,70,72] Key stakeholders in each of these groups should be involved in contributing to curricula, content, materials and the delivery of content.[80-82] Student learning would be enhanced through opportunities for clinical placements that provide exposure to different groups with differing and diverse health care needs.[70,78,83]

4.2.3 Changes in the burden of disease

4.2.3.1 International context

The burden of disease is significantly changing with more long term conditions and non-communicable diseases evident world-wide.[84] An unintended consequence of improved living conditions and increased survival is the emergence of chronic, non-communicable conditions such as diabetes, cancer, heart disease and dementia.[84] This is exacerbated by an ageing population and is increasing the burden on health services worldwide.[85,86] While this trend has been apparent for some time, the magnitude of the impact of chronic disease upon mortality and health systems and societies more generally is driving renewed interest in their management.[84] In response to the increasing adverse impact of non-communicable diseases, the WHO has developed a *Global Action Plan for the Prevention and Control of Non-communicable Diseases 2013 – 2020*.[87] The overarching principles underpinning the action plan include: advocacy for a life-course approach, empowerment of people and communities, application of evidence-based strategies, support for universal health coverage, management of real, perceived or potential conflicts of interest, commitment to a human rights and equity-based approach, national action and international cooperation and solidarity, and multi-sectoral action.[87, p 3]

In the seminal paper *Compression of Morbidity*, Fries provides evidence 'to confirm the existence of a finite human life span'.[88, p 807] He outlines his central thesis that:

> *The compression of morbidity occurs if the age at first appearance of aging manifestations and chronic disease symptoms can increase more rapidly than life expectancy.*[88, p 810]

This phenomenon is driven by a view that society and the health system can assist older people to age well, remain healthy, live a longer life and manage chronic disease with the 'consequent compression of morbidity into a shorter period at the end of life'.[88, p 820] This has the overall effect of 'compressing' the time-period in which the severity of disease impacts on a person's quality of life and their consequent need for health services. Through targeting people at a younger age with low cost health promotion and early intervention strategies, it is possible to delay the impact of symptoms of chronic disease. The potential result is improved quality of life for older age groups and reduced use of more costly health services in a shorter period of morbidity.[89] The challenge as noted by Fries several years later is to 'develop coherent health policies directed at reduction in morbidity'.[89, p 1]

In addition to the rise in chronic disease, the world is experiencing a growing burden of disease from mental health issues[90] and mental illness. Currently it is estimated that one in every two people worldwide will experience a mental illness in their lifetime.[91] Some one in five adults will be experiencing a mental health issue at any point in time.[91] Mental illness is insidious and many people do not receive optimal treatment for their mental health. In high income countries it is estimated that between 35-50% of those with severe mental illness receive no treatment.[92] Despite this apparent lack of intervention, early assessment and intervention by the right health professional can both enhance recovery and promote psychological well-being for those with mental health issues and mental illness.[93] As health and social policy has moved away from institutionalisation of those with mental illness, the demands for mental health care in the community has risen.[94] There are currently too few medical specialists to manage the growing number of people presenting with mental illness and mental health issues. To address this shortage, various multidisciplinary models have been developed and trialled to provide quality mental health care via generalist doctors, nurses and allied health, with referral to specialists when required. Many such models have shown promise in providing quality care with acceptable outcomes for consumers.[95,96]

4.2.3.2 National context

The burden of disease evident in other developed countries is also evident in Australia. While Australians are living longer than ever before, almost half of the population is living with at least one chronic condition and this affects quality of life.[46] Chronic conditions remain the leading cause of morbidity and are linked to a range of lifestyle or risk factors including: obesity, insufficient physical activity, tobacco smoking, inadequate nutrition and alcohol use.[46]

The impact of chronic conditions upon the Australian health system is evident on consideration of the following statistics:

- In 2017-18 just under half (47.3%) of Australians had one or more chronic conditions, an increase from 2007-08 when two-fifths (42.2%) of people had one or more chronic conditions.
- The prevalence of chronic conditions increased with age, with four in five (80.0%) people aged 65 years and over having one or more chronic conditions.
- One in five Australians (20.1%) reported mental health and behavioural conditions, which was the most commonly reported chronic condition in 2017-18 for both males and females.[97]

One of the key infectious disease threats facing contemporary society is antibiotic resistance.[98] Resistant bacteria can spread readily between individuals and create significant harm, as well as

high health costs to treat. A significant contributor to the increasing number of resistant pathogens is inappropriate antibiotic use.[99]

Mental health was declared a National Health Priority Area by the Australian Government in 1996.[100] The 2014-15 National Health Survey reported that four million people, 17.5% of Australians, experienced a mental illness in that year.[101,102] As the number of Australians with mental illness increases, so too does the costs of mental health related services. In the 2013-14 financial year the AIHW estimated that $8billion AUD was spent on mental health service provision across Australia.[103] In addition, there are many hidden costs of mental illness for individuals, families and communities. The many hidden financial expenses incurred as a result of living with a mental illness, including loss of potential income, medication costs, housing, and carer fatigue, are not included in cost estimates.[104] Despite their value in providing cost-effective, quality mental health care, there is an undersupply of qualified mental health nurses in Australia. Indeed only some 7% of Australian nurses are working primarily in mental health[105] and whilst the nursing workforce grew by 15.4% between 2007 and 2014, the number of mental health nurses remained static.[106] If this current decline continues, by 2021 the number of nurses working predominately in mental health settings will be as low as 4.8%. This is clearly problematic given the projected increases in numbers of people experiencing mental illness.

4.2.3.3 Implications

An essential component in refocussing nursing education to prepare graduates to work with people with complex co-morbidities, is to embed a holistic person-centred approach to care for people which encompasses the integral interrelationship between physical and mental health. This includes the social context in which people live and their corresponding relationships with family, friends and carers and community networks.[107] A study by Anderson and Malone of the content of Australian undergraduate nursing degrees identified the various ways in which chronic care related material was covered in the curriculum.[51] They concluded that the evidence based *Chronic Care Model* and the WHO's *Innovative Care for Chronic Conditions Framework* could be used as teaching resources and this would strengthen the focus on chronic care in the curricula.[51]

The multiple co-morbidities associated with chronic disease demand increased skills in care coordination and the management of lifestyle risk reduction.[108] Effective care coordination is dependent on health system literacy shared between people with chronic disease and health professionals.[109] Patient-centred care, including empowering patients with chronic co-morbidities to become active in the self-management of health, requires nurses to be equipped with effective communication and problem solving skills.[110] Despite the importance of the nursing role in lifestyle risk factor reduction, there is limited evidence around the preparation of nurses and use of communication skills by nurses in this area.[111]

Notwithstanding the increasing need for nurses to work in primary and community health settings, nurses are still being prepared primarily to work in acute care settings.[112,113] Norful et al. conducted a systematic review that explored nursing roles and responsibilities within primary care teams.[114] The 18 included studies were drawn from six countries: Australia (8), the US (5), Canada (2), New Zealand (1), Spain (1) and South Africa (1). The composition of the primary care teams utilising RNs differed across the studies, however in all examples RNs were primarily responsible for clinical nursing care. RNs also undertook a significant role in the

management of chronic diseases, monitoring of risk factors and care coordination. There is also increasing potential for ENs in community settings for example, to take on additional tasks with appropriate training, such as catheter and gastrostomy care.[115] This is only likely to be effective, however, if there is clear role delineation between registered and enrolled nurses and models of teamwork to ensure that all nurses have a clear role in service delivery.[115]

There are limitations in the effectiveness of current undergraduate approaches to improve health promotion skills. A systematic review conducted by Fillingham et al. investigated the effectiveness of undergraduate nurse education on the subject of patient obesity.[116] Of the eight studies included, only one was a randomised control trial. The method of intervention varied, and the methodology was assessed as poor in all studies. Evidence regarding the content and, most importantly, the outcomes and effectiveness of training provided to undergraduate nurses regarding obesity was lacking.[116] Introducing health promotion concepts too early in nursing curricula, was found to be unsuccessful in facilitating students' effective integration of the theory and practice of health promotion.[117]

Nurses have an important role to play in antibiotic resistance in several ways. Firstly, through antimicrobial stewardship they have a role in decreasing the inappropriate use of antibiotics.[118] Nurses also play a key role in infection control and reducing the spread of infection.[119] Finally, nurses have a crucial role in educating the community about both inappropriate antibiotic use and infection control measures. All of these roles have implications for undergraduate nursing programs, in that they require nurses to have a fundamental understanding of the biology underpinning infectious disease, as well as antibiotic use and patient education principles.

In addition to specialist mental health nurses, nurses working in other clinical areas are increasingly being exposed to people with acute and ongoing mental illness and mental health issues.[95,120] This changing health need is emphasising the importance for all nurses to be prepared to work with people with mental health issues, regardless of the setting in which they are employed. Whilst specialist mental health nurses have advanced education and skills development to provide support for complex mental health issues, all nurses need to have basic mental health assessment and management skills.[120] Nurses also require a knowledge of referral pathways to ensure that people in the community get the kind of early assessment and intervention that improves outcomes. In their recent systematic review of randomised controlled trials of nurse-led interventions for mental health in primary care, Halcomb et al. found that primary care nurses can improve mental health symptoms amongst those with mental illness.[120] Although the review found only nine studies that had heterogeneous interventions and study populations, this evidence was promising and highlights the need for further robust trials to evaluate generalist nurse roles in mental illness.

The rising prevalence of mental illness internationally, the high burden that mental illness places on individuals, families and communities and the need for all health professionals to engage in mental health care, highlights that mental health education should be a priority in the undergraduate preparation of nurses. Having all nurses educated in mental health assessment, intervention and referral, as well as understanding the lived experience of living with mental illness, is important to both promote positive mental health and intervene early when crises arise.

4.2.4 Health system safety and quality

4.2.4.1 International context

The increasing complexity, pressured and fast-paced nature of health care delivery has created issues for patient safety internationally. Unsafe and poor quality health services lead to avoidable unintended consequences for patients including harm and death. Rates of adverse events, in particular medication errors, remain startlingly high, including in high income countries. For example, the third leading cause of death in the US is now medical errors.[121,122] Addressing health system failures by improving quality and safety, reducing unwarranted variation and promoting appropriate care is a priority issue.

Safety and quality of health care remains high on the political agenda in the UK.[123] There have been several government commissioned inquiries into failures in the National Health Service (NHS), such as the Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry.[124] The Francis Report highlighted the impact of insidious institutional cultures that lose sight of patient-centred care and also effectively silence staff.[124] The inquiry identified that national regulators and others in critical roles including professional bodies and the coroner failed to respond appropriately to high patient mortality rates and complaints from staff, friends and families, a most serious systemic failure.[124]

The investigation undertaken by Kirkup[125] into the maternity and neonatal services of the Morecambe Bay NHS reached similar conclusions to those of Francis.[124] System failures occurred at the clinical, organisational, and regulatory level.[125] A further example of systemic failure in the NHS is found in the Gosport War Memorial Hospital, exposed in the report of the Gosport Independent Panel.[126] High mortality rates were the result of the absence of a patient-centred care approach combined with misuse of medication by hospital staff. These errors were compounded by the organisation dismissing concerns raised by nursing staff. The reliability of clinical systems within the NHS, including information for outpatient clinics and prescribing for inpatients, was investigated by Burnett et al.[127] They found that 20% of failures in clinical system reliability were identified as possible risks to patient safety. Lack of feedback and standardisation of processes were common problems.[127]

Issues with quality and safety, evident in the US health system, were labelled by the Institute of Medicine as a 'quality chasm'.[128] That is, a gap between current health care and high quality and safe health care. The quality chasm has been attributed to the advancement of medical science and technology, increasing complexity of health care, a lack of integrated management of chronic diseases in older people, and fragmentation in complex health care delivery processes. The Institute of Medicine identified six key fundamental requirements for health system redesign, namely that the health system must be: safe, effective, patient-centred, timely, efficient, and equitable.[128]

4.2.4.2 National context

The Australian Commission on Safety and Quality in Health Care (ACSQHC) was established in 2006 to lead and co-ordinate national improvements in safety and quality in health care. Safety and quality have previously been identified as strategic priorities in the COAG agreement on public hospital funding and health reform.[129] The *Australian Safety and Quality Framework for Health Care* was endorsed by Australian Health Ministers in 2010. The Framework provides a

vision for quality and safety in Australian health services and pinpoints three essential principles: care is patient centred, information driven, and organised for safety.[130]

The ACSQHC has developed *National Safety and Quality Health Service Standards* to 'protect the public from harm and to improve the quality of health care'.[131] There are eight standards that provide a quality assurance framework to guide the health system, they make explicit the standard of care that is expected for consumers.[131] The ACSQHC recently released the *Third Australian Atlas of Health Care Variation.*[132] The Atlas series explore variation in health care use according to where people live and aims to reduce unwarranted variation, promote appropriate care with the goals of reducing harm and achieving the best outcomes for patients.[133] A *Patient Safety Competency Framework* has been developed within Australia to guide curriculum development for nursing students.[134]

4.2.4.3 Implications

In response to growing concerns regarding patient safety, a multi-professional patient safety curriculum guide was developed by the WHO.[135] This curriculum guide, is based on Australia's *National Patient Safety Education Framework* which, includes systems thinking, teamwork and communication as core components of a patient safety curriculum.[135]

In medical training the re-focussing of the curriculum is seen as an important lever in achieving system improvements and health reform.[136] The recommended competencies include: effective interdisciplinary teamwork; systems thinking including use of technology and data; reflecting on the cyclic nature of theory and practice to improve quality; understanding drivers of cost of care; working with informed patients and advocates; and preventative and population health interventions such as nutrition and exercise.[136]

For the NHS, an outcome of the Francis review was recognition of the importance of all health care staff having the courage and capacity to raise concerns about patient safety. This led to reforms to protect staff rights in the event of them reporting concerns about the quality of patient care.[137] In the UK the *Report of the Willis Commission on Nursing Education* recognised the evidence that associates a higher proportion of RNs in the skill mix with better patient care and confirmed the 'economic value of well qualified and effectively deployed nurses'.[23, p 43] The move to degree-level registration of all newly qualified nurses in England was seen as an essential step 'that brings England into line with the rest of the UK and much of Europe'.[23, p 43] Nursing education is needed that promotes a caring professional culture and produces nurses capable of reflective practice and critical judgement, with the practical skills required to provide high quality and safe patient-centred care.

Health system failures highlight the importance of nursing leadership in health policy and decision-making. *Nursing Now* refers to a three-year global campaign run collaboratively with the WHO and ICN. The establishment of this campaign arose from the findings of the All-Party Parliamentary Group on Global Health report 'Triple Impact'.[138] The report presents a cogent argument for the development of nursing and outlines the triple impact of nursing as: better health, greater gender equality and stronger economies. The report's first recommendation is to 'raise the profile of nursing and make it central to health policy'.[138, p 5]

4.3 Economic issues

In this section of the PESTEL analysis the implications for the future key skills and attributes of nurses is presented in an integrated fashion at the end of the section. This is because the skills and attributes discussed are relevant to the combination of issues around demand, supply, sustainably funded health systems and the commodification of health care.

4.3.1 Rising demand for health care

4.3.1.1 International context

The need for health care increases as populations expand and age. The rising demand for health care is reflected by increasing health care expenditure. Organisation for Economic Co-operation and Development (OECD) countries report their health expenditure as a proportion of the gross domestic product (GDP) to enable comparison to be made across member countries. Using this metric, in 2016, the average for all OECD countries was 9.0%. The US had highest expenditure on health care at 17.2%, Canada expended 10.6% of GDP on health care, while the UK 9.7%, New Zealand 9.2% and Australia 9.6%.[46]

In 2017, the global rate of population growth had slowed from 1.24% a decade earlier to 1.10%. The 2017 rate is equivalent to an additional 83 million people annually. The rate varies between regions, but is showing signs of reducing internationally. Population changes are primarily driven by fertility and survival rates. On a regional level, as fertility rates increasingly diminish, survival rates are increasing and populations age.[139]

4.3.1.2 National context

In 2015-16, Australia spent approximately $170 billion on health care. Health expenditure grew at a faster rate than that of the economy as a whole.[46]

Australia's population grew by 17% from 20.6 million in 2006-07 to 24.0 million in 2015-16 while 'total health expenditure (adjusted for inflation) grew by 50% over the same period'.[46, p 55] The Australian Bureau of Statistics (ABS) reported that the annual population growth rate in 2018 was 1.6%. Most of this population growth was from overseas migration (60.8%), with only 39.2% due to natural increase (the number of births minus the number of deaths).[97] This population expansion has fuelled the demand for health care and the consequent increase in health care spending.

The Australian population is ageing.[140] However, it is not necessarily true that ageing is directly correlated with higher health care expenditure.[141] Harris and Sharma found that the relationship depends on whether or not there are changes in morbidity.[142] They found that

> *If people live longer without additional morbidity, then total health expenditure only grows at an average annual rate of 0.48%. If only some of those additional years are in good health, then the average year on year growth is 1.87%.*[142, p 1]

These findings reflect the earlier discussion on compression of morbidity (refer to Section 4.2.3) and support ongoing investment in health promotion and disease prevention, chronic disease management and strategies to promote active ageing.

4.3.2 Supply of the nursing workforce

4.3.2.1 International context

Supply of health care is a response to demand pressures. The nursing workforce, is the largest component of the professional health workforce and the relentless increase in demand for health care has generated nursing workforce shortages internationally.[86,143-150] This is reflected in changes in labour market composition and expectations as work roles and models of care shift. Although on a per capita basis the UK has a relatively high number of nurses when compared to other countries, in recent times 83% of UK organisations surveyed report shortages of qualified nurses.[138] Because the increasing demand for nurses cannot be met by the UK's own workforce it has become the destination of migration of foreign nurses both from within and outside the European Union.[151]

The maldistribution of health workers arises because of better opportunities in terms of income, training, career progression, work environment, employment and access to services and amenities in certain locations. This is evidenced by nurses moving from poorer to richer countries and, within a country, with movements from rural to urban areas. The result is that many people who are most in need, are not able to access adequate health services. The international nursing workforce has been 'commodified' as nations with acute shortages compete for these resources (refer to Section 4.3.4). An understanding of the forces affecting supply and demand is a prerequisite for workforce planning and strategic workforce development. Diverse strategies have been used to address this issue including greater engagement of patients in self-care, better use of technology including telehealth, robotics and remote monitoring, changes to nursing roles and adjusting the nursing skill mix (creating lower skilled roles and expanding the scope of practice of others).[149,152-154]

4.3.2.2 National context

In terms of workforce shortages, Australia is no exception, as the supply of health care professionals has not kept up with demand. The drivers of health workforce shortage in Australia are manifold.[43,44,155-157] Significant increases in graduate numbers and an increasing reliance on overseas-trained health workers have not corrected the shortage in the nursing workforce.[43] The shortages are even more acute in rural and remote areas and in certain special needs sectors, such as aged care.[43,157,158]

Various solutions to the health workforce shortage have been suggested including for example, ongoing changes in the composition of the health workforce to respond to shifts within the population and a future health workforce that may need to undertake a different mix of tasks.[159] Consequently, managers need to think about different workforce configurations and education programs that provide an increased emphasis on inter-professional work and common foundation learning.

Ralph et al. argue that nursing has three options: continue without change, greatly increase the number of students, or redefine the nursing profession into one that is highly specialised.[17] The Council of Deans of Nursing and Midwifery Australia and New Zealand recognise the importance of improvements in workplace relations and conditions in retaining nurses and mitigating workforce shortages.[160] To address workforce shortages in a range of occupations the Victorian Government has recently announced the abolition of course fees for several programs provided through the vocational education and training sector including the Diploma of Nursing.[161]

Recruitment and retention of the rural health workforce remains challenging. The role of rural clinical placements in strengthening interest in rural health employment has been well documented.[162,163] One such initiative, the *Rural Health Professionals Program*, was implemented to increase access to primary health care services in rural and remote Australia. Within two years of the program's launch (in January 2012), 130 nurses had elected to work in rural and remote Australia.[156,157] The challenge is for these programs to sustainably grow the workforce across the professions.

4.3.3 Sustainably funded health systems

4.3.3.1 International context

The continuing rise in health care expenditure has made sustainably funded health care systems a priority for government. There are a range of fiscal policy levers that government uses to manage the economy. Approaches to managing health care spending are diverse, for example: managing unwarranted variation in health care,[133] strengthening evidence-based decision-making, supporting quality improvement, using activity-based funding (ABF) mechanisms and educating clinicians about health care costs. The concept of value-based health care delivery has emerged from the work of Porter.[164] Its goal is to utilise available resources through maximising the value or outcomes of care for the population as compared to the volume of care provided.[165] This approach aims to reduce 'waste' in health care. That is, avoid health care that was either unnecessary, harmful, led to preventable errors or was not medically indicated. A value-based health care approach aims to address these and other types of unwarranted variation[166] and is supported by 'health-systems thinking' (refer to Section 4.2.4).

4.3.3.2 National context

In Australia almost three quarters of health spending goes to hospitals (39%) and primary health care (35%).[167, p 38] While the State and Territory governments are responsible for acute hospital funding, the Australian Government funds the primary health care sector. This differentiation of responsibilities creates a number of tensions around how the health sectors work together that are beyond the scope of this review. The costs of hospital services have been closely monitored and the majority of hospital funding comes now from ABF. Under the ABF model, hospitals receive funding based on the number and mix of patients they treat. The ABF model includes minor funding components that are associated with the quality of care provided.[168]

Value-based health care has been on the agenda in several Australian states and territories, especially in NSW. The NSW *Leading Better Value Care Program* targets 13 clinical initiatives and aims to improve the 'Triple Aim' of outcomes, experience and cost.[169]

In the primary health care sector, funding is primarily based on a fee-for-service model under Medicare. The Australian Government provides the Medicare Benefits Schedule (MBS) for subsidised Medicare services and the Pharmaceutical Benefits Scheme (PBS) which lists all subsidised medicines. These subsidies have normally been indexed regularly. However, the Australian Government Department of Health has stopped the indexation for several years as a cost control measure.[170] In recent years, various incentive funding schemes have been provided to encourage growth of the primary care nursing workforce. This funding to support accredited

general practices to employ nurses has facilitated the growth of the general practice nurse workforce from some from 3,255 nurses in 2004 to over 12,700 nurses in 2015. Whilst the numbers of nurses working in these settings have increased exponentially, there has been limited emphasis on ensuring that they are working to the top of their scope of practice or in roles that optimise patient health outcomes and promote job satisfaction.[171] Therefore, despite this rapid increase in workforce size, it is estimated that there will be a shortfall of some 814 full-time general practice nurse positions by 2025. This has significant implications for nursing education.[172]

4.3.4 Commodification of health care

4.3.4.1 International context

Commodification is characterised:

> *…as the conversion of a service or an object into a product that can be bought and sold for profit, in a market place.*[173, p 301]

Aspects of commodification of health care can be observed in most Western countries. It is embedded in highly privatised systems, such as that in the US, where the provision of health care and the profit of providers are the two main goals of the system.[174] They are characterised by an approach to maximising economic growth through deregulation of economic markets,[175] where health care is seen as a marketable and tradable commodity. This is in contrast to conceptions that see health care as a basic right best supported by universal access to health care based on need. This creates clear tensions and perverse incentives, as the interests of for-profit providers are frequently not aligned with the needs of patients.

Managed care models are supposed to generate efficiencies and improve equity of access. For example, Health Care Homes were designed to provide better integrated care and improve coordination and collaboration between primary care providers and the community. In this model nurses have an important role to play as a co-ordinator of care, patient advocate and liaison between health care professionals. Health Care Networks are a form of integrated care intended to encompass different settings (hospital or primary care), different levels of specialisation (highly specialised through to more basic care) and types of networks (collaborative or cooperative).[176] While the nuances of implementation may vary, such models frequently rely on a tiered capitation funding model. The risk of commodification of health care is that it produces a product that is no longer relevant to the real needs of patients or society.

4.3.4.2 National context

In 2011, as part of the National Health Reform Agreement (NHRA) reached by COAG, the Independent Hospital Pricing Authority (IHPA) was established as an independent government agency. Since then, it has been the responsibility of IHPA to introduce a nationally consistent ABF system for public hospitals which will further improve efficiency and transparency in public hospitals across Australia.[168]

In 2017, an Australian Health Care Homes trial was announced. This trial is envisaged to include up to 65,000 eligible patients from around 200 general practices (or Aboriginal Community Controlled Health Services) across 10 Primary Health Networks (PHNs). The intention of a Health Care Home is to better coordinate comprehensive and flexible care for patients with chronic and complex conditions and keep them out of hospital and living healthier lives at

home. It is intended that payments to Health Care Homes be based on the needs of the patients and responsibility for meeting those demands would be solely in the hands of the Health Care Homes providers. Whilst the trial has encountered a range of challenges in terms of recruitment, the trial and its evaluation is ongoing.[177]

The international global nursing workforce shortage is perhaps the most obvious example of commodification. In Australia our dependence on international nurse recruitment,[156,157] is similar to the experience of other developed countries.[145,178] In the current environment of workforce shortage, countries compete in a marketised environment to gain their preferred nursing talent.

4.3.4.3 Implications

Economic forces have a huge effect on the provision of health care. Nurses form the largest proportion of the health workforce, and decisions they make can be instrumental in influencing the efficiency as well as the efficacy of their workplace. Indeed, a number of studies have provided evidence of the important role nurses play in driving value-based care. Nursing in many countries has shown impressive adaptive capacity and resilience in the face of constant changes in health care systems including resourcing and changing models of care. There is robust research demonstrating that gains in patient outcomes are associated with appropriate investments in nursing resources (See Section 4.7.2).[179-182]

Health economics engenders a way of thinking that encourages evaluation of costs and benefits when clinical decisions are made. It provides tools to tackle high and rising health care costs, scarcity of resources, and consequently the necessity of cost containment.[183] Rising health care expenditure is a driver for health care professionals to have stronger economic literacy and greater health systems thinking, understanding the relationship between access, quality and cost. At an educational level, the ANMAC has an expectation that nursing education will increasingly address the cost drivers of health care and this is reflected in the RN Accreditation Standards.[184]

Platt et al. developed a set of six competencies required by nurses to ensure they had a sufficient level of economic thinking.[183] These included: evaluating trade-offs when resources are scarce, marginal analysis, applying the concept of production function to increase productivity, applying cost-benefit analysis for optimal decision-making, health insurance and its effect on nursing practice, and interpreting tables and graphs. Some of these concepts are embedded in decision-making using principles of evidence-based practice, whereby the best evidence is combined with clinical expertise and community preferences. However, the degree to which health economics is incorporated into nursing curricula remains poorly evaluated.

4.4 Social issues

4.4.1 Population ageing

The two major demographic changes influencing health care that are discussed in this review include population expansion (refer to Section 4.3.1) and population ageing. The impact of ageing and the issues it generates for nursing education are outlined below.

4.4.1.1 International context

Ageing populations are an international phenomenon and the most significant demographic trend influencing health systems in the developed world. Population ageing is contributing to the increased demand for health care leading to nations reviewing the focus of health policy, expenditure, and service delivery.[185,186] The pace of population ageing is much faster than in the past. Common conditions in older age include hearing loss, cataracts and refractive errors, back and neck pain and osteoarthritis, chronic obstructive pulmonary disease, diabetes, depression, and dementia. Furthermore, as people age, they are more likely to experience several conditions at the same time, termed multi-morbidity.[186]

People over 60 years of age account for close to a quarter of the total global burden of disease predominantly because of the increase in non-communicable diseases.[84] Opportunities to reduce the impact of this trend will be missed unless structural barriers are addressed such as ageism and the inability of health systems globally to effectively meet the preventive health needs of older people.[187] *The Global Strategy and Action Plan on Ageing and Health* upholds good health as fundamental for quality of life for older people.[185] The Strategy is based on human rights principles, for example creating age-friendly environments and strengthening long term care.[185] As the population ages, there is increasing frailty amongst our oldest members of the community. Frailty is generally considered to involve age-related decline in reserve and function across multiple systems that places the individual at greater risk of stressors negatively impacting their health.[188] Those with frailty have poorer health outcomes and increased morbidity compared to other community members.[189]

Ageing is a primary risk factor for dementia. Dementia is a major cause of disability and dependency among older adults worldwide, having a significant impact not only on individuals but also on their carers, families, communities and societies. However, dementia is not an inevitable consequence of ageing.[190] In response to the growing incidence of dementia worldwide, WHO has developed a *Global Action Plan on the Public Health Response to Dementia 2017 – 2025*. The action plan covers several issues including: raising awareness, risk reduction, clinical support, carer support and information and research.[190]

4.4.1.2 National context

Australia is not immune from the pressures of ageing and dementia as the following data from the Australian Institute of Health and Welfare demonstrates:

- The number and proportion of older Australians is expected to continue to grow. By 2037, it is projected there will be 6.4 million older people in Australia (20% of the population).[191]
- In 2016, the leading cause of death for females was dementia and Alzheimer's disease, this was the third leading cause of death for males.[46, p 82]
- In 2018, an estimated 376,000 people in Australia had dementia. This figure is projected to grow to 550,000 by 2030.[46, p 138]

Dementia was recognised as a national health priority area in 2012.[49] The Australian Government Department of Health, with guidance from the Australian Health Ministers Advisory Council, has released the *National Framework for Action on Dementia 2015 – 2019*.[192]

Traditionally, older people are high users of the health system, with health costs higher for older age groups. Consequently population ageing may place unsustainable pressure on expenditure within the health system.[193] Concerns regarding the quality and sustainability of the aged care system have prompted numerous reviews into aged care most recently the establishment of the Royal Commission into Aged Care Quality and Safety.[194] In addition the Department of Health has presided over the development of *A Matter of Care – Australia's Aged Care Workforce Strategy*,[195] and the *Resource Utilisation and Classification Study* to determine the characteristics of residents that drive residential care costs, and use this information to inform the government's consideration of future reform options.[196]

4.4.1.3 Implications

The health and social care demands generated by the growing proportion of the world's population that is ageing, and associated rise in the numbers of people with dementia, is driving demand for efficiencies and improvements to ensure the health system remains sustainable. This is reflected internationally through the better integration of health and social care systems in the UK and re-focussing of health services around health promotion and better management of non-communicable diseases.[197-199] These trends are seen in other countries such as Canada[200] and New Zealand.[201]

It is imperative that undergraduate nurse education adequately prepares nurses to work with older people who have chronic and complex care needs and multiple co-morbidities, especially those living with dementia and their families.[202] This includes preparing nurses to work in what can be experienced as a challenging work context.[203] Raising awareness of issues facing older people and their carers, such as advanced care planning and shared decision-making, is also important.[204] The health system as a whole will need to grapple with how to improve care for frail older people and their families to ensure that it is person-centred, holistic and strength-based.[205] Appropriate management of these individuals requires person-centred assessment of the degree of frailty and the presence of support mechanisms to assist the frail older person. Consequently, nurses require broad assessment skills in a range of areas, including mobility, physical activity, nutritional intake and weight loss. This includes nurses having non-ageist attitudes and being empathic towards older people.[206]

4.4.2 Generational change

4.4.2.1 International context

Generational changes are also occurring internationally in the health care workforce and are necessitating adjustments in workforce numbers, workforce roles and models of care.[138] In nursing, there are now four different generations in the workforce who all bring diverse values, expectations and perspectives to the workplace.[207] Further, each generation brings varied communication styles and ways of working and learning which present challenges for both tertiary institutions and health care organisations. There is an imperative to recruit and retain across these generations to ensure skill mix and workforce growth.[207-210]

It is broadly acknowledged that different generations have differing attitudes to work and that this can create tension in the workplace.[207] This tension can interfere with the transfer of knowledge between generations. This is likely to become a more significant issue within the next 15 years as the large population cohort of Baby Boomers leave the workforce. In order to enhance organisational culture, such differences need to be embraced and utilised to optimise recruitment and retention of the workforce.[211] In order to facilitate communication and knowledge exchange between generations the American Hospital Association Committee on Performance Improvement[207] recommends utilising 'cuspers' who are people born on the cusp of two generations and are likely to understand and relate to both groups.

4.4.2.2 National context

In Australia, nurses from the Baby Boomer generation are likely to retire between 2015 and 2025.[212] As this generation makes up a large proportion of the nursing workforce, the 'en masse' retirement will contribute substantially to the projected nursing shortfall. According to the most recent formal prediction, the national nursing workforce in Australia will confront a serious shortfall in the next five to ten years.[157] Apart from the shortfall in nursing numbers, the impact of their retirement has far reaching implications related to the loss of expertise in nursing leadership, advanced practice knowledge and education.[213]

4.4.2.3 Implications

Tertiary institutions are required to navigate the challenges posed by different generations in the classroom.[214] Teaching multiple generations at once requires an understanding of the values each generation holds, as well as flexibility and diversity in teaching and learning strategies. For example, Millennials and Generation Z are arguably more technologically savvy than previous generations and therefore should be encouraged to use technology to enhance their health care knowledge.[215,216] Skills and knowledge around using technology however, should not be assumed based on individuals' demographics. All nurses need to ensure that they build on the kinds of technological literacy required in their workplace, beyond that which they use in their personal lives. Therefore, it is essential that educators have the ability to adapt to multiple teaching and learning styles, as students' learning is enhanced when teaching methods are well-aligned with their particular learning styles.[214] However, large cohorts and generational mix makes such individualised attention complex.

In contrast to the Baby Boomer and Generation X populations, Generations Y and Z learners have been raised in times where information is readily available online. This has resulted in generations that are able to thrive in the context of web-based self-directed learning.[214,216] As technology further advances, it is inevitable that there will be shifts in the way future generations learn and their expectations of learning environments. This will be a key influencer of future nursing education. There is increasing popularity of online modes of nursing education (refer to Section 6.3.5) with contemporary teaching and learning methods incorporating e-learning and social media to enhance students' learning.[216] Consideration needs to be given, however, to the fact that often nurse academics may be in a different generation to the one that they are predominately educating. This creates some differences in the understanding and use of technology between educators and learners. It emphasises the need to ensure that academics are well prepared in terms of educational skills and teaching philosophies that are sufficiently agile to align to a range of learners.

Regardless of intergenerational differences, nurses have a professional and ethical responsibility to communicate effectively for the purpose of knowledge transfer. Additional

education related to the strengths and similarities of the various generations, and enhanced skills in communication may facilitate intergenerational knowledge transfer in the clinical health setting.[207]

4.4.3 Internationalisation

4.4.3.1 International context

The term 'internationalisation' refers to an entity's response to globalisation.[178] The internationalisation of the nursing workforce has occurred due to the international migration of nurses in response to workforce shortages. Organisations such as the ICN and WHO monitor international recruitment and migration of nurses to inform policy debates about these issues.[217,218] There is particular concern about increased migration of health professionals from developing countries to more affluent nations.[178] This movement of health workers has profound impacts on developing countries and developed nations are adopting voluntary ethical codes to ensure the ethical recruitment of health workers.[219] Other consequences of the establishment of the international workforce market [220] have previously been discussed (refer to Section 4.3.4). The trend in nurse mobility and migration requires nations and health care organisations to improve their understanding of the employment, integration, assimilation, and regulation of an international nursing workforce.[221]

Two further issues arising from internationalisation include the increasing number of health professionals who recognise that the experience of working internationally can broaden their skills, knowledge and cultural competence. Secondly, the mobility of people generally and health care professional roles particularly, has generated competition for international students in many developed countries.[222] This has led to the growth of off-shore training programs as well as innovative programs for learning exchange.[223]

4.4.3.2 National context

Despite Australia's geographic distance from the rest of the world internationalisation has already impacted health care delivery in this country. This is partly driven by the wider recognition of many health professions that health issues need to be considered in a global context. In recent years approximately 6,000 international nurses were issued with work visas in Australia. The contribution of these nurses to the Australian health system is important as many brought 'significant experience, specialist skills and a willingness to work in non-acute sector settings and/or rural and remote practice'.[156, p 26] However, it has also brought challenges, in terms of English language proficiency, integration of cultural groups into the workplace and the transferability of clinical skills.

Australian universities have an increasing reliance on the recruitment of international students. Indeed, in the 2017/18 financial year, international students injected some $31.9 billion into Australia's economy.[224]

4.4.3.3 Implications

At the undergraduate level, nurses may question the relevance of learning about internationalisation and global health issues when they plan to practice in Australia. These issues may become more relevant if they are framed in the context of their future roles in inter-professional or multidisciplinary teams, or in terms of the relationship between the social

determinants of health and positive and negative impacts of globalisation.[225] Health care facilities today present a culturally diverse mix of both staff and patients. Consequently nurses are expected to care for people with wide-ranging 'illnesses, conditions, treatments and interventions that relate to nursing'.[225, p 60] Nurses working in the Australian health system will need to work effectively with colleagues from other cultures who will have had different training experiences, to deliver safe patient-centred care. The importance of cross-cultural understanding, encompassing cultural sensitivity and cultural safety is critical to establishing effective inter-professional teams.[178] The contribution of internationally educated nurses to enhancing cross-cultural competence within their workplaces should also be recognised.[226]

The internationalisation of medical and nursing education is occurring through the development of global consortia[223] and cross border curriculum partnerships are growing fast in medical education:

> *…in which the curriculum that has been developed by one institution (the home institution) crosses borders and is implemented in another institution (the host institution).*[227, p 514]

Medical educators have identified several concerns about the effectiveness and appropriateness of this new form of internationalisation and identified factors that can support sustainable and effective partnerships.[227] Both medical and nursing curricula must become internationally relevant[178,228] and ideally produce graduates with skills and attributes that are portable across institutions, settings of care and potentially nations.

4.4.4 Consumer engagement in health care

4.4.4.1 International context

The greater engagement of consumers in health care has been hastened by the increasing access to web-based health information and growth in virtual networks and communities where consumers can explore common health interests. Additionally, the growth of wearable sensors and cheaper costs of personal monitoring devices have provided consumers and patients with an accessible means of self-monitoring and active involvement in self-care.

These technological developments have occurred at a time when there are changing patient expectations about consumer involvement in health care and greater interest in shared decision-making, particularly by the Baby Boomer generation.[229,230]

Patient engagement is defined as:

> *…the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a health care provider or institution, for the purposes of maximizing outcomes or improving experiences of care.*[231, p 30]

Accepted domains of patient centred care are 'respect, emotional support, physical comfort, information and communication, continuity and transition, care coordination, involvement of family and carers, and access to care'.[130, p 7] Measuring patient experience and outcomes as well as patient satisfaction is essential for improving patient engagement.[130]

Patient, or consumer, engagement is now recognised internationally as an essential component of health care quality and safety.[128,232] Engaging patients enables them to make informed decisions about their health care.[233] A lack of consumer engagement and patient-centred care was identified as a key factor in the failure of the UK NHS to provide safe and quality care to patients (refer to Section 4.2.4).[124-126] However, this heightened engagement in health care is not being experienced equally. Factors that may deter patients from being willing participants in their own care include: poor health literacy, the severity and nature of health conditions, opposing stance of health professionals, and contexts of care.[233]

4.4.4.2 National context

Australians' engagement in health care reflects similar patterns to that observed internationally, with many stakeholders having an interest in and promoting the active engagement of patients in their own health care as well as contributing to an improved health system. For example, the Consumers Health Forum of Australia, the national peak body representing Australian health care consumers, exists to achieve safe, quality, timely health care for all Australians, and advocates strongly for increased consumer engagement.[234]

The work of several health care agencies and organisations has been crucial in advancing patient engagement in this country. The Australian Commission on Safety and Quality in Health Care (ACSQHC), is an Australian Government agency that leads and coordinates national improvements in safety and quality in health care.[130] The *Australian Charter of Healthcare Rights* highlights consumers' right to be included in decisions and choices about care.[235] The ACSQHC has also been important in supporting developments in the use of patient reported outcome measures (PROMs) and patient reported experience measures (PREMs). PROMs and PREMs are instruments used to measure outcomes and experiences of care from the patient's perspective, and provide a mechanism to support shared decision-making and patient-centred care, as well as an understanding of variation in clinical practice.[236]

4.4.4.3 Implications

An interesting trend that has emerged is patient engagement in education of health care professionals. This has been reported particularly in relation to mental health care where patients or consumers with mental illness are informing the development of nursing curriculum.[237] Additionally, within the Recovery Camp clinical experience, undergraduate health students participate in therapeutic recreation with consumers with mental illness. Exposing students to consumers in a real-life setting has a profound impact on their learning and appreciation of mental health in the community. In various chronic illnesses, consumers are actively involved in educating health professionals about their lived experience.[238]

It is perhaps stating the obvious that undergraduate nurses in particular need to develop effective communication skills. Communication is at the heart of an effective nurse-patient relationship. Skills in listening and displaying empathy are also essential to facilitate shared decision-making. This can be challenging to do in practice.[230]

The emergence of PROMs and PREMs has implications for nursing education. In fact,

> *…nurses are consistently seen as being the most appropriate practitioners to lead on PROMs due to their positive attitude to using and acquiring health related quality of life data.*[239, p 8]

Students need an awareness of the variety of purposes for which these instruments are being used, and to understand and determine the type of PROM most suitable for use with their patient group.

4.4.5 Workplace aggression

4.4.5.1 International context

Workplace aggression is increasing against health care professionals who are exposed to a high level of direct contact with the public.[240] Nursing staff and other health care workers are subjected to workplace violence frequently, and in various verbal and physical forms, with verbal being the most prolific.[241] Workplace violence is an international issue and has been escalating in North America, Europe and Australia since the late 1990s and is now considered to be a significant occupational health issue.[240-244] In the US it is regarded as a serious workplace threat with nurses assaulted more often than police officers or prison guards.[245] The psychological and emotional consequences of being a victim of workplace violence in the health sector and impact on work functioning has been comprehensively outlined.[246]

Amongst emergency department nurses workplace aggression is extremely high with up to 100% of staff verbally assaulted and over 80% physically assaulted.[241] Illicit drug use is blamed for many incidents of aggression in emergency departments.[240,241] Nursing staff in aged care facilities also report high incidences of workplace aggression, particularly in dementia units.[241] The incidents of aggression against nursing staff are often associated with long wait times, lack of information, crowding, receiving bad news, stress, and poor coping skills.[245]

Bullying and incivility within the nursing workforce are also common occurrences.[247,248] With the majority of the nursing workforce being female, discrimination and gender inequality in the workplace remain significant challenges in the health sector.[249] Among nursing students in the US, incivility has been reported to be increasing within student to faculty and faculty to student interactions, which has the potential for long term psychological effects.[250] Bullying in the workplace impacts upon job satisfaction, morale, and health and well-being of employees. In turn, nursing practice and patient safety is compromised and the delivery of high quality health care threatened.[245,249]

4.4.5.2 National context

In Australia workplace aggression against health workers is significant, with both doctors,[244] nurses[251] and paramedics[242] frequently experiencing aggression, including verbal and physical abuse. A cross-sectional survey of 94 wards in 21 hospitals across two Australian states found that nurses perceived patients and families were responsible for most 'physical assaults' and 'emotional abuse'.[251, p 17]

Workplace violence and aggression significantly impacts nurses' job satisfaction.[251] Additionally, workforce bullying is considered a serious health and safety hazard that nursing staff have a right to be protected against.[252] Workplace bullying is defined in the Australian College of Nursing (ACN) Position Statement as:

> *…repeated and unreasonable behaviour directed towards a worker or a group of workers that creates a risk to health and safety.*[253, p 1]

Nurses who experience bullying and those who witness this negative behaviour may be affected by psychological stress, lowered self-confidence and self-esteem, anxiety and depression. In extreme circumstances bullying can lead to post-traumatic stress disorder and suicidality.[253] The emotional distress caused by being exposed to bullying impacts performance in the workplace and threatens the delivery of high quality and safe care by undermining positive practice environments. It disrupts effective teamwork and communication and affects organisations as a whole with lowered staff morale and motivation, increased absenteeism and staff turn-over, which undermine organisational culture and productivity.[248,253]

Some groups of the nursing workforce are known to be particularly vulnerable including those integrating into the workforce, undergraduate students, newly registered nurses and overseas qualified nurses.[34,254,255] Nurse education therefore, needs to incorporate strategies for building resilience and managing these complex issues that nurses face in the workplace.

4.4.5.3 Implications

The risks from workplace aggression towards nursing staff can be mitigated through the development of effective communication and de-escalation skills and knowledge about the context of use. This includes training and education programs for all levels of nursing staff in recognising signs of impending violence, and in verbal and non-verbal de-escalation skills that may reduce workplace aggression.[256] A high level of 'collegial awareness' has been reported to strengthen the resilience of nurses to respond to the potentially negative impacts of workplace violence.[243] When nurses' convey a caring and respectful demeanour and have a sound understanding of violence prevention strategies they are better able to recognise, assess and respond to incidents.[256]

Working environments should be conducive to reporting incidents of workplace aggression.[241] This includes facilitating confidential and effective incident reporting procedures and mechanisms that protect and support staff, and embedding resilience strategies in nursing curricula.[245,257] Increased resilience has been demonstrated to positively impact nursing staff,[258] however resilience training strategies for nursing students is sparse, often limited by weak methodological quality and is under-researched.[257] Effective conflict resolution skills and communication is required to prevent loss of nursing students and nurse faculty due to incivility.[250]

4.5 Technological issues

4.5.1 Telehealth and mobile technology

4.5.1.1 International context

The world of health care is increasingly a technology-centric environment rapidly changing the way health professionals work and consequently the educational needs of all categories of health professionals.[42] Several of the trends identified are current, for example telehealth, telemedicine and telepresence are already influencing practice. Telehealth is defined as:

> *The use of telecommunication techniques for the purpose of providing telemedicine, medical education, and health education over a distance.*[259, p 1]

Telehealth is used in rural and remote areas by doctors, nurses and allied health professionals.[260] Telehealth (or telenursing specifically) is expanding the profession's scope and capabilities of care, and has been incorporated into many aspects of nursing activity.[261] Remote interaction with patients can now be used for consultation, assessment, surveillance, treatment, or patient education. Telenursing increases access to health care for patients by removing distance as a barrier, and has been shown to improve patient outcomes and reduce health care costs.[262] Even though telehealth is an established mode of delivery, as technology advances so too do its clinical applications. Telepresence enhances and extends the skills of a human operator. The health professional may be based some distance away but is able to provide care as if the patient is directly in front of them.[263] This model is already in use in aged care and chronic disease management.[264] Telepresence is at the intersection with other technological advancements, including artificial intelligence and robotics (discussed further in Section 4.5.3) and simulation (addressed in the literature review for Topic 3 Clinical skill development).

Mobile technology is a progressively important factor influencing health care delivery. Mobile health (or mHealth) is facilitated through smartphones, tablets, gaming consoles, wearables, and mobile apps. A recent systematic review of 23 systematic reviews included 371 studies conducted in diverse countries and settings and examined the impact of mHealth interventions. There is an increasing use of mHealth primarily as a communication, monitoring and education tool with patients. mHealth has been used as an aid to improve access to care and to assist with treatment adherence in chronic disease management.[265] Mobile technology has spawned multiple smartphone apps now commonly used in health promotion to influence health behaviour change. Patients' self-management of chronic conditions can be aided via SMS reminders to undertake specific self-care tasks.[266] Mobile apps enable patients to digitally take their own measurements and regularly report these back to health professionals.[264] While there is obvious utility in the use of mobile technology the evidence base relating to these apps and their impact on health outcomes needs to be strengthened, with evaluations of these type of mobile interventions requiring greater rigour.[266-268] For health professionals, mobile technology is used to support clinical decision-making through point-of-care testing and provides nurses and other members of the health care team with immediate access to clinical and pharmacological information resources. It is expected that new indications will emerge for these technologies in the coming years.[26,269]

4.5.1.2 National context

In Australia telehealth is already providing access to specialised care in remote locations. Research into remote health service delivery 'has been extensively studied in various at-home, primary care and hospital based settings for more than twenty years'.[270, p 1-2] Technology's capacity as an efficient connecting interface between clinician and consumer is foundational to the partnerships required to enhance the accessibility and effectiveness of health care throughout Australia. The Australian Government's *National Digital Health Strategy* identifies telehealth as a priority health reform and a digital health solution that can improve access to health care, particularly in rural and remote Australia.[47,271] In rural and remote settings the potential benefits of this model of care include: reduced hospitalisations and patient transport costs, and shorter waiting lists. In the Northern Territory, increased attendance rates at doctor appointments and decreased accommodation and travelling expenses for patients have been reported.[271] Consistent with technological developments internationally, telepresence services are now also being used in Australia.[264] A key challenge in the rollout of this technology in Australia is the funding of services provided via telehealth as opposed to face-to-face consultations. In this way funding models need to keep pace with emerging trends to support innovation in care delivery.

The rollout of the National Broadband Network (NBN) in Australia aims to increase the use of and access to both telehealth and mHealth.[272] The CSIRO National NBN Telehealth Trial has recently examined the impact of home telemonitoring of vital signs for the management of diverse groups of chronically ill patients. Several encouraging findings for patients in the test arm of the trial are reported, including considerable reductions in predicted rates of medical expenditure, pharmaceutical expenditure, unscheduled admission to hospital, length of stay, and in mortality.[270] Benefits associated with using telehealth to deliver care to Aboriginal and Torres Strait Islander peoples have been outlined in a recent systematic review.[273] Improved social and emotional wellbeing, clinical outcomes, access to health services, reduced travel and improved screening rates were reported by authors of included studies. In addition, Aboriginal and Torres Strait Islander peoples expressed positive perceptions of their telehealth interaction, and no adverse outcomes were reported. The benefits of telehealth for rural, regional or remote Australians has also been demonstrated more broadly.[274] The reported benefits to health professionals included increased professional development opportunities and support from specialists.

4.5.1.3 Implications

The importance of incorporating technology into learning theory in curriculum development has been widely identified.[275] Nurses should be cognisant of the way technological trends impact on patients' interactions with their own health care and their engagement with health professionals. Australia's geography presents real opportunities for telehealth and telepresence and it will become a more common model of care into the future. The incorporation of telehealth theory and practice into the undergraduate nursing curriculum is crucial. Fronczek and Rouhana suggest that in addition to professional competence in telehealth technology, nurses also have a role in learning how to support patients' transition from more traditional models of care.[261] Incorporation of telehealth technologies into learning, for example via patient simulation, is needed to allow students to be exposed to and practice with this technology, before having to use it in their clinical practice.[262]

Mobile digital education (or mLearning), is a type of digital education increasingly used in both undergraduate and postgraduate education of health professionals. mLearning in this context is conceptualised as:

> *…any intervention using handheld, mobile devices connected through wireless connections to deliver educational content to pre and post-registration health professionals in order to extend the reach of learning and teaching beyond physical space and distance.*[276, p 2]

A recent systematic review that included 25 randomised control trials and four cluster randomised controlled trials found mLearning to be at least as, or possibly more, effective than traditional learning.[276] In nursing education specifically, the integration of mobile devices into undergraduate and graduate nursing curricula is well underway. Doyle et al. identified 52 studies on the topic.[277] While the evidence was limited, mLearning in nursing education appeared to benefit students.[277] The impact of mobile technology on learning outcomes in undergraduate nursing has been found to produce inconsistent results in improvement of knowledge and clinical skills, however student satisfaction and preference for these methods over traditional teaching methods was identified.[26] Mobile technology supports nursing students during clinical training, particularly through the immediate access it provides to evidence-based information which enhances knowledge and skills and improves practice at the point of care. However, sociotechnical barriers to implementation of the technology have been identified that need to be addressed.[269] Mobile technology and telehealth must contribute to improved patient care without causing detriment to the patient–nurse relationship.[277] Finally, increased guidance is required for nurses on how to ensure patient safety in health care interactions conducted using these technologies.[278]

4.5.2 Big data

4.5.2.1 International context

Although there are currently numerous definitions of 'big data' due to the emerging nature of the concept, Gartner's 'three Vs' definition is often used:

> *… high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision-making, and process automation.*[279, p 1]

More recently, two additional dimensions of big data are referred to, constituting the 'five Vs' definition: veracity (the characteristics of quality in the data) and value (the ability to obtain insights from the data and repurpose data for multiple uses).[280]

Closely associated with the concept of big data is data science and data analytics. Data science is a multidisciplinary field which aims to find actionable insights from large sets of raw data, it is used in machine learning and AI. Data analytics focuses on data mining and statistical analysis of large existing data sets to support evidence-based decision-making and solve specific problems.[281] Predictive modelling is already used to predict risk factors for hospitalisation or readmission and medication prescribing patterns.[280] The power of data is a fundamental force driving health care transformation[282] with significant implications for the nursing profession.[283] Big data and data science can provide rich insights into patient phenomena and assist with tailoring personalised interventional strategies.[284]

In health care, an important development in the area of big data and data science is the transition from paper-based health information systems to electronic health record (EHR) systems. This change has enabled longitudinal collection of individuals' electronic health information across health providers. When combined with data analytics, big data can provide: immediate electronic access to individual and population-level information, knowledge and decision support to enhance patient care, and support for more efficient processes for health care delivery.[285] Much of the data health professionals enter into EHRs cannot be used in big data analysis as these entries are not in a standardised format and thus not interoperable.[286,287] One larger problem with EHR systems experienced in the US is that they do not share data as they are stand alone, proprietary, and may be built on a billing platform and not a clinical service platform.[288,289] Efforts to standardise clinical terminologies, such as those by the International Health Terminology Standards Development Organisation (trading as SNOMED International), are crucial to realising the potential big data offers.[290] In addition to EHR systems, other important digital sources of big data include clinical registries, administrative datasets, genomic databanks and the data from wearable sensors that are used by patients to monitor their disease. Using advanced computer programs these data sets can now be analysed to reveal health patterns, trends and associations that were previously indiscernible using conventional analytic methods.[291] Despite the strong interest a recent systematic review found a lack of consensus about the operational definition of big data in health care and a paucity of information on evidence of real-world use of big data analytics in health care.[292]

4.5.2.2 National context

A report examining how Australia can use big data to improve health care highlights several areas of opportunity. Specifically, it is seen that big data can:

- improve the value of health care
- assist to prioritise high value health care
- identify low value health care
- help to prioritise MBS and PBS items
- improve pharmaceutical research and development
- develop personalised and targeted health care
- improve population health measures.[293]

The way big data can improve the value of health care is through facilitating the comparative effectiveness of interventions. It supports an outcomes-based approach where decisions about diagnostic tests and treatment are informed by 'data intelligence' so the most 'clinically relevant' and 'cost-effective' options are taken in the treatment of patients.[293, p 22]

The Australian Government implemented the *National Digital Health Strategy*, with a goal of delivering the benefits of digitally enabled health and care for the community.[271] The strategy includes the delivery of a national *Personally Controlled Electronic Health Record* system, *My Health Record,* which enables personal health information to be stored in a single record accessible to all authorised health care providers. There have been public concerns about data privacy within the community, which may limit the use of *My Health Record* and reduce treating practitioners' access to these data.[291] Six Nurse Champions have been appointed by the

Australian Digital Health Agency, in collaboration with the ACN, to drive engagement of nurses with the *My Health Record* and support nurses to use it in practice.[294] The Australian Government Department of Health has developed a *Framework to Guide the Secondary use of My Health Record system data*.[295]

4.5.2.3 Implications

The potential of big data in health care will only be maximised with increased data literacy and technological knowledge amongst health professionals. Specialty roles are already evolving in data analytics and related areas to ensure management, analysis and interpretation of complex data can be undertaken.[282] To obtain meaningful insights and valuable information from big data, these specialty roles will need to work in combination with other health care professionals who understand the context of health care delivery to effectively interpret the findings.[292] The nursing profession should understand the differences between big data and other electronic data sets (in particular the five Vs mentioned previously), become accustomed to new ways of thinking and working that have resulted from big data and data science, and understand the potential benefits big data offers and how to contribute (for example, asking and answering relevant questions that can result in improvements in clinical research, practice and health service delivery).[296, p 2921]

While clearly not all nurses need to be prepared as data scientists, data science should be used to inform nursing practice and research. There is scope to integrate data science concepts in the design of nursing curricula at the undergraduate and postgraduate levels, with referral to courses from supporting disciplines such as computer science and statistics as guided by students' learning needs.[284] However nurses need to understand the concepts and language of data scientists in order to contribute to this transdisciplinary field. They have a role in ensuring nursing research priorities are addressed[297] and that findings are disseminated amongst both patients and health care professionals.[296, p 2922] Nurses are well-placed to bring attention to ethical and legal issues relating to data use. In their recent literature review on the use of big data in nursing research Westra et al. reflected on whether nursing education is adequately preparing nurses to engage with big data and data science and if nurse academics are appropriately skilled to teach this content.[280] Nurses already in practice should be offered ongoing educational opportunities to enhance their information technology skills.[298]

4.5.3 Robotics and artificial intelligence

4.5.3.1 International context

The use of robotics in health care delivery is already evident.[299] Applications for robotics include laboratory and pharmacy automation, surgery or surgical assistance, medication administration, conducting assessments and providing assistance for the elderly or individuals with disabilities in performing daily activities of living. The integration of robotics into health care settings is predicted to rise because of their advancing technological capability, broadening applications and increasing pressures to reduce costs.[300] Robots are defined as 'physically embodied systems capable of enacting physical change in the world'.[301, p 68] This 'change' occurs through either the movement of the robot or the movement of objects in the environment.

> *Robotics involves the integration of information input with physical action…There is considerable overlap between robotics and AI. The degree of autonomy of a robot, that is the degree to which a robot requires human input, is directly related to its integration with AI.*[263, p 5]

Developments in AI will impact increasingly upon nursing practice in the future. Artificial intelligence is explained as follows:

> *Artificial intelligence describes the work processes of machines that would require intelligence if performed by humans…There are two kinds of artificial intelligence: weak artificial intelligence, the computer is merely an instrument for investigating cognitive processes – the computer simulates intelligence; strong artificial intelligence: the processes in the computer are intellectual, self-learning processes.*[302, p 10]

Put simply, AI is the effort to make machines think and act like humans (generating references to 'machine learning'). This occurs through teaching computers to recognise images and sounds, and then make decisions based on them. AI is based on underlying mathematical algorithms that process large volumes of data to assist with decision-making, they are seen as a way to increase efficiency.[303] While robots and AI can exist independently of each other, it is their integrated use that offers most promise for the health care sector. A recent scoping review surmises that the increased use of robots in nursing has been in part due to shortages in qualified nurses and increases in the aged population worldwide.[299] Robots are seen as a technological solution to address the need for help in caregiving, especially for the elderly and individuals living with disabilities. The two main categories of robots used in nursing are assistive robots (used for physical care, including service and monitoring tasks) and social assistive robots (used to provide emotional and cognitive care for patients in need).[299] Robotics also has the potential to positively contribute to nursing care, with robots taking on mechanised tasks and repetitive motions.[304]

There has been a mistaken notion that AI will replace human clinicians altogether. Conversely, the integration of AI and robotics is expected to create more opportunities for the workforce generally to engage in different forms of work.[302,305] The four main areas where AI appears likely to have the most influence include: patient administration, clinical decision support, patient monitoring and health care interventions.[306]

4.5.3.2 National context

In Australia, health care robots are already being used in clinical practice. Studies in aged care have examined the use of social assistive robots[307-309] and robots that provide entertainment, communication and health-monitoring functions.[310] The areas where robotics could benefit health care in Australia are broad for example diagnostic systems, in the form of robots that guide diagnostic equipment outside the human body or guide the body relative to a diagnostic instrument, automated vital signs monitoring and automated machines for blood taking, remote or tele-remote medicine to provide 'remote ward rounds' and in health care education to provide more realistic simulation-based teaching methodologies.[311]

The acceptability of robots to patients and health professionals, is an important issue for consideration. Australian evidence has shown nurses and health care services respond more positively to health care robots than patients, specifically elderly patients.[310] This is not surprising given that nurses are continuously adapting to technological changes, whilst the current aged population grew up without technology.

4.5.3.3 Implications

The potential impact of the increasing role of robots and AI in health care is challenging for the health care workforce.[312] A mixed methods systematic literature review highlights the potential for robots to decrease the workload on professional caregivers.[313] However, it is imperative that nurses and other health professionals are engaged in discussion about the potential contribution of robots and their impact not only on nursing care but also on future professional roles of health professionals.[312] A mixed methods systematic literature review highlights the potential for robots to decrease the workload on professional caregivers.[313]

To facilitate the adoption of this technology, it is recommended that the nursing profession build relationships with those with the requisite technical expertise. This will result in improved design and a collaborative approach to the integration of technology and patient care, as well as education of nurses in the technology.[314] There will be an ongoing need to integrate information about the application of robots and AI in the pre-registration and continuing education of nurses, and health professionals more broadly. Nursing education can be reframed to enhance the incorporation of technology and machine learning in the curriculum as a tool in health care.[315]

A fundamental step to equip the nurse of the future for more advanced technological developments such as robotics and AI is to build digital and information literacy. Many countries already have guidelines or standards to inform undergraduate curriculum development in nursing informatics, most recently New Zealand,[316] but also in Australia,[317] the US[318] and Canada.[319] The UK based Royal College of Nursing has recently undertaken a consultation process to review the digital capabilities required for 21st century nursing.[320] It is working with Health Education England to improve digital capabilities in six domains:

- Information, data and media literacies
- Teaching, learning and self-development
- Communication, collaboration and participation
- Technical proficiency
- Creation, innovation and scholarship
- Person-centred digital literacy.[321]

4.5.4 Human genomics and precision medicine

4.5.4.1 International context

The first human genome sequence was completed in 2003.[322] This discovery stimulated international interest in how diseases are linked to genes and gene sequences. These advances provided an opportunity for national health services to promulgate the benefits of genetics and more personalised treatments.[323] The distinction between genetics and genomics is important.

> *Genetics is the study of heredity and variation…Genomics is the study of the structure and function of the genome, including the interaction between genes and the environment.*[324, p 407]

Developments in genomics have allowed the study of genetic variation on a larger scale. For example:

> *…genome sequencing is increasingly being used to assess genetic contributions to complex diseases, where multiple gene variants may be involved in disease development and progression.*[325, p 18]

Genomic health care is a broad concept that involves the use of genomic information and technologies in health promotion, disease prevention and diagnostic and treatment approaches.[326,327] Genomics is used to not only predict the risk of rare diseases but increasingly common conditions such as diabetes, cancer and heart disease.[328,329] Genomic advances are also providing an understanding of individual response to drugs and optimal dosages.[330] These developments are changing clinical practice and spurring the growth of precision medicine which uses analyses of a patient's genetic makeup to inform patient and clinical decision-making and allows for the targeting of treatments based on the patient's specific needs.[331] For example, genomic information can be used to identify the specific mutations of a tumour and corresponding drug sensitivities thus guiding clinicians in the optimal ways to treat patients.[325] A greater precision in the identification of these risks results in savings for the patient and health care system, primarily through preventing adverse reactions and unnecessary treatments.[325,331]

While clinical geneticists and genetic counsellors have traditionally provided this specialised care,[332] genomic technologies are increasingly being integrated into mainstream health care practice. However, limited knowledge and awareness of the applications of genomics among health professionals poses an impediment.[327,333] It is suggested that 'health professionals will increasingly be asked to communicate and manage the results from genomic testing'.[332, p 28] Mainstream health care professionals will need to work closely with specialised genetics services.[334] This mainstreaming of genomics has implications for two groups of health care professionals 'non-genetic' medical professionals (specialists and GPs) and nurses.[333]

A knowledge of genomics and how it may improve patient care is increasingly seen to be relevant to the competencies for nurses.[324,328,335,336] The International Society of Nurses in Genetics aims to foster the development of nurses in genetics and genomics in relation to education, research and professional practice. The Global Genomics Nursing Alliance was established in 2017 to accelerate integration of genomics into everyday nursing practice.[337] In the UK the Genomics Education Program, funded by the NHS, provides training to different groups of health care professionals including upskilling existing staff so they are better equipped to incorporate genomic technologies in their work.[338]

4.5.4.2 National context

In Australia, those working clinically in genomics practice are classified as clinical geneticists (medical specialists) or genetic counsellors. However, a 2017 study conducted by Australian Genomics (also referred to as the Australian Genomics Health Alliance) for the Australasian Society of Genetic Counsellors found that only two-thirds of individuals with a genetic counselling qualification work with patients.[339] A comparison of current genomics practice with preferred future practice identified scope for increased genomics practice for genetic counsellors working clinically.[339] Genetic counsellors practicing in Australia come from diverse backgrounds with, for example, undergraduate qualifications in nursing, science or social work.[340]

There are arguments to accelerate the implementation of genomic medicine globally with developed countries such as Australia contributing to this process through its national genomic medicine initiatives.[334] The Australian Genomics Health Alliance[341] is leading the integration of genomic medicine into health care across Australia and sees successful implementation of clinical genomics dependent on the involvement of multidisciplinary teams.[342] They have recently released a technical report based on interviews with 32 education providers that addresses expectations for the future genomics health care workforce.[343] In addition to continued 'business as usual' training for genetic specialists, emphasis now appears to be on the educational needs of other health professionals. The role for non-genetic health care professionals working in routine health care in future genomic practice is topical.[329,336,339]

4.5.4.3 Implications

The genomics health care workforce includes laboratory scientists, clinical pathologists, bioinformaticians, clinical geneticists, genetic counsellors, and non-genetics health care professionals. This workforce requires genomics literacy and expertise across: '(i) clinical gatekeeping (ordering and interpreting genomic tests, including clinical utility), and (ii) counselling and consent'.[344, p 6]

A recent systematic literature review addressed aspects of genetics/genomics education for non-genetic health professionals, including nurses.[33] This review included 44 studies and found that nearly all studies reported some improvements in knowledge, skills, attitudes, intention, self-efficacy, comfort level or practice following the intervention. However, the poor quality of included studies makes it difficult to draw conclusions about the specific aspects that made programs successful. Another Australian Genomics project is in train to develop a program logic model and evaluation framework for genomics education to support evidence-based best practice.[345]

Camak undertook a literature review to assess the incorporation of genetics in nursing practice.[346] A key finding of this review was that 'practicing nurses exhibit deficiencies in genetic and genomic knowledge and skills'.[346, p 88] Nurses' current practice of genetic counselling was examined in an integrative review reported by Barr et al.[29] Despite its utility for response to emerging health problems at any life stage, genetic counselling was frequently associated with preconception, prenatal testing and newborn screening. The review concluded that nurses can make a significant contribution to supporting those affected by genetic problems through their role as front-line health professionals whose clinical practice is based upon a philosophy of person-centred care. However, most undergraduate nursing degrees do not prepare graduates for this role.[29]

A competency framework is seen as a critical precursor to integration of genetics/genomics into nurse education and practice.[324] The available evidence suggests that nurses internationally feel unprepared to support patients at risk of a genetic condition or their family members. Competencies have been developed for both specialist and generalist medical practitioners as has a competency framework for nurse education in the UK, both using a consensus-building approach.[324,336,347] The lack of structured input regarding genetics in nursing curricula is thought to be partially attributable to a lack of confidence in a generation of nurse educators who 'were trained in the era when genetics was considered a specialism involving rare diseases'.[348, p 401]

Advances in human genomics,[33] the prevalence of disability[29] and the high proportion of primary care patients who have a condition with a genetic basis[348,349] are generating increased

interest in education and training in this area for nurses. Awareness of the potential for genetic influence on disease will arguably support prevention, early detection or the treatment of common conditions, such as cancer or heart disease. There is a role for and corresponding educational need to support nurses and non-genetic health care professionals to be engaged in genomic health care.[350]

4.5.5 Social media

4.5.5.1 International context

Health information is becoming increasingly accessible with more than 3.2 billion people worldwide having access to the internet.[351] Social media is used by patients to gather health information, explore options and to share and rate experiences.[352] In the US, over 80% of the population seek health information online and approximately 12,000 hospitals use social media to engage with patients.[352]

Social media is driving increased patient involvement in health care through virtual communities and information networks. Social media health information sources include patient blogs, microblogging (e.g. Twitter), social networking (e.g. Facebook; Twitter), video and file sharing sites or apps (e.g. YouTube), or health related apps (e.g. symptom tracking, food / exercise diary), support group websites and websites of medical organisations and health professionals.[351,352] Online social networking sites provide a novel mechanism for providing health information to consumers and health professionals.[298]

The use of the internet for searching health-related information anecdotally is commonly referred to as 'Dr Google' with the majority of users being young, highly educated females.[351] Patients search the internet for online answers to symptoms but also to prepare for consultations. Prior online searching is not necessarily seen as a threat by health care professionals in that it can potentially lead to a better mutual understanding of symptoms and diagnoses and can contribute in a positive way to the consultation.[351] The effect of using social media for health information seeking on the perceptions and behaviour of patients has not been well researched.[351] However limited research has been carried out on the benefits of social media in improving patient care.[352] Challenges of using social media as a source of health information include the risk of misinformation. Little is known about the quality of information from social media sources, or how much of it is evidence-based.[352]

4.5.5.2 National context

Australians are some of the most active social media users in the world with approximately 60% of the population active on Facebook. It is anticipated that by 2020 the NBN broadband access network will service eight million homes and businesses across Australia.[353] As at 30 June 2018, there were approximately 27 million mobile handset subscribers and 14.7 million internet subscribers in Australia.[354] The 'digital divide' in Australia refers to the digital inequality arising from differential access to the internet and is reflected by age, geography, education and income.[355] For example, households in major cities are more likely to have internet access at home (88%) than those in remote or very remote parts of Australia (77%). Nearly all (99%) households with children under 15 used a mobile or smart phone to access the internet. The lowest proportion of internet users (55%) comes from the older age group (65 years and over). The proportion of internet users accessing the internet for health services or health research

has increased from 22% of internet users in 2014-15 to 46% in 2016-17.[356] There is significant scope to increase the use of online health resources by older people,[355] particularly given their acceptance of this technology in some trials.[357]

Many health professionals have embraced mobile technology and social media in their professional lives. Professional conferences routinely establish a hashtag and live Twitter feed as participants share opinions and observations about content presented. The virtual networking function has made it easy for multidisciplinary and discipline specific groups to form virtual communities of practice. In the future it is anticipated that nurses will integrate social media into all phases of the nursing process, 'assessing, diagnosing, planning, implementing and evaluating care'.[358, p 123] Social media is already being incorporated into consumer education programs through blogs or the use of medication reminders via private messaging on Facebook. The capacity to use this technology for diagnostic collaboration through access to high quality evidence-based information is already occurring. Casella et al. provide an interesting example of the application of social media to patient assessment through content sharing as follows:

> *Content sharing could also be used in the assessing phase and applied, for example, to wound healing assessment. Clients could use devices like smart phones to film their wounds being re-dressed at home and upload the footage to a private content sharing site. A nurse could assess the client's wound-dressing techniques and the wound itself.*[358, p 124]

4.5.5.3 Implications

Social media can be used as a mechanism to promote health programs and services. When utilised appropriately it can reduce errors and system inefficiencies (e.g. SMS message prompts to patients and health professionals). It can increase access to timely and credible health information and function as an educational strategy communicating short messages speedily to global audiences. It can also be used as a mechanism for sharing the contributions of nursing with the public and to strengthen the image of nursing globally.[359] Social media can be a powerful tool for rapidly communicating, educating and influencing and has significant potential to highlight the contribution of the nursing profession.

Social media can help nursing staff stay abreast of recent health care developments, to enrich practice and to dialogue with the professional community and the public. It is essential that standards, policies and guidelines and regulations regarding the use of social media are regularly updated and keep pace with technical advances.[359] It is important that social media is used appropriately and professionally, with nursing staff adhering to codes of conduct governing social media use. Personal and professional use of social media should be kept separate and patient confidentiality and data security maintained at all times.[359]

Australian research on social media has demonstrated that social media platforms such as Facebook are important tools by which nursing students can engage in peer learning and build self-efficacy. This can potentially impact on students' decisions to remain in nursing programs.[360,361] It is an expectation that nursing graduates are able to comfortably use information systems, however preparing nurses for the technological contexts in which they will work does not feature in many curricula. Nurse academics, both in practice and education, will be essential in leading a successful technological evolution for nursing.

4.6 Environmental issues

4.6.1 Climate change

4.6.1.1 International context

The major environmental trend influencing health care in the future arises from the impact of climate change upon the social and environmental determinants of health including clean air, safe drinking water, sufficient food and secure shelter.[362] Climate change is considered by many as the most significant global challenge of the 21st century.[363]

The effects of climate change arguably pose the biggest threat to human health in the coming decades,[364,365] impacting the health of all populations,[366] exacerbating existing health problems and increasing health inequalities.[367,368] In addition to more commonly acknowledged effects of climate change on human health such as extreme heat, air pollution and infectious diseases, effects such as lack of clean water and food resources have also been identified.[369] More recently the impact of climate change upon mental health has been discussed.[369,370] The WHO has drawn attention to the unique vulnerability of Small Island Developing States.[362] Ministers of Health from Pacific Island countries recognise the risks of climate change, they identify lack of funding as a barrier to preparing for and managing associated health risks.

The essential role of nurses in reducing and responding to the health consequences of climate change has been informed by input from the American Academy of Nursing Expert Panel on Environmental and Public Health.[371] Specifically, there is a need for policies that address upstream opportunities, focusing on pollution prevention and promotion of sustainable practices, as well as downstream needs focusing on climate adaptation and response. It is these downstream needs that involve preparation of the nursing workforce to address the health consequences of climate change. This will occur through developing curricula and increasing the knowledge and skills of nurses to effectively address health impacts.[372]

4.6.1.2 National context

Australia is not immune to the environmental impact of climate change.[370] There has been an increased interest in research related to preparing health professionals and health services for climate change in recent years.[373-375] The fifth biennial *State of the Climate* report released by the CSIRO and Australian Government identifies how climate change affects Australians, particularly the changes associated with increases in the frequency or intensity of heat events, fire weather and drought.[376] Zhang et al. provide a detailed assessment of the health effects of climate change in the Australian context and note that:

> *Several health outcomes are known to be directly (e.g., heat and severe storms) or indirectly (e.g., vector-borne disease and mental health) associated with climate.*[370, p 474]

The impact of prolonged drought and natural disasters on rural communities has implications for health care delivery now and in the future. Analysis of a 2007 survey of 8,000 people living in rural and regional areas of Australia found that drought has negative mental health impacts, particularly for farmers, farm workers and their families.[377]

The Australian Rural Mental Health Study is a longitudinal cohort study (2007-2013) that analysed data relating to localities in non-metropolitan NSW. It assessed personal drought-related stress, community drought-related stress and general psychological distress. The results showed that farmers in NSW experience significant stress about the effects of drought on themselves, their families and their communities. The role of nurses in influencing the health of rural communities was not discussed, however, medical practitioners in rural communities were identified as being able to contribute to initiatives that address mental health in rural areas.[378] An earlier study, conducted in rural NSW, found Mental Health First Aid training for rural support workers and community volunteers has the potential to be an effective part of a strategy of mental health support in rural communities.[379]

In addition, Australia's position as a developed country within the South Pacific has implications because of the likelihood of Pacific neighbours requiring assistance to deal with the effects of climate change, such as the impact of rising sea levels and increasing risk of inundation on vulnerable communities.[376]

4.6.1.3 Implications

The role of nurses in climate change and health and the integration of environmental health (including consideration for climate change) into nursing education, and health professional education is evident in the academic literature.[369,371,372] A recent scoping review referred to the nursing professions' responsibility in addressing the effects of climate change, outlining opportunities for nurses to become actively involved, for example through policy, advocacy, research, and practice opportunities.[380] Various curricular frameworks for integrating climate change content, the role of nursing in disaster preparedness, and prevention of climate change-related illness have been published.[381] There are for example, guides for design and development of sustainable health care curriculum teaching materials and courses for health professionals, prioritising curriculum on climate change.[382]

Leading nursing professional organisations, associations and federations recognise climate change as an issue affecting nursing and they believe they have an important role in mitigation against, and adaption to the impacts of, climate change. The ICN recommend that national nursing associations collaborate with their respective governments to embed sustainability in nursing practice and integrate climate change-related knowledge into undergraduate nursing curricula and continuing education.[383,384] The ICN has released subsequent position statements detailing nurses' roles in disaster risk reduction, response and recovery.[384] This statement supports education and training of nurses in this area, guided by their *Framework of Disaster Nursing Competencies* and encourages educational programs to incorporate disaster risk reduction, response and recovery according to local needs.[384]

The ACN has recommended that climate and health education is embedded in nursing education programs.[385] It identifies that climate change has direct impacts (e.g. heat waves), health consequences from changes to ecosystems and biological processes (e.g. mosquito-borne infections) and health consequences of populations who are disrupted or displaced.

The integration of climate change content into the nursing curriculum, via the use of an ecological framework, is required in both basic and advanced nursing education.[371] The nursing workforce of the future must understand environmental impacts upon population health and engage in ways to increase adaptive capacity to lessen the health risks and impacts of natural disasters. This will be particularly important for nurses working in rural communities as will

appropriate skills in recognising the impacts of natural disasters and prolonged extreme weather events on the mental health of rural communities.

Disaster preparedness education may be particularly important considering results from a recent systematic review by Labrague et al. which found that:

> *…it is widely reported that nurses are insufficiently prepared and do not feel confident responding effectively to disasters.*[386, p 41]

In the Australian context, disaster education within nursing has been found to be ad hoc with 'no disaster education in the undergraduate nursing curriculum'.[28, p 65] Nurses will be integral to Australian responses to catastrophic events or crises both at home and abroad. Despite the need for greater disaster preparedness content in nursing curriculum, the lack of research in this area makes it difficult to identify the specific competencies, roles, and functions for development.[28] Nonetheless, the broad ranging health consequences of climate change and the potential role of nurses in responding to these effects and in helping build resilience, should be taken into account when considering the development of future nursing education programs.

4.7 Legal and regulatory issues

4.7.1 Nurses' scope of practice

4.7.1.1 International context

There are several challenges relating to nurses' scope of practice, these include: the capacity of nurses to work to their full scope of practice; the contribution of lesser skilled roles such as nursing support roles or care assistants to the care team (in Australia these positions would be aligned to the assistant nursing role and not the EN), and the potential for nursing role extension (usually referring to designated advanced nursing practice roles such as the NP).

Scope of practice issues are closely linked to the legal and regulatory framework of the country in which practice occurs.[86] Regulation must be able to adapt to allow the development of new roles.[387] There is heightened interest internationally in the scope of practice issue for several reasons. In some countries it is seen as a strategy to assist with workforce shortages in both nursing and other disciplines.[387] This view is often fuelled by an economic imperative which is driving strategies to substitute RN roles with various combinations of lower skilled personnel. In other locations 'scope of practice' is framed as a nursing leadership issue, as advanced nursing roles are perceived to be essential to moving the profession forward,[208] particularly in the development of nursing specialties. In the UK the Nursing and Midwifery Council (NMC) is reviewing its approach to education, training and quality assurance of its regulatory processes. This is in part a response to the changing requirements for nurses, particularly the increasing complexity of their roles and requirement to practice in different care settings. Standards for RNs and nursing associates have already been reviewed.[388] Post-registration standards will shortly be considered.

There is widespread agreement internationally about the appropriateness of promoting nurses to work to their full scope of practice and developing career pathways that accommodate and support practice enhancement.[30,245] However, the All-Party Parliamentary Group on Global Health reported that internationally:

> *…nurses report that they are frequently not permitted to practise to the full extent of their competence; are unable to share their learning; and have too few opportunities to develop leadership, occupy leadership roles and influence wider policy.*[138, p 4]

In 2015, the American Nurses Association established a professional issues panel on barriers to RNs' scope of practice. Standardised educational preparation of RNs at the baccalaureate of science in nursing level is deemed an essential first step. In addition RNs must be accountable for their ongoing learning and educational progression.[389] The American Association of Nurse Practitioners reported that as of 20 December 2018 there were 22 states and four territories with full practice authority, 16 states and two territories have reduced authority and the remaining 12 states have restricted practice.[390]

In the UK new roles such as the nursing associate role have been developed as a link between health care assistants and graduate RNs. The role of the state EN was phased out from the late 1980s.[391]

The nursing associate role is regulated by the Nursing and Midwifery Council. The aim of the role is to:

- Support the progression of care assistants;
- Increase the supply of nurses; and
- Enable nurses to undertake more advanced roles.[392, p 1]

As a relatively new initiative, however, there is no evidence about its contribution to the workforce or impact on the quality of care provided. It will be some time until an evaluation provides evidence of this.

The increasing demand for home care, limited availability of personnel to deliver care and pressures to manage the costs of care is resulting in aspects of patient care being provided by lesser skilled roles. This phenomenon is referred to as task-shifting, with the implication being that work is shifting from the RN to non-registered roles. There are many titles used to describe these roles including for example, that of nursing assistant and unregulated care provider. Referring particularly to Canada, the authors note that:

> *Unregulated care providers are not licensed or regulated by a professional or regulatory body, and significant variation in the educational preparation and expectations of these providers persist both nationally and internationally.*[393, p 783]

The contribution of lesser skilled roles in home care was explored through a scoping review of the role of unregulated care providers that assessed the patient care activities provided by these personnel.[393] The review included 28 papers, most qualitative, and conducted in Canada (11), Sweden (5), Belgium (2), UK (5), US (4) or New Zealand (1). The review found that as well as providing personal care and assistance with activities of daily living, untrained workers provide care beyond their training, including activities previously provided by nurses. Whilst such shifting of tasks may assist in relieving nurses of work that does not require their skill level, having untrained workers providing care they are not prepared for has significant implications for patient safety.

These lesser skilled roles make an important contribution to patient care when they are part of an integrated care team and appropriately supervised.[394] There is evidence that substituting the RN workforce with lesser skilled nursing roles may not be cost-efficient when considering the lower mortality rates comparative to settings where patients were cared for by non-baccalaureate educated nurses.[179]

An interesting development has occurred in the UK with Health Education England, NHS Improvement and NHS England developing a new *National Framework for Multi-Professional Advanced Clinical Practice*. Advanced clinical practitioners have diverse backgrounds comprising nursing, pharmacy, paramedics and occupational therapy. This framework is applicable to all settings and subject areas, it provides a national definition, core capabilities and standards of education and aims to provide role clarity and consistency amongst diverse stakeholders including employers.[395] This development has generated debate including the need for the UK Nursing and Midwifery Council to regulate advanced practice.[396]

4.7.1.2 National context

In Australia nursing is predominantly provided by ENs and RNs, with a much smaller number of NPs. There are multiple constraints upon nurses' capacity to work to their full scope of practice

including role ambiguity, funding models and the attitudes of medical colleagues.[397] There may be scope to reduce the environmental and system impediments to this.[398]

An integrative review of 20 primary and 9 secondary sources about the RN scope of practice in Australia identified that there is confusion and uncertainty about the term 'scope of practice'. This has limited the responsiveness of the profession to changing health needs and health system developments.[30] The authors identified 'four foundational themes relating to RNs' scope of practice in Australia' which related to the elusiveness of the concept, relationship with context, issues of boundaries and advanced practice.[30, p 525] A conclusion from this review was the importance of the profession led development of a scope of practice for the RN.[30, p 540] Australia has trialled expanded or extended scopes of practice for post-registration nurses in several domains, for example in endoscopy nursing. There have also been trials of extended care paramedics and the use of extended care physiotherapists in Emergency Department settings. The main requirements for successful implementation of these extended care roles included for example, a receptive context for change and the availability of staff with the necessary training and skills.[399,400]

4.7.1.3 Implications

Collaborative effort between professional organisations, health system funders, regulators and educational providers may be the first step in ensuring nurses work to their full scope of practice. The work carried out by the UK General Medical Council and the Nursing and Midwifery Council 'has effectively established common standards for education across nursing and medical education with profession specific variation where required'.[387, p 159]

There are economic pressures to use lesser skilled care roles as they are perceived to be lower cost than more skilled workers. However, whilst wage costs may be lower, this may be balanced by greater costs in terms of care quality and subsequent mortality.[179] Additionally, untrained workers require training and education as well as appropriate ongoing supervision. Registered health professionals could better support unregulated care workers to take on added skills, particularly in the home care environment, with access to standardised guidelines.[393] These guidelines should include information about the expectations for nurses who work with unregistered care professionals, activities that are outside their scope of practice (controlled acts and exceptions), teaching, delegating, assigning and supervising.[394]

4.7.2 Safe staffing

4.7.2.1 International context

There is an established body of evidence about the association between the number and qualifications of nursing staff and patient outcomes.[182,401] Despite the higher costs of a workforce consisting of baccalaureate educated RNs this is still the most cost efficient option based on lower mortality rates comparative to settings where patients were cared for by non-baccalaureate educated nurses.[180] However legislation mandating nurse-patient ratios has not been adopted consistently and is not widespread. Paulsen sums up the current body of published research in this area and reports on another key barrier:

> *Collectively, the results of these studies support having a nursing workforce with higher levels of experience, education, and certification to produce safer patient care, but they don't tell us how much is the right amount or allow for causal conclusions, leaving plenty of room for future research.*[401, p 44]

Nursing workload is influenced by individual patient factors, the complexity of patient care requirements, the context in which nursing work is undertaken and the skill mix of the available staff. These issues are complex and may not be accounted for by mandated minimum patient-staff ratios. Nurse-patient ratios do not always consider skill mix in the allocation of numbers of nurses per patient when calculating the minimum nurse-patient ratio. Likewise, the complexity of patient care needs are also not considered. To make matters even more complex, some legislation and guidelines mandate a minimum nurse to patient ratio and others discuss minimum amounts of nursing hours per patient day.

Mandated nurse-to-patient ratios were first legislated in California (US) in 1999 and came into full effect in 2004.[402] The Californian legislation mandated the numbers of Licensed Nurses in Californian hospitals with nursing hours per patient day increasing to a mean of 6.9 hours per day.[403] It is important to note, however, that not all Licensed Nurses in the US have a baccalaureate education, with substantial numbers being trained at diploma level. Nurse staffing regulations have been subsequently established in 14 US states plus the District of Columbia since 1999.[403] The Welsh Government is determining safe staffing levels by measuring patient acuity, monitoring quality of care indicators and using clinical judgement.[404] The 'Welsh Levels of Care' tool was developed to assess patient acuity and is based upon the 'Safer Nursing Care Tool'.[405] In April 2018, the legislation came fully into force along with a commitment to extend the Act into additional settings by the end of the current Welsh Assembly term.[406]

Research suggests that mandating minimum nurse staffing levels can have unintended consequences. This includes dilution of skill mix if less qualified staff are substituted for RNs to comply with the required minimum staffing levels which in turn can lead to poorer patient outcomes.[182] Another consequence is that nurses can be required to work longer hours and there is increased overtime. Increasing the working hours of existing staff can also have significant impacts on patient outcomes with research indicating that longer shift lengths and overtime can lead to nursing care being left undone and poorer ratings of the quality of care.[407] Ensuring that there are enough staff with sufficient qualifications to provide care therefore becomes the crucial challenge.[408]

4.7.2.2 National context

There have been several studies and reviews exploring the association between nurse staffing and patient outcomes in Australia over the last two decades.[409-412] As a result of these studies and international evidence, most Australian jurisdictions have introduced (or plan to introduce) some form of mandated nurse-patient ratios.

A recent summary of evidence was prepared by the Department of Parliamentary Services, Parliament of Victoria.[413] The Western Australian Government introduced regulations to govern the minimum number of nursing hours per patient day in public hospitals in Western Australia in 2002. This regulation categorised wards into seven different types and set out different levels of staffing required in each unit.[413] The Victorian Government was the first jurisdiction in Australia (and second in the world) to legislate minimum nurse-to-patient ratios via the *Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Act 2015*. Subsequently the Victorian Government introduced the *Safe Patient Care (Nurse to Patient and Midwife to Patient Ratios) Amendment Bill 2018* with the aim of improving minimum nurse and midwife to patient ratios in public health services over five phases commencing in 2019. The Queensland

Government enacted legislative change to ensure safe nurse-to-patient ratios in acute medical and surgical wards in prescribed Queensland public health services from 1 July 2016. An independent evaluation of the impact of minimum nurse-to-patient ratios is being undertaken.[414] NSW has implemented minimum nurse-patient ratios via the industrial award for public hospitals. This includes calculation of nursing hours per patient day as a tool to calculate nursing hours per patient day ratios based on type of ward and hospital classification.[413] Most of this legislation, however, applies only to acute public hospitals. Therefore, settings such as residential care, primary and community care are not included in the legislation.

4.7.2.3 Implications

Safe staffing and its relationship to mandated nurse-patient ratios has two significant implications for nursing education in the future. Firstly, there is a need for enough staff with the right qualifications to provide the nursing care required. Additionally, the nurse of the future will need to better understand how the interplay of staffing and skill mix contribute to the quality and safety of patient care. This includes a capacity to use reliable and valid tools or resources to assess and establish safe staffing levels.

Investments in nursing will improve patient outcomes[410] and to achieve this the number and skill mix of staff caring for patients must be considered. Aiken et al. have provided evidence that increasing a nurse's workload in an inpatient ward by one patient, leads to a seven percent increase in mortality within 30 days of admission.[179] Increasing the number of baccalaureate prepared nurses by 10 percent, results in an 11 percent decrease in the odds of death.[415] This evidence tells us that effective mandated nurse-patient ratios must also consider the skill mix of staff.

Nurses of the future require an understanding of patient acuity measures, information about skill mix and scope of practice of unregulated nursing positions such as Assistants in Nursing, and of regulated positions such as ENs, RNs and NPs. In addition, they require knowledge of nursing-sensitive patient indicators so that nurses possess the knowledge and skills they need to evaluate the outcomes of the care they provide.[416]

4.7.3 Expanded access to medicinal cannabis

4.7.3.1 International context

Cannabis contains a variety of compounds (cannabinoids) and has historically been used medicinally in several cultures [417]. Increasingly governments around the world are legalising medical or medicinal cannabis for particular indications and patient groups.[418]

There is as yet relatively limited evidence to support the wide use of cannabinoids.[419] There is increasing interest in conducting new research however, these studies may not produce new evidence and information in the short term.[420] A systematic review investigating the benefits and adverse events of cannabinoids across a broad range of conditions, included 79 randomised controlled trials (with 6,462 participants). The majority of the studies focused on nausea and vomiting due to chemotherapy or chronic pain, and spasticity due to multiple sclerosis and paraplegia. Whilst there were significant limitations in study quality, there was moderate-quality evidence to support the use of cannabinoids for treatment of chronic pain and spasticity, but low-quality evidence in the other four patient categories investigated.[419]

There is also limited evidence about public opinion towards medicinal cannabis policy however, internationally public support for medical cannabis legalisation is significant (noting the distinction from legalisation of cannabis for recreational use), and this view has influenced national policy in several countries including 31 US jurisdictions, Canada, the Netherlands, Israel, and several European countries.[417,418] In response to these changes in policy and legislation, governments from various jurisdictions and organisations representing health care professionals have issued guidelines and advice for health professionals.[245,421] These guidelines provide both therapeutic information and address legal and regulatory issues for those caring for patients who request and/or use cannabis for medical purposes.

4.7.3.2 National context

Cannabis remains illegal for non-medicinal or recreational use. In Australia, despite the use of medicinal cannabis being authorised at a Commonwealth level in 2016, there continue to be difficulties in access for patients. Amendments to the federal *Narcotics Drug Act 1967 (Commonwealth)* were passed 'to allow controlled cultivation of cannabis for medicinal or scientific purposes through a single national licensing scheme'.[422, p 371] Subsequently legislative changes occurred to allow a patient with a prescription 'to use a medicinal cannabinoid manufactured from legally cultivated cannabis plants in Australia'.[422, p 371] Within Australia community attitudes show increasing support for the use of medicinal cannabis as well as an increasing number of Australians supporting decriminalisation.[423]

The Therapeutic Goods Administration has released *Guidance for the use of medicinal cannabis in Australia – Overview* to assist health professionals and patients with Australia's legislation.[424] Medicinal cannabis products are not listed on the Pharmaceutical Benefits Scheme and any associated costs of treatment must be met by the patient or a third party.

There has been public interest in the role of medicinal cannabis in cancer care generally and palliative care in particular. The Palliative Care Clinical Studies Collaborative has introduced the RAPID quality improvement program to monitor the prospective use of medications and non-pharmacological interventions in palliative care.[425] This includes prospective monitoring of patients prescribed cannabis who are receiving palliative care through an outcomes focused study to capture the benefits and adverse effects for patients.

4.7.3.3 Implications

The increased interest in the use of medicinal cannabis generates regulatory and educational issues for nurses. For example, there are several legal and regulatory considerations for nurses that relate to their respective scopes of practice. These are illustrated in Canada and encompass the issuing of medical documents to patients that permit the lawful use of cannabis; permission to administer cannabis (with nuances in the legislation between what a NP as opposed to RN may do) and risk management issues (primarily the knowledge and competency of the NP to authorise use).[421] In addition nurses must be aware of the legislation (potentially both federal and state or provincial) that applies to medicinal cannabis particularly what is permitted as opposed to prohibited. A nurse must also be aware of the position of the professional regulatory body that oversights their registration and practice as well as the policies of their employer. In Canada a nurse practitioner can be 'permitted to prescribe dried marijuana in the province in which they practise'.[421, p 1] In the US if a patient meets the requirements to use medicinal cannabis the health care provider issues an 'authorisation for

use' rather than a prescription. The patient is responsible for using this authorisation to procure the medicinal product[426] In some jurisdictions the nurse may assist the patient administering the cannabis.[245]

The ANMF has recently produced a position statement on medicinal cannabis use. This statement notes:

> *Nurses and midwives should be aware of, and informed about, the underpinning legislation relevant to their state or territory which covers the appropriate use of medicinal cannabis for the treatment and management of medical conditions.*[427, p 1]

The other pressing issue for nurses relates to education. The introduction of medicinal cannabis requires an educational and not just a regulatory framework. There are many different varieties of cannabinoids and each has its own pharmacological actions and therapeutic effects. Nurses need to understand the therapeutic roles of cannabinoids and potential adverse effects.

4.7.4 Misuse of prescription opioids

4.7.4.1 International context

Opioid misuse of both prescription and illicit drugs is a significant problem across the world. Access to effective pain management is a human right however, internationally misuse of opioids is increasing. Prescription opioid pain relievers are among the most commonly misused and abused medicines resulting in increased morbidity and mortality.[428,429] In North America, Australia and New Zealand, their illicit use outpaces that of heroin.[430] The US ranks first in its consumption of prescription opioid analgesics, while Canada ranks first for per capita consumption of oxycodone.[431] In the US there has been a 200 percent increase in deaths resulting from overdose due to opioid and heroin use between 2000 and 2014.[428] Approximately 1,000 emergency department visits per day in the US are associated with misuse.[432]

Opioid addiction and substance abuse can affect anyone regardless of age, occupation, economic circumstances, ethnicity, or gender.[432] However, it is evidenced that the prevalence of drug overdose deaths and opioid prescriptions occur more frequently in rural areas and among people with lower socio-economic status.[428] Opioid abuse results in substantial treatment costs, decreased workplace performance, and adverse impacts on families and communities.[433] Opioid diversion (the buying, selling or passing on of drugs outside their prescribed use) is also reported to be a significant problem.[429,431]

4.7.4.2 National context

Opioids have an essential role in the management of severe acute pain, however prescription opioid misuse is on the rise. Levels of prescription opioid overdose, including accidental overdose are at record levels in Australia and internationally.[434] Opioid prescribing in Australia increasing by 30% between 2009 and 2014. According to Roxburgh et al.:

> *In 2016, there were 1,045 opioid-induced deaths among Australians aged 15-64 years (6.6 per 100,000 people) compared to 1,083 in 2015 (6.9 per 100,000 people). This represents an increase over the last 10 years from 3.8 per 100,000 people in 2007, although lower than rates recorded in the late 1990s…The majority (85%, n=890) of deaths in 2016 were considered accidental.*[435, p 1]

In Australian general practice, oxycodone is now the seventh leading drug prescribed.[436] Oxycodone (in various dosages) is listed on the PBS with prescribing rights for medical practitioners and NPs endorsed to prescribe under state or territory legislation as PBS prescribers.[437] One of the reasons for this increase in use has been significant 'indication creep' which may not be evidence-based:

> *For example, a major driver of increases in opioid prescriptions in Australia in recent years has been management of pain associated with osteoarthritis, although there is a lack of evidence for their use.*[434, p 11]

The Australian Government Department of Health, through the Therapeutic Goods Administration released a consultation paper relating to *Prescription strong (Schedule 8) opioid use and misuse in Australia – options for a regulatory response.*[434] It examines the factors contributing to opioid use and misuse and presents seven regulatory options, for example 'Consider whether the highest dose products should remain on the market, or be restricted to specialist / authority prescribing.[434, p 14] The importance of educating prescribers is highlighted.

4.7.4.3 Implications

A lack of knowledge related to interpretation and assessment of pain levels, has been identified as a factor in opioid misuse and abuse.[438] Nurses are likely to encounter situations where substance misuse is affecting the health and safety of individuals and families.[421] Nurses are in an ideal position then to make a critical contribution to addressing the misuse of opioids through prescriber education and training and prescription drug monitoring programs.[432] Nurses, with appropriate knowledge and skills, have a role in providing essential anticipatory guidance to patients whenever they receive prescription medication. The trusted relationship that frequently exists between nurse and patient may assist with educating patients about the risks and potentially fatal consequences of opioid diversion and nonmedical opioid use. It is also necessary to ensure that patients understand issues relating to the safekeeping and proper disposal of opioids. At a population health level, nurses working in public health and in pain management services may be well positioned to contribute to research and evaluation relating to trends in prescription opioid use. This may help improve the body of knowledge of prescription analgesic requirements for pain management.[429]

There are strategies to mitigate the health impacts of substance misuse and opioid-related morbidity and mortality. Provider and patient knowledge, ongoing monitoring and review of medication as well as advocacy at the legislative level are strategies that can help reduce inappropriate prescribing and use.[432] Addressing the opioid epidemic requires a multifaceted approach through policy, regulation and initiatives.[432,438]

There needs to be a commitment to opioid stewardship in monitoring and improving prescriber compliance and in providing guidelines on opioid prescribing for chronic pain.[433] Furthermore, clinical and regulatory management to prevent misuse and diversion requires a collaborative effort.[438,439]

5 Summary of the results

5.1 Future directions in health care delivery

- Internationally, there are political and professional pressures to reduce health inequity and pursue universal access to health care. Australia is in the fortunate position of having a well-established universal health care system, Medicare.
- Improvements in health inequity can be achieved through multidisciplinary teams including nurses skilled in working with marginalised and priority population groups.
- The changing burden of disease (particularly relating to non-communicable diseases) is reflected in national policies that are driving new models of care with a shift from higher cost acute settings to primary and community based care.
- The economic impact of the growing demand for health care is already creating supply challenges with workforce shortages evident, balancing the drivers of access, quality and cost is essential to ensuring a sustainably funded health system.
- Social trends such as ageing are fuelling the growing demand for health care and nurses skilled in the care of older people.
- Internationalisation has produced a much more mobile nursing workforce. Nurses of the future will continue to need strong teamwork skills, cultural competence and ideally graduate with skills and attributes that are portable across institutions, settings of care and potentially nations.
- Greater engagement of consumers in their health care, fuelled by increasing access to web-based health information, virtual networks and the growth of personal monitoring devices mean that nurses must have the skills to communicate, educate and engage patients in person-centred care, self-management and lifestyle modification.
- The rise in workplace aggression, with nurses exposed to violence in the workplace from patients, family and carers, and issues relating to bullying and incivility within the workplace, mean that nurses require the skills and resilience to address these issues.
- Technology is one of the most significant influences on the education and training of all health care professionals in the future, primarily because of its impact on nursing practice including the use of telehealth, telepresence and mobile technology.
- Big data is predicted to have a transformational impact on the delivery of health care. For example, the use of predictive analytics, based on patterns derived from big data to identify patients at risk of a particular condition or to prevent hospital readmission.
- Robotics and artificial intelligence will impact the health care environment, including robots providing social assistance to patients through to AI influencing roles in patient administration, clinical decision support, patient monitoring and health care interventions.
- The nurse of the future will increasingly be exposed to genomics, precision medicine and personalised care. While medical genomics and genetic counselling require specialised skills, RNs will progressively interact with patients requiring information and advice about genetic testing, particularly the genetic influence on disease.
- The rise of social media and health applications is providing a cheap and accessible way for patients, their carers and families to interact, particularly those with common conditions. This requires nurses to be equipped to respond to more informed consumers and

understand the consequences of providing information and advice that may quickly be shared world-wide. Additionally, nurses need to consider their role in 'prescribing' health applications to support patient self-management.

- The environmental consequences of climate change for nurses include addressing direct impacts (such as heat waves), the health consequences arising from vector-borne diseases increasing and the health consequences of displaced communities.
- Equipping nurses to work to their full scope of practice, providing appropriate training for advanced nursing roles and ensuring nurses have the capacity to integrate lesser skilled or unregulated roles appropriately into the care team is the key legal / regulatory issue in the future.
- All nurses should be educated about the intersection between skill mix, nursing staffing and patient safety.
- Appropriate prescribing practices have an important influence on prescription opioid use and the increasing access to medicinal cannabis. NPs and nurse prescribers in particular, must remain abreast of legislative or regulatory changes relating to their use.

5.2 Implications for future nursing skills and attributes

- Australia's changing health needs, evolving roles of nurses and imperative to adapt to workforce change all contribute to an ongoing demand for inclusion of new topics in the nursing curricula.
- The increasing volume and complexity of health care being delivered in primary care and community settings necessitates review of current acute care focussed nursing curricula to better prepare graduates for the realities of practice outside the hospital setting.
- The demand for additional content areas inevitably raises the possibility of a four year undergraduate degree. While this may bring undergraduate nursing courses in-line with several other health professions, there is no evidence of the impact of an increased volume of learning on the skills, knowledge or work readiness of graduates and little agreement about the additional content.
- Investing in post-graduate education that allows nurses to advance their skills and career in directions that meet the needs of both communities and employers is also necessary.

5.3 Implications for specific nursing designations

- The current and emerging issues described will affect all future Australian nurses, recognising that this will be to varying degrees depending on the nursing designation and associated scope of practice.
- There is limited literature relating to the EN curricula, EN graduates and EN roles.
- Supporting work integrated learning of concepts and practices will be critical to the success of the EN role through enhancement of problem solving ability and critical thinking skills as opposed to the more traditional time and task focus.
- The legal and regulatory issues relating to the prescribing/authorising of medicinal cannabis is an issue for NPs in several countries.

A summary of enhancements to the current key skills and attributes likely to be required of RNs, ENs and NPs in the next 15 years is summarised in Table 4.

Table 4 Synthesis of key nursing skills and attributes required in the next 15 years

Key skills and attributes
▪ Understand the interface between health policy and clinical practice.
▪ Recognise the centrality of the nursing voice to debates about health policy development and implementation.
▪ Adapt to new models of care, e.g. community based, chronic and complex care, health promotion and preventive health; models of care for older people with issues of frailty, multi-morbidity and/or dementia and models supporting 'active ageing'.
▪ Strengthen non-ageist attitudes and empathy towards older people.
▪ Instil a conceptual and practical understanding of the health impact of inequality, the social determinants of health and the issues for marginalised or priority population groups (e.g. Aboriginal and Torres Strait Islander peoples, people with disabilities, refugees and people identifying as LGBT+) and strengthen skills in caring for people from priority population groups.
▪ Expand skills in working with people with mental health issues and mental illness. All nurses need skills, knowledge and confidence in basic mental health assessment and management skills and referral pathways to early assessment and intervention, respecting the lived experience of people with enduring mental illness.
▪ Integrate the theory and practice of health promotion into clinical practice in all settings.
▪ Build proficiency to communicate, counsel, educate and engage patients in person-centred care including, self-management of chronic disease, lifestyle risk factor modification, provision of advice about genetic testing, and support around advanced care planning.
▪ Enhance capacity to monitor patient safety and outcomes of care, including the use of continuous rather than episodic data and information generated through PREMs and PROMs.
▪ Improve skills in shared decision-making and care coordination within health care teams.
▪ Strengthen capability to manage workplace violence, bullying and incivility including appropriate de-escalation and conflict resolution skills as well as personal resilience.
▪ Develop systems thinking/health system literacy to understand the interplay between access, quality and cost, including economic literacy and understanding of the cost drivers of health care.
▪ Strengthen nursing leadership to reduce the risk of health system failures in patient safety.
▪ Focus on the underpinning principles of patient safety, for example: systems thinking, interdisciplinary team work and communication.
▪ Understand the nurses' contribution to public health issues including for example, the effects of climate change and develop skills in disaster preparedness.
▪ Improve knowledge and use of technologies such as telehealth, telepresence, mobile health applications and mobile technology to support care delivery.
▪ Improve understanding of genomics, precision medicine and personalised care, including the genetic influence on disease and the applications of genomics.
▪ Integrate predictive analytics into practice e.g. to identify patients at risk of a particular condition, to prevent hospital readmissions from patients identified at risk, and health promotion activities targeted at patients with known risk factors.
▪ Adapt care processes to include social and physical assistive robots.
▪ Leverage the contribution of artificial intelligence to strengthen clinical decision supports, patient monitoring and interventions.
▪ Increase awareness of the role of social media including patient interaction via mobile apps and the prescribing of apps for patient self-management. In addition, foster greater understanding of codes of conduct relating to social media use.

Key skills and attributes
▪ Strengthen data, information and digital literacy including how big data and data science can inform nursing practice, research and health service delivery.
▪ Ensure clear scopes of practice for all nursing designations and support all nurses to work to their full scope of practice.
▪ Develop skills in team management and leadership to facilitate integration of unregulated roles into the multidisciplinary care team.
▪ Recognise the relationship between patient acuity, skill mix and nursing staffing and how this contributes to the quality of patient safety, including the role of nursing sensitive patient indicators.
▪ Ensure understanding of the regulatory framework supporting nursing practice e.g. regulatory changes that impact on prescribing rights of NPs and nurse prescribers in relation to medicinal cannabis, as well the regulatory limits on scope of practice, therapeutic roles of cannabinoids and potential adverse effects.
▪ Understand the nurses' role in providing anticipatory guidance to patients who receive opioid prescriptions and supporting actions to reduce the risks of drug misuse.
▪ Build skills in translational science e.g. assessing the quality of available evidence and generating knowledge through practice-based research; and supporting nurse researchers to work with clinicians to ensure research impact.

6 Considerations for the system of nursing education

Section 4 has outlined the current and emerging issues facing the health system of the future. In Section 5 a summary of key points is provided in addition to a brief synthesis of the implications for enhancements to future nursing skills and attributes. This section turns to the broader impact of the identified issues for the system of nursing education. Where relevant, the experience of medical education is discussed to provide a comparison with similar developments in nursing education.

6.1 Strengthening nursing education

The WHO has clearly stated its aspiration that an undergraduate (bachelor's) degree in nursing should become the entry qualification for all RNs.[440] Nursing education in Australia is well established in the tertiary sector after its move from hospital based training in the late 1980s. University education is an important component of RN education as it has a strong focus on critical thinking, research and higher order skills which prepare graduates to effectively practice in changing environments and modern workplaces.[441]

The notion of a four-year undergraduate degree for RNs has been raised internationally and within Australia.[31] Whilst this may bring nursing education in line with the volume of pre-registration education undertaken by some other health disciplines (for example physiotherapy and occupational therapy), the efficacy of this change is not well established. There is limited evidence to support the impact of increasing the course length on the quality or work readiness of graduates, and there is little agreement about what additional content a four year degree would provide. It may be conceptually alluring to use the additional year of study to improve the coverage of current and emerging issues such as those highlighted in this review. However, in reality this will not be a sustainable way in which to manage curriculum development as new trends will always be emerging.

Although beyond the scope of this review, the included literature has indicated a rising prevalence of 'untrained workers' within the health workforce, such as health care assistants, medical assistants, assistants in nursing, care companions (several of the legal and regulatory impacts of these roles are briefly addressed in Section 4.7.1). The emergence of these groups creates a need for RN and EN curricula to provide education to prepare RNs and ENs for managing nursing teams including unskilled workers.

6.2 Integrating new knowledge, skills and attributes into existing curricula

The literature presented in Section 4 has highlighted the range of new knowledge, skills and attributes that are likely to be expected of nurses into the near future. The profession of nursing is growing rapidly and nursing education needs to keep pace.[442, p 1060] However, at the same time, for graduates to be safe and effective novice clinicians they need to have received a robust education in a range of fundamental concepts that underpin their practice. For example, while antimicrobial stewardship is an emerging area that needs to be addressed in curricula,[443] for a graduate to be able to understand the importance of this emerging concept and its application they likely need an understanding of concepts of pathophysiology, infection control and immune response.

Incorporating new and emerging trends generates a tension in curriculum development since to include new content areas requires previous content to be compressed or removed. There is limited guidance in the literature around how this is best balanced, or the impact that these

choices have on graduate attributes and work readiness. Arthur and Bowman refer to this phenomenon as 'curriculum hypertrophy' and it occurs where appropriate curriculum design is sacrificed in the attempt to address divergent external pressures for curriculum change.[444] What is challenging is integrating new knowledge, skills and attributes into existing curricula in a timely way.

6.3 Issues for curriculum design and development

6.3.1 Alignment with community needs and workforce requirements

Curriculum content must reflect the major international and national issues confronting the health care workforce of the future to ensure that nurses are equipped to meet national as well as local changing health needs.[445] The tailoring of curricula to the local context can occur when educational institutions have strong partnerships with public and private sector health service providers. Engagement with health providers and other relevant locally based aged and social care providers will ensure that specific contextual issues relevant to the region are considered during curriculum development.

Nursing curricula must remain responsive to trends arising from workforce planning. Historically in Australia 'workforce planning and education has been sporadic, poorly integrated and inadequate'.[446, p 5] Nursing roles have evolved substantially as advances in health care occur.[447] Nurses increasingly require highly complex clinical skills and knowledge, and educational institutions have a crucial role in ensuring alignment between community needs, workforce requirements and nursing curricula.[448]

In Australia it has been reported that there is a 'disconnect' between the number of graduating nursing students and the availability of nursing graduate positions. There are several factors driving this, including increasing numbers of nursing graduates. This is occurring despite medium to longer term projections of nursing workforce shortages.[447] This is a significant issue for nursing education and workforce development as new graduates who are unable to gain nursing graduate positions are likely to seek alternative employment outside of nursing. This means that resources expended in training are lost and there is no net gain in workforce numbers. The projected workforce shortages, along with financial pressures in the higher education sector arising from changes in government policy,[449] suggest that student numbers will at the very least remain at current levels and possibly increase. Increasing student numbers has significant implications for the delivery of quality education in nursing programs. Large student cohorts bring challenges in the delivery of content, quality assurance, access to clinical placements and resource allocation. Any increases in student numbers, therefore, need an accompanying allocation of resources to support the efficient and effective delivery of quality educational programs.

6.3.2 Competency-based training

The literature relating to standards of practice for nurses evidences a continuing interest in competency-based standards for regulation, education and training.[25,450] Within undergraduate medical education many forms of curricula are in use, for example traditional discipline-based curriculum, organ-based curriculum, integrated curriculum, problem-based learning curriculum and competency-based curriculum.[451] Many medical schools combine different forms of curricula. Problem-based learning approaches are valued as they support the development of

critical thinking.[451] Whereas integrated curriculum approaches aim to coordinate learnings from basic sciences, clinical sciences and clinical education. There is long-standing interest in competency-based curricula in medical education.[452-454]

The interest in competency-based approaches is just as evident in nursing education, in part driven by a view that linking regulatory frameworks with curricula results in more explicit articulation of competencies. This is thought to be of value to employers, reduces risk and contributes to safe practice.[138,455,456] The competency-based approach is a departure from the accepted 'time-based' approaches historically seen in both medical and nursing curricula.[457] Whilst this approach implies that students who achieve competencies may progress faster, this does not appear to occur in practice. One of the criticisms of competency-based training is that it is reductionist and generates a focus on individual tasks. This focus may detract from integration with broader skills and qualities that health professionals require such as empathy and professionalism and not necessarily equate with 'safe professional practice'.[457, p 1]

In Australia, the interest in competency-based education was demonstrated through a Commonwealth funded initiative to map health workforce competencies and assess evidence relating to competency-based health career frameworks.[455] The language of competencies is already embedded in the VET sector and used to guide EN educational requirements.[455] In the UK a competency-based career framework for the health care workforce 'the Skills Escalator', has been introduced to provide new routes into health care, support better utilisation of existing skills and provide clear structure for progression in new and extended roles based on the attainment of competencies.[458] There is limited evidence, however, of the relative impact of this type of education compared to traditional models.

The research of Garneau et al. suggest that competency has two dimensions and needs to be thought of as both 'process-oriented and outcome-oriented'.[456, p 24] They argue that by conceptualising competency in this way it becomes more dynamic and contextually relevant.[456]

6.3.3 Accreditation and curricula review

In the US, nursing education programs have been accredited since the early 1950s again with the intention 'to define standards of quality regarding the curriculum, faculty and resources'.[25, p 423] Currently, the ANMAC accredits all Australian nursing curricula before they are implemented by each University. This national accreditation process 'is undertaken in the interest of public safety'.[459] It is lengthy and includes both document review and site visits. However, there is a lack of clarity around ongoing processes which measure the degree to which the accredited curricula is implemented in course delivery and the changes that occur across the accreditation period. Curriculum creep is not a new issue and refers to the degree of change in curricula between accreditation processes and course delivery. While contemporary education programs need to be agile enough to reflect emerging trends, it is important that accredited courses are delivered in a way that matches the assessed curricula.

The Nursing and Midwifery Board of Australia (NMBA)[460] approves programs of study offered by Australian education providers for ENs, RNs and NPs. This work is supported by a series of accreditation standards. The standards for ENs[461] and RNs[462] were recently comprehensively reviewed. As has been identified in the other literature reviews in this series, there is limited literature relating to the EN curricula, EN graduates and EN roles. However, the scope of practice for ENs has grown in recent years, for example in medication administration including

intravenous therapy and medications.[463] Therefore, it is difficult to determine the effectiveness of current curricula in preparing ENs for graduate practice and their changing role.

In Australia the *Nurse Practitioners Standards Framework* addresses four domains: clinical, education, research and leadership. The standards are supported by 'orientating statements'.[400,464] The NMBA notes that:

> *The nurse practitioner (NP) scope of practice is built on the platform of the registered nurse (RN) scope of practice, and must meet the regulatory and professional requirements for Australia including the registered nurse standards for practice and Code of conduct for nurses.*[464, p 1]

Leidel perhaps controversially discusses 'missed opportunities' in the Australian NP movement.[465] A key criticism appears to be a perceived failure of the movement to 'align itself with the priorities identified by health policy makers'.[465, p 85] The importance of aligning curriculum and practice with health policy directions is recognised.

The accreditation standards for ENs, RNs and NPs not only inform clinical practice but also curriculum design by educational institutions. However, it appears that once a program of study is accredited there is rarely an audit of curriculum design. This means that in practice what is delivered by universities may have diverged from what was originally approved. A structured process of curriculum management, monitoring and renewal,[36] may be the first step in improving the alignment between nursing curricula and changing health needs. Benchmarking provides a means for comparing curricula and learning from other institutions and is used within the Australian context. For example, benchmarking has aided investigation of the structure and implementation of Bachelor of Nursing (Honours) programs. The process of benchmarking identified differences in programs including how courses were delivered and assessed with the potential to inform curriculum review and policy development.[466] With the fast moving pace of the health system, consideration needs to be given to the nimbleness of accreditation processes and curriculum transformation to ensure that this remains abreast of changing consumer, community and employer expectations and health needs to address practice/ industry employment issues.

6.3.4 Alternative models and approaches

Many of the models used in nursing and medical education curriculum development are not new. Educators have been using integrated curriculum approaches[36] and student-centred approaches such as problem-based learning for many years.[37] In the past, nursing curricula emphasised content but concept-based approaches have subsequently evolved.[25,467] Spaced education is used in graduate medical education and has been effective in delivering quality and safety education.[468]

The growth in wireless networks and current trend of embracing 'cloud' technology means that information is now accessible anywhere and anytime.[269,283] This allows on-demand access to educational material and has generated one of the most significant trends in nursing education – the development of online modalities. Emerging issues in curriculum design are very much about the technological impacts for example, cloud platform curriculum model design; the development of nursing education consortia models, including cross border curriculum

partnerships; and issues such as crowd sourced curriculum development.[458,469,470] These issues are discussed further in Section 6.3.5 below.

6.3.5 Online delivery

The growth in online delivery of undergraduate curricula or pre-registration training for health professionals, particularly nurses, is of profound importance now and in the future. The implications of 'flipped classroom' models and the advent of Massive Open Online Courses (MOOCs), Free Open Access Medical Education (FOAM) and simulation, is changing how health professionals learn.

Online delivery of post-basic nursing education is increasingly being used to assist heath workers in rural locations maintain and advance their skills. This is one of the significant advantages of this modality. For pre-registration education, particularly of RNs and NPs, there is an increasing reliance both internationally and nationally upon online delivery. Nursing curricula has included online education as an adjunct to face-to-face delivery and simulation for many years. For example, in the US the term 'flipped classroom models' is popular and describes an integrative approach to the use of online learning. The 'flipped classroom' blends online learning with face-to-face delivery.[471] However, more recently, several Australian universities have moved to fully online delivery of pre-registration nursing courses with only short face-to-face skills development blocks. Whilst this move may meet the fiscal and resource constraints of the tertiary sector and the preference for online learning of some students, its impact on the skills, knowledge and work readiness of graduates has yet to be investigated. Without such evaluation the widespread implementation of this model is a significant risk to the profession, particularly when workforce shortages are looming.

6.3.5.1 MOOCs and FOAM

Technological advances such as AI and machine learning are disruptive and will change both existing educational models and how students learn. Developments in high-fidelity simulation (addressed in the third literature review in this series 'Topic 3: Clinical skill development') are already occurring and 'virtual patients' will provide more complex and problem-based learning opportunities with the growth of AI.[472]

The advent of Massive Open Online Courses (MOOCs) and Free Open Access Medical Education (FOAM) is changing how health professionals learn. A MOOC 'is a free course delivered through the net to a large number of students'.[473, p 187] They are usually a supplement to classroom teaching, however many participants complete a MOOC who are not enrolled in formal programs of study. MOOCs are being provided by a large number of prestigious universities as a way to reach a mostly 'untapped' group of learners. They provide free access to education with programs that are easily scalable to different numbers of students. It remains unclear whether the appeal for universities is in their educational and technological or marketing potential.[473] Chen et al. describe a 'systematic approach to online curriculum development' for medical education including the development of on-line curricula and MOOCs.[471, p 3] MOOCs and Open Courseware (OCW) are just as evident in nursing education. OCW refers to free 'digitally published learning content including full and partial courses' and frequently includes a range of learning resources.[474, p 307] Several factors have contributed to the development of OCW including the availability of the internet, demand for online education and globalisation.[474]

FOAM was a term that emerged at the International Conference on Emergency Medicine in Dublin, Ireland in 2012. It has been described online as:

> *…a globally accessible crowd-sourced educational adjunct providing inline (contextual) and offline (asynchronous) content to augment traditional educational principles.*[475]

FOAM encompasses diverse sources of online digital resources which can be collated and used to support medical education.[476] For example, blogs, podcasts, tweets, documents, photographs, online videos etc. There are very few scholarly publications about FOAM online educational delivery, although there are some examples in emergency medicine and critical care fields.[477,478]

This crowd-sourced approach to medical education is emerging in nursing education with the establishment of Free Open Access Nursing education (FOANed). FOANed is a Twitter hashtag in use to stimulate interactive nursing education. Within the short time-frame for this literature review no examples relating to FOANed were found in the academic literature however there is an emerging online presence internationally.[479,480]

6.3.5.2 Personalised education

In addition to technological developments, generational change is forcing the system of nursing education to adapt current educational strategies. Part of the appeal of online delivery is the capacity to personalise student learning and individualise curricular experiences.

Personalised learning pathways are facilitated by technological advances. Algorithms can be developed based on learner behaviour and deployed to match student needs with content and delivery methods.[35] The proliferation of open access sources, including MOOCs, emerging in secondary and higher education broadens the availability of content and facilitates curriculum development across professional disciplines, institutions and national borders. While universities may develop the technological capacity to provide individual or personalised educational approaches, it is unlikely to be scalable for universities with large undergraduate nursing programs in the short to medium term.[481] The capacity of the academic workforce to develop and navigate personalised learning pathways within existing resources is questionable.

6.3.5.3 Outcomes

Online learning is here to stay. What is unclear is to what extent online methods should replace more traditional methods of face-to-face delivery. As Hajhashemi et al. note:

> *…the use of online learning will continue to grow both in Australia and other countries promoting the uptake of flexible delivery modes within courses and offering new means of enhancing students' learning and engagement.*[473, p 187]

Most undergraduate nursing education programs offered through Australian universities include some aspects of online delivery. The WHO commissioned the Imperial College London to undertake a systematic review to evaluate the effectiveness of e-learning for undergraduate health professional education.[35] This review included 49 studies which focused on non-networked computer based e-learning. Forty studies (82%) compared e-learning to traditional learning methods and 9 studies assessed particular modes of e-learning. A further 60 studies were included in their analysis of internet, networked, online or local area network-based e-learning. For both analyses, differences in outcomes between e-learning and traditional

learning were explored as well as outcomes of e-learning compared with other e-learning strategies. All 109 studies included outcome measures relating to knowledge gain, skills, attitudes and student satisfaction, however there was variable assessment of outcomes. For example in the first group of 49 studies comparing e-learning to traditional learning 33 of 40 studies assessed knowledge, 13 skill, 12 measured attitudes and 9 of the 40 assessed student satisfaction. It should also be considered that the majority of included studies reportedly 'had important methodological flaws that may have biased the findings'.[35, p xvi]

Despite the limitations of included studies and outcome measures, the outcomes were equivalent to traditional learning with respect to knowledge and skill acquisition.[35, p xvi] The perceived advantages for students were predominantly 'ease of access, flexibility and portability'.[35, p xvii] Additionally, students reported better interaction with both teachers and peers. The major disadvantages reported by students included lack of interaction and support from educators, the isolation and inability to discuss issues with a group, and the time-consuming nature of e-learning. Educational providers identified economic advantages both in terms of lower costs of delivery and increased capacity of educators (through time saving efficiencies), as well as improvements in scalability (both in terms of student reach and educational resources). Efficiencies in the revision of educational materials as well as advantages such as 'portability and enabling students to practise skills prior to experience with real patients' were also reported.[35, p xvii]

Swift published a systematic review with meta-analysis about e-learning in continuing education of health professionals.[482] The review included 16 studies with data relating to 5,679 learners, while the mean sample size was 400 only three trials were reported that had more than 150 participants. The key finding was that:

> *…there is little evidence for greater improvement in patient outcomes, health care professional behaviours, skills and knowledge when e-learning is compared with traditional methods.*[482, p 1]

These reviews did focus on different groups of health professionals, undergraduates[35] and health professionals requiring continuing education,[482] however their conflicting findings highlight an important tension for nursing education in the future. The appeal of predominantly online delivery for undergraduate nursing programs is accelerating, perhaps spurred on by the potential economic benefits. While there are obviously many advantages to integrating online delivery and e-learning into nursing curricula, further research is needed to understand the impact of these educational strategies and their association with educational and skills outcomes.[482]

6.4 Nursing educators of the future

Developing and delivering high quality, innovative and contemporary curricula that prepare graduates for the workplace requires high quality nurse academics. Yet the development and capacity building of nursing faculty has received scant attention in the literature,[483] with most papers reporting initiatives being undertaken in single institutions or in relation to specific aspects of the curricula or teaching methods.

There is a growing shortage of nurse academics in Australia and internationally.[156,484] This shortage is predicted to worsen into the future as high workloads lead to faculty taking retirement at an earlier age.[485] In Australia, it can be hard to recruit experienced nurses into

academic roles as the remuneration of junior academic salaries is not competitive with more senior clinical roles that attract penalty rates. Clinical experience is not well recognised within academic job descriptions, which often require academic competencies, such as doctoral qualifications.

An important aspect of the strengthening of nursing as a profession is the capacity building of RN and NP scholars who have completed higher degree studies. While a growing number of nurses are completing PhDs they face several challenges. Firstly, the practical challenges of a low number of scholarships and limited funding opportunities impact the capacity for many to undertake doctoral studies. In the current economic climate, taking time away from paid employment for long term study is not practicable for many. Additionally, experienced RNs or NPs often are less competitive in University scholarship ranking metrics than other disciplines who have completed Bachelor Honours and gained research experience. The current and future shortage of nurse academics, however, is a real issue that is reported in the included international and national literature. This shortage has significant implications on the delivery models of pre-registration education and the numbers of students that can be catered for within nursing programs. Whilst post-graduate education is outside the scope of this review, preparation of those who are delivering nursing preparation programs is an important consideration to ensure that high quality programs are delivered which facilitate the development of work ready graduates.

Literature from the US indicates that the composition of nursing faculty does not well mirror the diversity of the community.[485] Under representation of minority groups may impact on the way in which skills such as cultural awareness and sensitivity are embedded in the curricula. Consideration of supporting pathways for RNs and NPs from minority groups to enter academia may assist in developing and promoting nursing programs that prepare nurses to work in diverse communities.

Casualisation of the nurse academic workforce and its implications for nurse education has long been reported in the literature.[484] High numbers of casual staff undertaking face-to-face teaching places higher administrative workloads on permanent staff, as well as creating issues for managing quality teaching delivery in large cohorts of students with many casual teaching staff.

Many of those nurses who do move into academia are not doctorally prepared and, although there is limited published evidence, it appears that they often have limited formal teaching experience or educational qualifications.[484] As nursing and education are two different disciplines, clinical experience does not necessarily translate into teaching capability.[486] This means that those working in academia have significant variations in the education and training that they have received, resulting in inconsistency amongst staff members.[24]

Unlike other health disciplines, such as medicine, nursing in Australia has few opportunities for active adjunct positions or joint appointments, involving clinical leaders sharing their workload between teaching and clinical practice. Whilst professional chairs exist, these are largely focussed on research or translating evidence rather than teaching. A key barrier to these roles is around the complexity of dual employment by educational institutions and health services. Formal arrangements for staff to work for two entities are complex to negotiate and often

result in loss of benefits to the employee. Further work at a policy and systems level would assist in addressing these challenges.

6.5 Summary of key points

- University education is a vital entry qualification for RNs as it has a focus on critical thinking, research and higher order skills which prepare graduates to effectively practice in changing environments and modern workplaces.
- A four-year Bachelor's degree for RNs has been raised nationally and internationally. There is no evidence of the impact of an increased volume of learning on the skills, knowledge or work readiness of graduates and little agreement about the additional content.
- The discipline of nursing is growing rapidly and nurse education needs to keep pace. However, for graduates to be safe and effective novice clinicians they need to have received a robust education in the fundamental concepts which underpin their practice.
- Incorporating new and emerging trends generates a tension in curriculum development since to include new content requires previous content to be compressed or removed. There is limited evidence to guide how this is balanced, or the impact these choices have on work readiness.
- Large student cohorts bring challenges in the delivery of content, quality assurance, access to clinical placements and resource allocation. Increases in student numbers, need a concomitant increase in resources to support quality program delivery.
- Linking regulatory frameworks with curricula results in more explicit articulation of competencies. However, when competency-based training generates a focus on individual tasks, this detracts from integration with broader skills and qualities that nurses require such as empathy, critical thinking and professionalism.
- Changes in nursing curricula are being driven by increasing technology, improved access to online education and information, changing learning needs, fiscal imperatives, the size of student cohorts and resource availability, including clinical placement opportunities.
- In order to effectively deliver curricula using new approaches to teaching and learning and new technologies, nurse academics need to be prepared in these approaches.
- The ANMAC accredits all nursing curricula offered by Australian Universities. However, there is a lack of clarity around ongoing processes which measure how the accredited curricula is implemented and the changes that occur across the accreditation period.
- With the fast moving pace of the health system, consideration needs to be given to the nimbleness of accreditation processes and curriculum transformation to ensure that this keeps pace with changing consumer, community and employer expectations and health needs to address practice/ industry employment issues.
- While universities may develop the technological capacity to provide individual or personalised educational approaches it is unlikely to be scalable for universities with large undergraduate nursing programs in the short to medium term.
- Most undergraduate nursing education programs offered through Australian universities include some form of online delivery. Several Australian universities are now offering fully online degrees. To date there is no evidence to understand the impact of these delivery models and their association with educational outcomes and graduate work readiness.

- An important aspect of the strengthening of nursing as a profession is the capacity building of RN and NP scholars who have completed higher degree studies.
- Developing and delivering high quality, innovative and contemporary curricula that prepares graduates for the workplace requires high quality nurse academics. There is a growing shortage of nurse academics in Australia and internationally.

7 Discussion

The diverse array of political, economic, social, technological, environmental and legal and regulatory trends emerging internationally and nationally, will influence how future generations learn to work effectively as health care professionals. Nursing education curricula will need to adapt and adjust to the changing context of both the health care environment and health service delivery to effectively equip the nurse of the future.

7.1 Equipping the nurse of the future

The PESTEL analysis has presented the current and emerging issues influencing the education and training of health care professionals. None of the issues discussed occur in isolation, these issues do not follow a linear path – they are phenomena that are interrelated and frequently overlapping. It is through the convergence of multiple issues and influences that significant and transformational change occurs.

From the distillation of these trends three fundamental issues for nursing education are briefly discussed under the following sub-headings:

- Integrating new models of care
- Evolving nursing roles
- Adapting to workforce change.

7.1.1 Integrating new models of care

Demographic changes, including the ageing of the population, increasing prevalence of chronic diseases and compression of morbidity are generating needs for new models of care and corresponding knowledge, skills and attributes. For example, the impact of frailty as the community ages may necessitate increased capability around its management (e.g. the capacity to assess function). The focus of care is shifting toward community and home based settings and this means that a skilled primary and community care workforce will be increasingly important.[24] Nurses must be trained so they can adapt to different health settings, for example home-based models of care present challenges for effective risk management, independent practice and staff and patient safety.

Many nurses have already appropriately integrated health promotion and preventive health care into their practice. There will be ongoing demand for skills in coordinating care for patients with complex multi-morbidities arising from chronic disease and providing lifestyle counselling to mitigate the impact of risk factors. Nurses may be required to counsel patients who decide to undergo genetic testing to better understand their predictive risk of developing certain conditions and self-managing. The rapid growth in the application of genome sequencing and medical genomics more broadly in everyday clinical practice, may drive adaptations to existing models of care and care processes.

New models of care will be required to more effectively address the health needs of marginalised, minority and priority population groups. Nurses must enhance their understanding of the impact of the social determinants of health and how they might contribute to reductions in health inequality and improvements in social justice through their practice in health, aged and social care. Advances in telemedicine and telepresence suggest that there will be a continuing need for nurses in regional, rural and remote locations to integrate this modality into their practice.

7.1.2 Evolving nursing roles

Nursing is evolving as a profession and this demands professional responsiveness to current and emerging issues with related changes in nursing education curricula. Patients have more complex clinical needs and growing expectations for quality care. This presents challenges for patient care in all clinical settings and demand for nurses that can work to their full scope of practice and in advanced practice, specialised nursing roles. When new nursing roles are introduced or changes to existing roles, other groups of health professionals may resist and undermine these efforts. This opposition arises from multiple factors and addressing many of these will be beyond the capacity of the affected nurses. However the nurse of the future can be equipped to better understand how the health system functions, particularly the intersection between access, quality and cost. They will need to be capable of using principles from translational science and change management to integrate new practices into existing workplaces and regimes of care.

There are challenges integrating lesser skilled and non-regulated nursing roles into health care teams in addition to health workers from other cultures and countries. It has been argued that nurses will have the primary responsibility of coordinating care within the health care team. This may include supporting other team members to share provision of the fundamentals of nursing care. The nurse of the future requires empathy, cultural competence and a strong capacity for multidisciplinary team work.

The relationship between health care professionals, particularly nurses and consumers is changing. Consumers have access to a wealth of health information via the internet. They are involved in monitoring their own health using smart phones and other electronic devices. In Australia the retiring Baby Boomer cohort is influencing perceptions of ageing and demanding more responsive health services that provide more personalised care. The voice of patients is being integrated into real-time electronic health records and consequently care through the use of patient reported outcomes and patient reported experience measures. This heightened engagement in health care is not being experienced by all with the elderly, non-English speaking and most disadvantaged segments of communities least able to engage in these developments in self-care. This dynamic has an impact on nursing roles and the educational requirements of nurses who will be required to share decision-making with patients, their carers and families and respond appropriately when challenged by informed consumers, carers and families.

The impact of technology may drive a higher reliance or value on technical skills and nursing education has an important role in ensuring new nurses are presented with a balanced view of the importance of these new technical skills with the non-technical skills that make the nursing profession a unique compassionate and caring role.

7.1.3 Adapting to workforce change

Within Australia workforce planning occurs at a national level. Currently workforce planning is not effectively linked to education programs provided by universities and other education providers. The result is workforce shortages, and a reliance on overseas trained nurses and a casualised workforce. Retention of the existing workforce is an important issue. The health care needs of rural communities and challenges in providing a sustainable rural workforce are

particularly important given the current drought across much of rural Australia, and the projected longer term impacts of such climatic change on these communities.

There are many pressures upon new and existing nurses to adapt to workforce change. Shortages in the available workforce generate a multiplicity of challenges. Nurses working in the Australian health system will need to work effectively with colleagues from other cultures who will have had different training experiences, to deliver safe patient-centred care. There are already pressures evident from intergenerational change as the nursing workforce will increasingly be comprised of Millennials who have very different attitudes and expectations of their career and working life. This coupled with the potential loss of the vast tacit knowledge held by the retiring Baby Boomer generation will present challenges.

Inevitably, as is the case in many sectors, the roles of health care professionals will change as technology advances. The staggering pace of technological change is driving demand for a much more digitally literate workforce who is prepared to utilise emerging technologies and engage in data informed care. The rise of robotics, AI and machine learning will not be feared as a disruptive innovation if nurses are taught during their undergraduate training about how these advances can support high quality nursing care. Nurses will require skills to navigate the volume of information available and this may best be done through enhancing capacities to critically appraise the quality of evidence and information.

The health care workplace is experiencing increasing incidents of workplace aggression, with threats to front-line personnel, particularly those based in emergency department settings. The increasing use of illicit substances and alcohol binging is responsible for a significant portion of this burden. However, longer waiting times and dissatisfaction with care also contribute to aggressive behaviour. There is now much greater awareness of the adverse impacts of bullying and incivility within health care, as well as wider social movements challenging inappropriate and unacceptable interpersonal behaviour.

There is increasing emphasis on a culture focussed on patient safety. Nurses must be educated to be resilient and guided in their understanding of their ethical responsibilities to patients and colleagues, including the importance of speaking up on behalf of patients when unsafe or inappropriate practice is observed.

While social media can be a valuable adjunct in keeping nurses informed of developments in their discipline the risks associated with inappropriate use must also be understood and appreciated.

Finally, nurses as a profession must continue to nurture leaders to take the profession into the future through advocacy, policy development and research. High quality, relevant and transformational nursing education provides the foundation for developing nurse leaders of the future.

7.2 Conclusion

The Willis[24] review identified that one of the most pressing challenges in educating the nurse of the future is to reduce the existing variations in education and training that staff receive. Health care and nursing practice are both dynamic and constantly changing fields. Australia's changing health needs, evolving roles of nurses and imperative to adapt to workforce change all contribute to an ongoing demand for inclusion of new topics in the nursing curriculum. This

inevitably raises the possibility of a four year undergraduate degree or better processes to inform decision-making about curriculum content. Investing in post-graduate education that allows nurses to pursue their career in directions that meet the needs of both communities and employers is also necessary. Ralph et al. assert that:

> *Curriculum content must be nationally and globally relevant to future-proof nursing education in Australia.*[17, p 9]

Baldwin et al. describe graduate attributes for nurses as 'a transferrable set of specific attributes that make nursing graduates work ready'.[487, p 9] Nurses of the future are reliant on the pre-registration education that they receive to develop these attributes. Nursing education is the mechanism that equips nurses with the skills and attributes that allow them to contribute 'knowledgeably, compassionately and confidently' to health care in the future.[487, p 9]

7.3 Recommended issues for further consultation

From this review of the literature several issues have emerged worthy of further consultation. The following questions are provided to inform the consultation. Several of these questions are more suited to discussions with particular stakeholder groups.

- From the various issues identified, which knowledge, skills and attributes are the highest priority for inclusion in undergraduate nursing curricula?
- Do current curricula adequately prepare nurses to work in teams including unregulated health workers?
- What is needed to better integrate unregulated workers into the health care workforce?
- Does the current system of nursing education have adequate processes in place for curriculum review and renewal?
- What innovations in curriculum development should be supported?
- What innovations in the delivery of nursing education are showing good outcomes from unpublished evaluations?
- What opportunities exist to improve alignment between nursing curricula and new models of care?
- How can nurses be supported through pre-registration and post-registration education and training to adapt to evolving workforce roles and workforce change?
- What needs to be done to ensure an adequate nursing education workforce in the future?
- What needs to be done to support nurse academics / educators to prepare themselves to deliver nursing education into the future?

References

1. Australian Government Department of Health. Stronger rural health strategy: strengthening the role of the nursing workforce. 2018. http://www.health.gov.au/internet/budget/publishing.nsf/Content/budget2018-factsheet27.htm (accessed 6 March 2019).
2. Nursing and Midwifery Board of Australia. Code of conduct for nurses. 2018.
3. Grant MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal* 2009; 26(2): 91-108.
4. Halcomb E, Fernandez R. Systematic reviews: a guide for the novice researcher. *Nursing Standard* 2015; 29(33): 45-51.
5. NHMRC. Guidelines for guidelines: Synthesising evidence. Australian Government; 2018.
6. Whittemore R, Knafl K. The integrative review: updated methodology. *Journal of Advanced Nursing* 2005; 52(5): 546-53.
7. Thorne S. Rediscovering the "narrative" review. *Nursing Inquiry* 2018; 25(3): e12257.
8. Greenhalgh T, Thorne S, Malterud K. Time to challenge the spurious hierarchy of systematic over narrative reviews? *European Journal of Clinical Investigation* 2018; 48(6): e12931.
9. Greenhalgh T, Peacock R. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: Audit of primary sources. *BMJ* 2005; 331(7524): 1064-5.
10. Lo Giudice S, Grace S. Excellence in student research: Is it time for a review of allied health curricula?: Nutrition training in osteopathy. *Journal of the Australian Traditional-Medicine Society* 2015; 21(4): 250-3.
11. Aguilar F. Scanning the business environment. New York: Macmillan; 1967.
12. Ho J. Formulation of a systemic PEST analysis for strategic analysis. *European Academic Research* 2014; II(5): 6478-92.
13. Evennett C, Barlow J. Twenty-Thirty Health care scenarios - exploring changes in health care in England over the next 20 years. London, UK.: Imperial College Business School, 2013.
14. Gillam S, Siriwardena A. Leadership and management for quality. *Quality in Primary Care* 2013; 21: 253-9.
15. Huizer Y, Kraaij-Dirkzwager M, Timen A, Schuitmaker T, van Steenbergen J. Context analysis for epidemic control in the Netherlands. *Health Policy* 2015; 119: 66-73.
16. Jackson J, Hussainy S, Kirkpatrick C. Identification of major factors in Australian primary care pharmacists' practice environment that have a bearing on the implementation of professional models of practice *Australian Health Review* 2017; 41: 378-83.
17. Ralph N, M B, Y C, K. F. Future-proofing nursing education: An Australian perspective. *SAGE Open* 2014; 4(4): 1-11.
18. King E, Alperstein N. Best Practices in Planning Strategically for Online Educational Programs. 1st Edition ed. New York: Routledge; 2017.
19. George A, Scott K, Garimella S, Mondal S, Ved R, Sheikh K. Anchoring contextual analysis in health policy and systems research: A narrative review of contextual factors influencing health committees in low and middle income countries. *Social Science & Medicine* 2015; 133: 159-67.

20. Mazo L, Macpherson I. A Strategic Communication Model for Sustainable Initiatives in Higher Education Institutions. *Athens Journal of Mass Media and Communications* 2017; 3(4): 321-42.
21. Scottish Government. The Chief Nursing Officer (CNO) Commission on widening participation in nursing and midwifery education and careers - final report. Edinburgh, Scotland, United Kingdom: Scottish Government, 2017.
22. National Nursing Organisations. Report from the National Nursing Organisations to Health Workforce New Zealand: New Zealand Government, 2014.
23. Willis Comission. Quality with compassion: The future of nursing education. England, London: Willis Commission, 2012.
24. Willis P, Lord,. Raising the bar. Shape of caring: A review of the future education and training of registered nurses and care assistants. London, England, United Kingdom, 2015.
25. Valiga T. Nursing education trends: future implications and predictions. *Nursing Clinics of North America* 2012; 47(4): 423-34.
26. Lee H, Min H, Oh S, Shim K. Mobile technology in undergraduate nursing education: A systematic review. *Healthcare Informatics Research* 2018; 24(2): 97-108.
27. McCann E, Brown M. The inclusion of LGBT+ health issues within undergraduate healthcare education and professional training programmes: A systematic review. *Nurse Education Today* 2018; 64: 204-14.
28. Rokkas P, Cornell V, Steenkamp M. Disaster preparedness and response: Challenges for Australian public health nurses–A literature review. *Nursing & health sciences* 2014; 16(1): 60-6.
29. Barr J, Tsai L, Welch A, et al. Current practice for genetic counselling by nurses: An integrative review. *International Journal of Nursing Practice* 2018; 24: 1-9.
30. Birks M, Davis J, Smithson J, Cant R. Registered nurse scope of practice in Australia: An integrative review of the literature. *Contemporary Nurse* 2016; 52(5): 522-43.
31. Christiansen A, Jacob E, Twigg D. Is it time to consider a four year nursing bachelor degree in Australia? A discussion paper. *Collegian* 2018; 25(5): 567-71.
32. Rozendo C, Santos A, Cameron B. A critical review of social and health inequalities in the nursing curriculum. *Nurse Education Today* 2017; 50: 62-71.
33. Talwar D, Tseng T, Foster M, Xu L, Chen L. Genetics/genomics education for nongenetic health professionals: A systematic literature review. *Genetics in Medicine* 2017; 19(7): 725-32.
34. Zhu Z, Xing W, Lizarondo L, Guo M, Hu Y. Nursing students' experiences with faculty incivility in the clinical education context: a qualitative systematic review and meta-synthesis. *BMJ Open* 2019; 9(2): e024383.
35. Al-Shorbaji N, Atun R, Car J, Majeed A, Wheeler E. eLearning for undergraduate health professional education: A systematic review informing a radical transformation of health workforce development. Geneva: Imperial College London, 2015.
36. Changiz T, Yamani N, Tofighi S, Zoubin F, Eghbali B. Curriculum management/monitoring in undergraduate medical education: A systematized review. *BMC Medical Education* 2019; 19: 1-9.

37. Onyura B, Baker L, Cameron B, Friesen F, Leslie K. Evidence for curricular and instructional design approaches in undergraduate medical education: An umbrella review. *Medical Teacher* 2016; 38(2): 150-61.
38. World Health Organization. Ten threats to global health in 2019. 2019. https://www.who.int/emergencies/ten-threats-to-global-health-in-2019.
39. World Health Organization. WHO priorities. 2019. https://www.who.int/dg/priorities/en/ (accessed 5 April 2019).
40. World Health Organization. New Perspectives on Global Health Spending for Universal Health Coverage. Geneva: World Health Organization, 2017.
41. Marmot M. Social determinants of health inequalities,. *Lancet (London, England)* 2005; 365: 1099-104.
42. CSIRO. Future of health. Shifting Australia's focus from illness treatment to health and wellbeing management, 2018.
43. Health Workforce Australia. Health workforce 2025: Doctors, nurses and midwives - Volume 1. Adelaide, Australia: Australian Government, 2012.
44. Health Workforce Australia. Health workforce 2025: Doctors, nurses and midwives - Volume 2. Adelaide, Australia: Australian Government, 2012.
45. Calder R, Dunkin R, Rochford C, Nichols T. Australian health services: Too complex to navigate. A review of the national reviews of Australia's health service arrangements: Australian Health Policy Collaboration, 2019.
46. Australian Institute of Health and Welfare. Australia's Health 2018. Canberra: AIHW, 2018.
47. COAG. Intergovernmental Agreement on National Digital Health. Canberra, Australia: Australian Digital Health Agency 2018.
48. COAG. Intergovernmental agreement for the National Disability Insurance Scheme (NDIS) launch. Canberra, Australia: The Commonwealth of Australia, 2012.
49. Australian Government Department of Health. Our health: Better health and wellbeing for all Australians - corporate plan 2018-19. 2018.
50. Australian Government Department of Health. Budget 2018-19: Portfolio budget statements 2018-19. Budget related paper No.1.9 Health Portfolio. Canberra, Australia: Australian Government, 2018.
51. Anderson J, Malone L. Chronic care undergraduate nursing education in Australia. *Nurse Education Today* 2015; 35: 1135-8.
52. World Economic Forum. The Global Risks Repot 2017: 12th edition. Geneva, Switzerland WEF, 2017.
53. Gallagher RW, Polanin JR. A meta-analysis of educational interventions designed to enhance cultural competence in professional nurses and nursing students. *Nurse Education Today* 2015; 35: 333-40.
54. Ryan TA, Scior K. Medical students' attitudes towards people with intellectual disabilities: A literature review. *Research in Developmental Disabilities* 2014; 35(10): 2316-28.
55. Smeltzer SC, Blunt E, Marozsan H, Wetzel-Effinger L. Inclusion of disability-related content in nurse practitioner curricula. *Journal of the American Association of Nurse Practitioners* 2015; 27: 213-21.
56. World Health Organisation. World Report on Disability, 2011.

57. Symons AB, Morley CP, McGuigan D, Akl EA. A curriculum on care for people with disabilities: Effects on medical student self-reported attitudes and comfort level. *Disability and Health Journal* 2014; 7: 88-95.

58. Lyon L, Houser R. Nurse educator attitudes toward people with disabilities. *Nurse Education Perspectives* 2018; 39(3): 151-5.

59. Durston J, Paajanen A. Nursing of refugee and asylum seeker families: An integrative review. Helsinki Metropolia University of Applied Sciences; 2016.

60. Hudson CC, Adams S, Lauderdale J. Cultural expressions of intergenerational trauma and mental health nursing implications for U.S. health care delivery following refugee resettlement: An integrative review of the literature. *Journal of Transcultural Nursing* 2016; 27(3): 286-301.

61. Giancola JR. Achieving cultural competency with lesbian, gay, bisexual and transgender (LGBT) patients through application of Carper's Fundamental Patterns of Knowing in Nursing. 2014. p. 1-8.

62. Australian Government Department of the Prime Minister and Cabinet. Closing the gap. 2019. https://closingthegap.pmc.gov.au/ (accessed 5 April 2019).

63. Australian Government Department of Social Services. Disability and carers: National Disability Insurance Scheme. 2019 (accessed 5 April 2019).

64. Taylor J, Haintz GL. Influence of the social determinants of health on access to healthcare services among refugees in Australia. *Australian Journal of Primary Health* 2018; 24(1): 14-28.

65. Australian Human Rights Commission. Marriage equality in a changing world: Position paper on marriage equality Sydney, Australia AHRC, 2012.

66. Kritsotakis G, Galanis P, Papastefanakis E, et al. Attitudes towards people with physical or intellectual disabilities among nursing, social work and medical students. *Journal of Clinical Nursing* 2017; 26: 4951-63.

67. Storms H, Marquet K, Claes N. General practitioners' and primary care nurses' care for people with disabilities: Quality of communication and awareness of supportive services. *Journal of Multidisciplinary Healthcare* 2017; 10: 367-76.

68. Trollor JN, Eagleson C, Turner B, et al. Intellectual disability health content within nursing curriculum: An audit of what our future nurses are taught. *Nurse Education Today* 2016; 45: 72-9.

69. Courtenay-Furst MA, Salvador-Carulla L. Intellectual disability in Australian nursing education: Experiences in NSW and Tasmania. *Journal of Intellectual and Developmental Disability* 2017; DOI: 10.3109/13668250.2017.1386288: 1-10.

70. Trollor JN, Eagleson C, Turner B, et al. Intellectual disability content within pre-registration nursing curriculum: How is it taught? *Nurse Education Today* 2018; 69: 48-52.

71. Suurmond J, Seeleman C, Rupp I, Goosen S, Stronks K. Cultural competence among nurse practitioners working with asylum seekers. *Nurse Education Today* 2010; 30: 821-6.

72. Stewart K, O'Reilly P. Exploring the attitudes, knowledge and beliefs of nurses and midwives of the healthcare needs of the LGBTQ population: An integrative review. *Nurse Education Today* 2017; 53: 67-77.

73. Mitchell KM, Lee L, Green A, Skyes J. The gaps in health care of the LGBT community: Perspectives of nursing students and faculty. *Papers and Publications: Interdisciplinary Journal of Undergraduate Research* 2016; 5(5): 21-30.
74. Cornelius JB, Carrick J. A survey of nursing students' knowledge of and attitudes toward LGBT health care concerns. *Nursing Education Perspectives* 2015; May/June 2015: 176-8.
75. Walsh D, Hendrickson SG. Focusing on the "T" in LGBT: An online survey of related content in Texas nursing programs. *Journal of Nursing Education* 2015; 54(6): 347-51.
76. Drummond A, Cox L. Indigenous history, health, wellness and culture within nursing curriculum. *Focus* 2016; 23(8): 35.
77. Mills K, Creedy DK, West R. Experiences and outcomes of health professional students undertaking education on Indigenous health: A systematic integrative literature review. *Nurse Education Today* 2018; 69: 149-58.
78. Hunt L, Ramjan L, McDonald G, Koch J, Baird D, Salamonson Y. Nursing students' perspectives of the health and healthcare issues of Australian Indigenous people. *Nurse Education Today* 2015; 35: 461-7.
79. Power T, Virdun C, Gorman E, et al. Ensuring Indigenous cultural respect in Australian undergraduate nursing students. *Higher Education Research and Development* 2018; 37(4): 837-51.
80. Biles J. The development of Indigenous Australia cultural competence in nursing. *Focus* 2018; 26(4): 40-1.
81. Blackstock SY. Shifting the academic lens: Development of an interdisciplinary Indigenous health course. *Journal of Nursing Education and Practice* 2017; 7(1): 11-6.
82. Coggins D. An exploration of nursing leaders' experiences addressing Indigenous health in university undergraduate nursing programs in Ontario. Electronic Thesis and Dissertation Repository 5958: The University of Western Ontario; 2018.
83. Ramjan L, Hunt L, Salamonson Y. Predictors of negative attitudes toward Indigenous Australians and a unit of study among undergraduate nursing students: A mixed-methods study. *Nurse Education in Practice* 2016; 17: 200-7.
84. World Health Organization. Global Status Report on noncommunicable diseases Geneva, Switzerland WHO, 2014.
85. National Institue on Aging, National Institutes of Health, U.S. Department of Health and Human Services, U.S. Department of State. Why population aging matters: A global perspective. Baltimore, Maryland: U.S. National Institutes of Health 2007.
86. World Health Organization. Health workforce 2030: Towards a global strategy on human resources for health. Geneva, Switzerland, 2015.
87. World Health Organization. Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013 - 2020 Geneva, Switzerland: WHO, 2013.
88. Fries JF. The compression of morbidity. *The Milbank Quarterly* 2005; 83(4): 801-23.
89. Fries J, Bruce B, Chakravarty E. Compression of morbidity 1980 - 2011: A focused review of paradigms and progress. *Journal of Aging Research* 2011; 2011: 10.
90. OECD. Making mental illness count: The social and economic costs of neglecting mental health care. OECD Publishing: OECD Health Publishing Studies, 2014.
91. OECD. Health at a Glance 2017. 2017. http://dx.doi.org/10.1787/health_glance-2017-en (accessed May 24th 2018).

92. World Health Organization. Mental health action plan 2013–2020. Geneva, Switzerland: WHO, 2017.

93. National Collaborating Centre for Mental Health (UK). Depression in Adults with a Chronic Physical Health Problem. Treatment and Management. NICE Clinical Guidelines, No. 91. Leicester, UK: British Psychological Society, 2010.

94. Bergmark M, Bejerholm U, Markström U. Policy changes in community mental health: Interventions and strategies used in Sweden over 20 years. *Social Policy & Administration* 2017; 51(1): 95-113.

95. Halcomb EJ, McInnes S, Moxham L, Patterson C. Nurse-delivered interventions for mental health in primary care: A systematic review of randomised controlled trials. *Family Practice* 2019; 36(1): 64.-71.

96. Newton D. A review of the scientific literature informing the development of models of primary care in mental health 2017. https://www.healthylondon.org/wp-content/uploads/2017/11/Literature-review-Primary-care-mental-health-service-development.pdf (accessed 11 April 2019).

97. Australian Bureau of Statistics. 3101.0 - Australian Demographic Statistics - Sep 2018. 2018. https://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/3101.0Main%20Features2Sep%202018?opendocument&tabname=Summary&prodno=3101.0&issue=Sep%202018&num=&view (accessed 11 April 2019).

98. Manning ML, Pfeiffer J, Larson EL. Combating antibiotic resistance: The role of nursing in antibiotic stewardship. *American Journal of Infection Control* 2016; 44(12): 1454-7.

99. Australian Commission on Safety and Quality in Health Care. AURA 2016 – First Australian report on antimicrobial use and resistance in human health. 2016. https://www.safetyandquality.gov.au/publications/aura-2016-first-australian-report-on-antimicroibal-use-and-resistance-in-human-health/ (accessed 11 April 2019).

100. Department of Health. Fifth National Mental Health Plan. 2016. http://www.health.gov.au/internet/main/publishing.nsf/content/mental-fifth-national-mental-health-plan (accessed 26/07/2017.

101. Australian Bureau of Statistics. National Health Survey: First Results, 2014-15. Canberra: ABS, 2016.

102. Australian Institute of Health and Welfare. Mental Health in Australia. Canberra: AIHW, 2014.

103. Australian Institute of Health and Welfare. Health expenditure Australia 2013-14. Canberra: AIHW, 2015.

104. Moxham L. Living with mental illness. Melbourne: CEDA, 2015.

105. Australian Institute of Health & Welfare. Mental health nursing workforce 2016. 2016. https://mhsa.aihw.gov.au/resources/workforce/mental-health-nursingworkforce/ (accessed August 1 2017).

106. Australian Institute of Health & Welfare. Nursing and Midwifery workforce 2012. National health workforce series no. 6. Cat. no. HWL 52. Canberra, ACT: Australian Government, 2013.

107. Gray R. Transforming nurse training to address multi-morbidity: The missed opportunity of the shape of caring review. *Journal of Psychiatric and Mental Health Nursing* 2015; 22: 653-4.

108. Wylie A, Leedham-Green K. Health promotion in medical education: lessons from a major undergraduate curriculum implementation. *Education for Primary Care* 2017; 28(6): 325-33.

109. Naccarella L, Osborne R, Brooks P. Training a system-literate care coordination workforce. *Australian Health Review* 2016; 40(2): 210-2.

110. Rushton C, Green J, Jaarsma T, Walsh P, Stromberg A, Kadam U. The challenge of multimorbidity in nurse education: An international perspective. *Nurse Education Today* 2015; 35: 288-92.

111. James S, Halcomb E, McInnes S, Desborough J. Integrative literature review: Lifestyle risk communication by nurses in primary care. *Collegian* 2019; 26: 183-93.

112. Ashley C, Halcomb E, Brown A. Transitioning from acute to primary health care nursing: an integrative review of the literature. *Journal of Clinical Nursing* 2016; 25: 2114-25.

113. Forber J, DiGiacomo M, Davidson P, Carter B, Jackson D. The context, influences and challenges for undergraduate nurse clinical education: Continuing the dialogue. *Nurse Education Today* 2015; 35(11): 1114-8.

114. Norful A, Martsolf G, de Jacq K, Poghosyan L. Utilization of registered nurses in primary care teams: A systematic review. *International Journal of Nursing Studies* 2017; 74: 15-23.

115. Murray-Parahi P, Edgar V, Descallar J, Comino E, Johnson M. ENsCOPE: Scoping the practice of enrolled nurses in an Australian community health setting. *International Nursing Review* 2017; 64(1): 59-68.

116. Fillingham A, Peters S, Chisholm A, Hart J. Early training in tackling patient obesity: A systematic review of nurse education. *Nurse Education Today* 2014; 34(3): 396-404.

117. Mooney B, Timmins F, Byrne G, Corroon A. Nursing students' attitudes to health promotion to: Implications for teaching practice. *Nurse Education Today* 2011; 31: 841-8.

118. Olans RN, Olans RD, DeMaria Jr A. The critical role of the staff nurse in antimicrobial stewardship—unrecognized, but already there. *Clinical Infectious Diseases* 2015; 62(1): 84-9.

119. Herzig CT, Stone PW, Castle N, Pogorzelska-Maziarz M, Larson EL, Dick AW. Infection prevention and control programs in US nursing homes: results of a national survey. *Journal of the American Medical Directors Association* 2016; 17(1): 85-8.

120. Halcomb E, McInnes S, Moxham L, Patterson C. Mental health practice standards for nurses in Australian general practice. Canberra, ACT: Australian College of Mental Health Nurses Inc., 2018.

121. World Health Organization. Patient safety: Making health care safer. Malta, Greece: WHO, 2017a.

122. World Health Organization. Medication without harm. Malta, Greece: WHO, 2017b.

123. The King's Fund. Staff engagement: Six building blocks for harnessing the creativity and enthusiasm of NHS staff. London, England: The King's Fund: Ideas that Change Health Care, 2015.

124. Francis R. Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry. London, England: The Mid Staffordshire NHS Foundation Trust, 2013.

125. Kirkup B. The report of the Morecambe Bay Investigation. London, England: Morecambe Bay Investigation 2015.

126. Gosport Independent Panel. The report of the Gosport Independent Panel: Gosport War Memorial Hospital. London, England: Department of Health, 2018.

127. Burnett S, Franklin BD, Moorthy K, Cooke MW, Vincent C. How reliable are clinical systems in the UK NHS? A study of seven NHS organisations. *BMJ Quality and Safety* 2012; 21(6): 466-72.

128. Institute of Medicine. The Future of Nursing: Leading Change, Advancing Health. Washington, D.C.: Institute of Medicine of the National Academies., 2011.

129. COAG. Heads of agreement between the commonwealth and the states and territories on public hospital funding and health reform. Canberra, ACT: Council of Australian Governments 2018

130. ACSQHC. Australian safety and quality framework for health care. Sydney, NSW, 2010.

131. ACSQHC. National safety and quality health service standards Sydney, NSW: ACSQHC, 2017.

132. ACSQHC. Vital signs 2017: The state and safety and quality in Australian health care. Canberra, Australia: ACSQHC, 2017.

133. ACSQHC. The Third Australian Atlas of Healthcare Variation. 2018. https://www.safetyandquality.gov.au/atlas/the-third-australian-atlas-of-healthcare-variation-2018/ (accessed 4 April 2019).

134. Levett-Jones T, Dwyer T, Reid-Searl K, Heaton L, Flenady T, Applegarth J. The patient safety competency framework for nursing students. 2018.

135. World Health Organization. Patient safety curriculum guide: Multi-professional edition. Malta, Greece: WHO, 2011.

136. Sklar D, Hemmer P, Durning S. Medical education and health care delivery: A call to better align goals and purposes. *Academic Medicine* 2018; 93(3): 384-90.

137. Johnson L, Malik N, Gafson I, et al. Improving patient safety by enhancing raising concerns at medical school. *BMC Medical Education* 2018; 18(1): 1-9.

138. All-Party Parliamentary Group on Global Health. Triple Impact: How developing nursing will improve health, promote gender equality and support economic growth. London, England, United Kingdom: United Kingdom Government 2016.

139. United Nations DoEaSA-PD. World Population Prospects: the 2017 Revision Key findings and advance tables. Working Paper No. ESA/P/WP/248, . 2017 (accessed 29 March 2019).

140. Australian Bureau of Statistics. 3101.0 Australian Demographic Statistics - Jun 2016. 2016. http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/3101.0Feature%20Article1Jun%202016.

141. Coory M. Ageing and healthcare costs in Australia - a case of policy-based evidence? *Medical Journal of Australia* 2004; 180(11): 581-3.

142. Harris A, Sharma A. Estimating the future health and aged care expenditure in Australia with changes in morbidity. *Plos One* 2018; 13(8): e0201697.
143. Anderson A. The impact of the Affordable Care Act on the health care workforce. *The Heritage Foundation* 2014; 2887(March 18, 2014).
144. Buchan J, Seccombe I, Gershlick B, Charlesworth A. In short supply: pay policy and nurse numbers - Workforce profile and trends in the English NHS, 2017
145. Bungeroth L, Fennell E. Left to chance: the health and care nursing workforce supply in England - policy report. London, England, United Kingdom: Royal College of Nursing., 2018
146. Canadian Association of Schools of Nursing. Registered nurses education in Canada statistics 2015-2016: Registered nurse workforce, Canadian production: Potential new supply. Ottawa, ON: CASN, 2017.
147. Global Health Workforce Alliance, World Health Organization. Health workforce 2030: A global strategy on human resources for health. Geneva, Switzerland: WHO, 2016.
148. International Council of Nurses. Communique: International Council of Nurses 2019 international workforce forum. International Council of Nurses 2019 International Workforce Forum, Beirut, Lebanon: International Council of Nurses; 2019.
149. Scottish Government. National Social Care and Health Workforce Planning: Discussion Document. 2017.
150. World Health Organization. Global strategy on human resources for health: Workforce 2030. Geneva, Switzerland, 2016.
151. Leone C, Young R, Ognyanova D, Rafferty AM, Anderson J, G. D. Nurse migration in the EU: a moving target? *Euro Observer - Newsletter of The European Observatory on Health Care Systems,* 2016; 22(1): 7-10.
152. Crettenden I, McCarty M, Fenech B, Heywood T, Taitz M, Tudman S. How evidence-based workforce planning in Australia is informing policy development in the retention and distribution of the health workforce. *Human Resources for Health* 2014; 12(1): 1-13.
153. Rees G, Crampton P, Gauld R, MacDonell S. New Zealand's health workforce planning should embrace complexity and uncertainty. *The New Zealand Medical Journal* 2018; 131(1477): 109-15.
154. Reilly PIfES. Preparing for Brexit through workforce planning 2018.
155. Health Workforce Australia. Health workforce 2025: Medical specialties - Volume 3. Adelaide, Australia: Australian Government, 2012.
156. Health Workforce Australia. Nursing workforce sustainability: Improving nurse retention and productivity. Canberra, ACT: Commonwealth Department of Health, Australian Government, 2014a.
157. Health Workforce Australia. Australia's Future health workforce - Nurses (Detailed report). Canberra, ACT: Australian Government Department of Health 2014b.
158. Cosgrave C. Attracting (and keeping) Australia's Rural Health Workforce. 2018. https://pursuit.unimelb.edu.au/articles/attracting-and-keeping-australia-s-rural-health-workers (accessed 11 April 2019).
159. Duckett S. Health workforce design for the 2st century. *Australian Health Review* 2005; 29(2): 201-10.

160. Council of Deans of Nursing and Midwifery Australia and New Zealand. Response from the Council of Deans of Nursing and Midwifery (Australia & New Zealand) to the Productivity Commission's Position Paper on Australia's Health Workforce ,. 2005. https://www.pc.gov.au/inquiries/completed/health-workforce/submissions/subpp215/subpp215.pdf (accessed 11 April 2019).

161. Victorian Government - TAFE Victoria. Free TAFE. 2019. https://w.www.vic.gov.au/freetafe/free-tafe.html (accessed 29 March 2019).

162. Hudson JN, Weston KM, EA. F. Changes in medical education to help physicians meet future health care needs. *MJA* 2017; 9: 378-9.e1.

163. Sen Gupta T, Woolley T, Murray R, Hays R, McCloskey T. Positive impacts on rural and regional workforce from the first seven cohorts of James Cook University medical graduates. *Rural & Remote Health* 2014; 14(1): 1-13.

164. Porter M. Value-based health care delivery. *Annals of surgery* 2008; 48(4): 503-9.

165. Gray M. Value base healthcare. *BMJ (Clinical Research Ed)* 2017; 356: j437.

166. OECD. Tackling Wasteful Spending on Health. Paris, 2017.

167. Australian Institute of Health and Welfare. Australia's health 2018: in brief. Canberra, Australia: Australian Government, 2018.

168. Independent Hospital Pricing Authority. IHPA Annual Report 2017-18. 2018. https://www.ihpa.gov.au/publications/annual-report-2017-18 (accessed 9 April 2019).

169. Agency for Clinical Innovation, Clinical Excellence Commission, NSW Ministry of Health. Leading Better Value Care. 2019. http://www.eih.health.nsw.gov.au/lbvc (accessed 9 April 2019).

170. Australian Government Department of Health. Medicare Indexation Schedule,. 2019. http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/Content/Factsheet-MedicareIndexationSchedule (accessed 9 April 2019).

171. Halcomb E, Stephens M, Bryce J, Foley E, Ashley C. The development of national professional practice standards for nurses working in Australian general practice. *Journal of Advanced Nursing* 2017; 73(8): 1958-69.

172. Heywood T, Laurence C. An overview of the practice nurse workforce in Australia, 2012–2015. *Australian Journal of Primary Health* 2018; 47(11): 227-32.

173. Lysaght M. Your Wealth is your Health': A Study of the Commodification of Health Services in Ireland,. *Critical Social Thinking: Policy and Practice* 2009; 1: 298-314.

174. Christiansen I. Commodification of Healthcare and its consequences. *World Review of Political Economy* 2017; 8(1): 82-103.

175. Macmillan A, Jones R. Government climate and health equity priorities must prompt a deeper re-think of health and healthcare for the 21st century. *New Zealand Medical Journal* 2018; 131(1481): 9-12.

176. Raus K, Mortier E, Eeckloo K. Organizing Health Care Networks: Balancing Markets, Government and Civil Society. *International Journal of Integrated Care* 2018; 18(3,6): 1-7.

177. Australian Government Department of Health. Health Care Homes - Health Professionals. 2018.

http://www.health.gov.au/internet/main/publishing.nsf/Content/health-care-homes-professional (accessed 29 March 2019 2019).

178. Parker V, McMillan M. Challenges facing internationalisation of nursing practice, nurse education and nursing workforce in Australia. *Contemporary Nurse* 2007; 24(2): 128-36.

179. Aiken L, Sloane DM, Bruyneel L, et al. Nurse staffing and education and hospital mortality in nine European countries: A retrospective observational study. *The Lancet* 2014; 383(9931): 1824-30.

180. Aiken L. Baccalaureate nurses and hospital outcomes: More evidence. *Medical Care* 2014; 52(10): 861-3.

181. Aiken L. Economics of nursing. *Policy, Politics, and Nursing Practice* 2008; 9(2): 73-8.

182. Aiken et al. Nursing skill mix in European hospitals: Cross-sectional study of the association with mortality, patient ratings, and quality of care. *British Medical Journal Quality and Safety* 2017; 26(7): 559-68.

183. Platt M, Kwasky A, Spetz J. Filling the gap: Developing health economics competencies for baccalaureate nursing programs. *Nursing Outlook* 2016; 64(1): 49-60.

184. Australian Nursing and Midwifery Accreditation Council. Registered Nurse Accreditation Standards 2012,. 2012. https://www.anmac.org.au/sites/default/files/documents/ANMAC_RN_Accreditation_Standards_2012.pdf (accessed 11 April 2019).

185. World Health Organization. The Global strategy and action plan on ageing and health 2016. https://www.who.int/ageing/global-strategy/en/ (accessed 7 April 2019).

186. World Health Organization. Ageing and health. 2018. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health (accessed 7 April 2019).

187. Prince MJ, Wu F, Guo Y, et al. The burden of disease in older people and implications for health policy and practice. *The Lancet* 2015; 385(9967): 549-62.

188. Xue Q-L. The frailty syndrome: definition and natural history. *Clinics in geriatric medicine* 2011; 27(1): 1-15.

189. Nguyen QD, Wu C, Odden MC, Kim DH. Multimorbidity Patterns, Frailty, and Survival in Community-Dwelling Older Adults. 2018.

190. World health Organization. Global action plan on the public health response to dementia 2017 - 2025. 2017. https://www.who.int/mental_health/neurology/dementia/action_plan_2017_2025/en/ (accessed 7 April 2019).

191. Australian Institute of Health and Welfare. Older Australia at a glance. Canberra, ACT: Australian Governement, AIHW, 2018.

192. Australian Government Department of Health. National Framework for Action on Dementia 2015-2019. 2019. https://agedcare.health.gov.au/ageing-and-aged-care-older-people-their-families-and-carers-dementia/national-framework-for-action-on-dementia-2015-2019 (accessed 6 April 2019).

193. Australian Institiute of Health and Welfare. Ageing and the health system: Challenges, opportunities and adaptations Canberra, ACT: Australian Governement, AIHW, 2014.

194. Royal Commission into Aged Care Quality and Safety. Home page. 2018. https://agedcare.royalcommission.gov.au/Pages/default.aspx (accessed 11 April 2019).

195. Aged Care Workforce Strategy Taskforce. A Matter of Care Australia's Aged Care Workforce Strategy, . 2018. https://agedcare.health.gov.au/sites/default/files/documents/09_2018/aged_care_workforce_strategy_report.pdf (accessed 11 April 2019).

196. Australian Government Department of Health. Ageing and Aged Care - Resource Utilisation and Classification Study. 2019. https://agedcare.health.gov.au/reform/resource-utilisation-and-classification-study (accessed 11 April 2019).

197. Audit Scotland. Health and social care integration: Update on progress Endiburgh, Scotland Acounts Commission, Auditor General, 2018.

198. Department of Health and Social Care. The Department of Health and Social Care mandate to Health Education England United Kingdom Government, 2018.

199. Government of Wales. Parliamentary Review of Health and Social Care in Wales Interim Report. 2017.

200. Health Canada. 2016-17 Report on plans and priorities. Ottawa, ON, Canada: Government of Canada, 2016.

201. Ministry of Health New Zealand. Health Workforce New Zealand: Annual Report to the Minister of Health 1 July 2016 to 30 June 2017. Wellinging, New Zealand: New Zealand Government, 2018.

202. Banerjee S, Farina N, Daley S, et al. How do we enhance undergraduate healthcare education in dementia? A review of the role of innovative approaches and development of the Time for Dementia Programme. *International Journal of Geriatric Psychiatry* 2017; 32(1): 68-75.

203. Davis J, Morgans, Birks M, Browning C. The rhetoric and reality of nursing in aged care: views from the inside. *Contemporary Nurse* 2016; 52(2-3): 191-203.

204. Sinclair C, Field S, Williams K, et al. Supporting decision-making: A guide for people living with dementia, family members and carers. Sydney: Cognitive Decline Partnership Centre, 2018.

205. Moore K. Quality of care for frail older adults. *International Psychogeriatrics* 2018; 30(9): 1255-7.

206. Gholamzadeh S, Khastavaneh M, Khademian Z, Ghadakpour S. The effects of empathy skills training on nursing students' empathy and attitudes toward elderly people. *BMC medical education* 2018; 18(1): 198-.

207. American Hospital Association Committee on Performance Improvement. Managing an intergenerational workforce: Strategies for health care transformation. Chicago, IL: Health Research & Educational Trust, 2014.

208. Keating S. Looking back to the future: Current issues facing nursing education from the reflections of a member of the silent generation. *Nursing Forum* 2016; 51(3): 153-63.

209. Shacklock K, Brunetto Y. The intention to continue nursing: Work variables affecting three nursing generations in Australia. *Journal of Advanced Nursing* 2011; 68(1): 36-46.

210. The Policy Institute at King's College London. Futureproofing our NHS: A generational shift. 2018.

211. Health Education England. The Topol Review Preparing the healthcare workforce to deliver the digital future. 2018.
212. Australian Bureau of Statistics. Australian Bureau of Statistics Retirement and Retirement Intentions, Australia. Canberra, Australia: Australian Bureau of Statistics, 2014.
213. Wilson S. Should I stay or should I go? Retirement intentions of baby boomer nurses at the Royal Adelaide Hospital. *ACORN: Journal of Perioperative Nursing in Australia* 2016; 29(4): 21-4.
214. Johnson SA, Romanello ML. Generational diversity. *Nurse Educator* 2005; 30(5): 212-6.
215. Boysen P, Daste L, Northern T. Multigenerational challenges and the future of graduate medical education. *Ochsner Journal* 2016; 16(1): 101-7.
216. Hopkins L, Hampton B, Abbott J, et al. To the point: Medical education, technology, and the millennial learner. *American Journal of Obstetrics and Gynecology* 2018; 218(2): 188-92.
217. Buchan J, Parkin T, Sochalski J. International nurse mobility: Trends and policy implications. Geneva, Switzerland: WHO, 2003.
218. International Council of Nurses. Guidelines. Career moves and migration: Critical questions. Geneva, Switzerland, 2010.
219. World Health Organization. User's guide: The WHO global code of practice on the international recruitment of health personnel. Geneva, Switzerland, 2010.
220. National League for Nursing. A vision for expanding US nursing education for global health engagement. Washington D.C.: NLN, 2017.
221. Jones CB, Sherwood G. The globalization of the nursing workforce: Pulling the pieces together. *Nursing Outlook* 2014; 62(1): 59-63.
222. Prideaux D. The global–local tension in medical education: Turning 'think global, act local' on its head? *Medical Education* 2019; 53(1): 25-31.
223. Amerson R. Transforming global service learning experiences. *Journal of Transcultural Nursing* 2019; 30(2): 205.
224. Universities Australia. International students inject $32 billion a year into Australia's economy - Boosting Aussie jobs and wages 2018. https://www.universitiesaustralia.edu.au/Media-and-Events/media-releases/International-students-inject--32-billion-a-year-into-Australia-s-economy---boosting-Aussie-jobs-and-wages#.XKwFE5gzaUn (accessed 8 April 2019).
225. Bradbury-Jones C, Clark M. Globalisation and global health: issues for nursing. *Nursing Standard* 2017; 31(39): 54-63.
226. Njie-Mokonya N. Internationally educated nurses' and their contributions to the patient experience. *Online Journal of Issues in Nursing* 2016; 21(1): 1-10.
227. Waterval D, Driessen E, Scherpbier A, Frambach J. Twelve tips for crossborder curriculum partnerships in medical education. *Medical Teacher* 2018; 40(5): 514-9.
228. Whitehead C, Ho M, Martimianakis M, Hodges B. Achieving international harmony in global medical education standards: Time for more cross-cultural dialogue and research? *Medical Education* 2014; 48(2): 8.
229. Kahana E, Kahana B. Baby boomers' expectations of health and medicine. *The virtual mentor : VM* 2014; 16(5): 380-4.

230. Madsen C, Fraser A. Supporting patients in shared decision making in clinical practice. *Nursing Standard* 2015; 29(31): 50-60.

231. Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling* 2017; 100(1): 30-6.

232. Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health Affairs* 2008; 27(3): 759-69.

233. World Health Organization. Patient engagement. Geneva, Switzerland WHO, 2016.

234. Consumers Health Forum Australia. Consumers transforming health (A white paper). Canberra, ACT CHF, 2018.

235. ACSQHC. Australian Charter of Healthcare Rights. Sydney, NSW: ACSQHC, 2008.

236. Williams K, Sansoni JE, Morris D, Grootemaat PE, Thompson CJ. Patient-reported outcome measures: literature review. Wollongong, NSW: Australian Health Services Research Institute, Univeristy of Wollongong, 2016.

237. McCann TV, Moxham L, Farrell G, Usher K, Crookes P. Mental health content of Australian pre-registration nursing curricula: summary report and critical commentary. *Nurse Education Today* 2010; 30(5): 393-7.

238. Patterson C, Moxham L, Taylor E, et al. The effect of immersive workplace experience on undergraduate nurses mental health clinical confidence. . *International Journal of Mental Health Nursing,* 2017; 26(6): 620-8.

239. Cox CL, Whiteing N. PROMS in gastrointestinal nursing. *Gastrointestinal Nursing* 2010; 8(5): 16-9.

240. Samuels S, Hunt S, Tezra J. Patient Violence against Healthcare Workers. *Journal of Business and Behavioral Sciences* 2018; 30(2): 127-38.

241. Phillips J. Workplace violence against health care workers in the United States. *The New England Journal of Medicine* 2016; 374: 1161-9.

242. Boyle M, McKenna L. Paramedic student exposure to workplace violence during clinical placements–A cross-sectional study. *Nurse Education in Practice* 2017; 22: 93-7.

243. Nowrouzi-Kia B, Isidro R, Chai E, Usuba K, Chen A. Antecedent factors in different types of workplace violence against nurses: A systematic review. *Aggression and violent behavior* 2018.

244. Hills DJ, Joyce CM, Humphreys JS. Prevalence and prevention of workplace aggression in Australian clinical medical practice. *Australian Health Review* 2011; 35(3): 253-61.

245. National Council of State Boards of Nursing. The nursing regulatory environment in 2018: issues and challenges. *Journal of Nursing Regulation* 2018; 9(1): 52-67.

246. Lanctôt N, Guay S. The aftermath of workplace violence among healthcare workers: A systematic literature review of the consequences. *Aggression and violent behavior* 2014; 19(5): 492-501.

247. Johnson SL. Workplace bullying, biased behaviours and performance review in the nursing profession: A qualitative study. *Journal of Clinical Nursing* 2018; 00: 1-10.

248. Lever I, Dyball D, Greenberg N, Stevelink S. Health Consequences of Bullying in the Healthcare Workplace: A Systematic Review. *Journal of Advanced Nursing* 2019; 0(ja).

249. International Council of Nurses. Position statement. Prevention and management of workplace violence. Geneva, Switzerland: ICN, 2017.

250. Rawlins L. Faculty and student incivility in undergraduate nursing education: An integrative review. *Journal of Nursing Education* 2017; 56(12): 709-16.

251. Roche M, Diers D, Duffield C, Catling-Paull C. Violence Toward Nurses, the Work Environment, and Patient Outcomes. *Journal of Nursing Scholarship* 2010; 42(1): 13-22.

252. Australian Nursing and Midwifery Federation. Australian Nursing and Midwifery Federation policy. Bullying in the workplace, 2018.

253. Australian College of Nursing. Bullying in the workplace: Position statement. Canberra, Australia, 2016.

254. Budden LM, Birks M, Cant R, Bagley T, Park T. Australian nursing students' experience ofbullying and/or harassment during clinical placement. *Collegian* 2017; 24(2): 125-33.

255. Hartin P, Birks M, Lindsay D. Bullying and the nursing profession in Australia: An integrative review of the literature. *Collegian* 2018; 25(6): 613-9.

256. Morphet J, Griffiths D, Beattie J, Velasquez Reyes D, Innes K. Prevention and management of occupational violence and aggression in healthcare: A scoping review. *Collegian* 2018; 25(6): 621-32.

257. McGowan JE, Murray K. Exploring resilience in nursing and midwifery students: a literature review. *Journal of advanced nursing* 2016; 72(10): 2272-83.

258. Thomas L, Asselin M. Promoting resilience among nursing students in clinical education. *Nurse Education in Practice* 2018; 28: 231-4.

259. Australian Government Department of Health. Telehealth. 2015. http://www.health.gov.au/internet/main/publishing.nsf/Content/e-health-telehealth (accessed 4 April 2019).

260. Speyer R, Denman D, Wilkes-Gillan S, et al. Effects of Telehealth by Allied Health Professionals and Nurses in Rural and Remote Areas: A Systematic Review and Meta-Analysis. *Journal of Rehabilitation Medicine* 2018; 50(3): 225-35.

261. Fronczek AE, Rouhana NA. Attaining mutual goals in telehealth encounters: Utilizing King's framework for telenursing practice. *Nursing Science Quarterly* 2018; 31(3): 233-6.

262. Lister M, Vaughn J, Brennan-Cook J, Molloy M, Kuszajewski M, Shaw R. Telehealth and telenursing using simulation for pre-licensure USA students. *Nurse education in practice* 2018; 29: 59-63.

263. Standing Senate Committee on Social Affairs Science and Technology. Challenge ahead: Integrating robotics, artificial intelligence and 3D printing technologies into Canada's healthcare systems. . Ottawa, ON, Canada: Government of Canada, 2017.

264. Dods S, Hansen D, Boyle J, et al. A digitally-enabled health system. Sydney, NSW: CSIRO, 2014.

265. Marcolino MS, Oliveira JAQ, D'Agostino M, Ribeiro AL, Alkmim MBM, Novillo-Ortiz D. The impact of mHealth interventions: systematic review of systematic reviews. *JMIR mHealth and uHealth* 2018; 6(1): e23.

266. Jones KR, Lekhak N, Kaewluang N. Using mobile phones and short message service to deliver self-management interventions for chronic conditions: A meta-review. *Worldviews on Evidence-Based Nursing* 2014; 11(2): 81-8.

267. McKay FH, Cheng C, Wright A, Shill J, Stephens H, Uccellini M. Evaluating mobile phone applications for health behaviour change: A systematic review. *Journal of Telemedicine and Telecare* 2018; 24(1): 22-30.

268. Whitehead L, Seaton P. The effectiveness of self-management mobile phone and tablet apps in long-term condition management: A systematic review. *Journal of Medical Internet Research* 2016; 18(5): e97.

269. O'Connor S, Andrews T. Mobile technology and its use in clinical nursing education: A literature review. *Journal of Nursing Education* 2015; 54(3): 137-44.

270. Celler B, Varnfield M, Jayasena R. What Have We Learned from the CSIRO National NBN Telehealth Trial? *Stud Health Technol Inform* 2018; 246: 1-17.

271. Australian Government ADHA. Australia's National Digital Health Strategy – Safe, seamless and secure: evolving health and care to meet the needs of modern Australia. Sydney, NSW: ADHA, 2018.

272. Knezevic E. National Broadband Network. n.d. https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook45p/NBN (accessed 5 April 2019).

273. Caffery LJ, Bradford NK, Wickramasinghe SI, Hayman N, Smith AC. Outcomes of using telehealth for the provision of healthcare to Aboriginal and Torres Strait Islander people: a systematic review. *Australian and New Zealand journal of Public Health* 2017; 41(1): 48-53.

274. Moffatt JJ, Eley DS. The reported benefits of telehealth for rural Australians. *Australian Health Review* 2010; 34(3): 276-81.

275. Bois J, Waterbury T, Prasad M, et al. Coupling technology with learning theory in curriculum development: Postgraduate medical education at Mayo Clinic. *Journal of Graduate Medical Education* 2016; 8(2): 283-4.

276. Dunleavy G, Nikolaou C, Nifakos S, Atun R, Law G, Tudor Car L. Mobile digital education for health professions: Systematic review and meta-analysis by the digital health education collaboration. *Journal of Medical Internet Research* 2019; 21(2): 1-17.

277. Doyle G, Garrett B, Currie L. Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation model. *Nurse Education Today* 2014; 34(5): 775-82.

278. Huckvale C, Car J, Akiyama M, et al. Information technology for patient safety. *British Medical Journal Quality & Safety* 2010; 19(Suppl 2): i25-i33.

279. Gartner. Garnter IT Glossary: Big data. 2019. https://www.gartner.com/it-glossary/big-data (accessed 11 April 2019 2019).

280. Westra BL, Sylvia M, Weinfurter EF, et al. Big data science: A literature review of nursing research exemplars. *Nursing Outlook* 2017; 65(5): 549-61.

281. Wang Y, Kung L, Byrd TA. Big data analytics: Understanding its capabilities and potential benefits for healthcare organizations. *Technological Forecasting and Social Change* 2018; 126: 3-13.

282. Stanford Medicine. Stanford Medicine 2017 health trends report: Harnessing the power of data in health: Stanford University, 2017.

283. O'Connor S, Andrews T. Smartphones and mobile applications (apps) in clinical nursing education: A student perspective. *Nurse Education Today* 2018; 69: 172-8.

284. Brennan PF, Bakken S. Nursing needs Big Data and Big Data needs nursing. *Journal of nursing scholarship : an official publication of Sigma Theta Tau International Honor Society of Nursing* 2015; 47(5): 477-84.

285. Sensmeier J. Big data and the future of nursing knowledge. *Nursing Management* 2015; 46(4): 22-7; quiz 7-8.

286. Keenan GM. Big Data in health care: An urgent mandate to change nursing EHRs! *Online journal of nursing informatics* 2014; 18(1).

287. Ghosh A, McCarthy S, Halcomb E. Perceptions of primary care staff on a regional data quality intervention in Australian general practice: a qualitative study. *BMC family practice* 2016; 17(1): 50.

288. Thorn SA, Carter MA. The potential of health information exchange to assist emergency nurses. *Journal of Emergency Nursing* 2013; 39(5): e91-e6.

289. Raghupathi W, Raghupathi V. Big data analytics in healthcare: promise and potential. *Health information science and systems* 2014; 2(1): 3.

290. Australian Digital Health Agency. Clinical terminology. 2018. https://www.digitalhealth.gov.au/get-started-with-digital-health/what-is-digital-health/clinical-terminology (accessed 5 April 2019).

291. Scott IA. Hope, hype and harms of Big Data. *Internal medicine journal* 2019; 49(1): 126-9.

292. Mehta N, Pandit A. Concurrence of big data analytics and healthcare: A systematic review. *International Journal of Medical Informatics* 2018; 114: 57-65.

293. Garcia R. Big Data Big Possibilities: How Australia can use big data for better healthcare. Sydney, Australia The McKell Institute, 2016.

294. Australian Digital Health Agency and Australian College of Nursing. Joint media relase 28 November 2018 Nurse Champions for My Health Record. 2018. https://www.myhealthrecord.gov.au/sites/default/files/joint_media_release_with_acn_-_appointment_of_my_health_record_nurse_champions.pdf?v=1543358803.

295. Australian Government Department of Health. Framework to guide the secondary use of My Health Record system data. 2018 (accessed 25 March 2019).

296. O'Connor S. Big data and data science in health care: What nurses and midwives need to know. *Journal of Clinical Nursing* 2018; 27(15-16): 2921-2.

297. Daniel BK. Big Data and data science: A critical review of issues for educational research. *British Journal of Educational Technology* 2019; 50(1): 101-13.

298. Risling T. Educating the nurses of 2025: Technology trends of the next decade. *Nurse education in practice* 2017; 22: 89-92.

299. Maalouf N, Sidaoui A, Elhajj I, Asmar D. Robotics in nursing: A scoping review. *Journal of Nursing Scholarship* 2018; 50(6): 590-600.

300. Cresswell K, Cunningham-Burley S, Sheikh A. Health care robotics: qualitative exploration of key challenges and future directions. *Journal of Medical Internet Research* 2018; 20(7): e10410.

301. Riek L. Healthcare robotics. *Communications of the ACM* 2017; 60(11): 68-78.

302. Wisskirchen G, Thibault-Biacabe B, Bormann U, et al. Artificial intelligence and robotics and their impact on the workplace. London: International Bar Association, 2017.

303. Knight W. The dark secret at the heart of AI. *MIT Technology Review* 2017; (May/June 2017).

304. Murray T. Nursing education: our iceberg is melting. *Journal of Nursing Education* 2018; 57(10): 575-6.

305. Mathiason G, Pierce N, Cerilli J, et al. The transformation of the workplace through robotics, artificial intelligence, and automation: employment and labor law issues, solutions, and the legislative and regulatory response. San Francisco, US.: Littler., 2016.

306. Reddy S, Fox J, Purohit M. Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine* 2019; 112(1): 22-8.

307. Birks M, Bodak M, Barlas J, Harwood J, Pether M. Robotic seals as therapeutic tools in an aged care facility: A qualitative study. *Journal of Aging Research* 2016; 2016.

308. Khosla R, Chu M, Kachouie R, Yamada K, Yoshihiro F, Yamaguchi T. Interactive multimodal social robot for improving quality of care of elderly in Australian nursing homes. 20th ACM International Conference on Multimedia; 2012 October-November 2012; Nara, Japan; 2012.

309. Robinson H, MacDonald B, Broadbent E. Physiological effects of a companion robot on blood pressure of older people in residential care facility: A pilot study. *Australasian Journal on Ageing* 2015; 34(1): 27-32.

310. Broadbent E, Kerse N, Peri K, et al. Benefits and problems of health-care robots in aged care settings: A comparison trial. *Australasian Journal on Ageing* 2016; 35(1): 23-9.

311. Australian Centre for Robotic Vision. A robotics roadmap for Australia 2018. Brisbane: Queensland Institute of Technology, 2018.

312. Papadopoulos I, Koulouglioti C, Ali S. Views of nurses and other health and social care workers on the use of assistive humanoid and animal-like robots in health and social care: A scoping review. *Contemporary Nurse* 2018; 54(4-5): 425-42.

313. Kachouie R, Sedighadeli S, Khosla R, Chu M. Socially assistive robots in elderly care: A mixed-method systematic literature review. *International Journal of Human–Computer Interaction* 2014; 30(5): 369-93.

314. Clipper B, Batcheller J, Thomaz A, Rozga A. Artificial intelligence and robotics: A Nurse Leader's primer. *Nurse Leader* 2018; 16(6): 379-84.

315. Pepito J, Locsin R. Can nurses remain relevant in a technologically advanced future? *International Journal of Nursing Sciences* 2019; 6(1): 106-10.

316. Honey M, Collins E, Britnell S. Guidelines: Informatics for nurses entering practice 2018. Auckland, New Zealand; 2018.

317. Australian Nursing and Midwifery Federation. National informatics standards for nurses and midwives. Melbourne, Australia: Funded by the Australian Government Department of Health and Ageing, 2015.

318. Hübner U, Shaw T, Thye J, et al. Technology Informatics Guiding Education Reform - TIGER. *Methods of Information in Medicine* 2018; 57(5): e30-e42.

319. Canadian Association of Schools of Nursing. Nursing informatices entry-to-practice competencies for registered nurses. Ottawa, Canada., 2012.

320. Royal College of Nursing. Every Nurse an E-nurse Insights from a consultation on the digital future of nursing. London, England, United Kingdom: Royal College of Nursing, 2018.
321. Heath Education England, Royal College of Nursing. Improving digital literacy. London, England, United Kingdom: Royal College of Nursing, 2017.
322. US Department of Energy. Human Genome Project Information Archive 1990-2003 - HGP Research Area: Sequencing. 2019. https://web.ornl.gov/sci/techresources/Human_Genome/research/sequencing.shtml (accessed 1 April 2019).
323. Department of Health. Our Inheritacne - Our Future - Realising the potential of genetics in the NHS,. Norwich: The Licensing Division HMSO,, 2003.
324. Kirk M, Tonkin E, Skirton H. An iterative consensus-Building approach to revising a genetics/genomics competency framework for nurse education in the UK. *Journal of Advanced Nursing* 2014; 70(2): 405-20.
325. Mattick JS, Dziadek MA, Terrill BN, et al. The impact of genomics on the future of medicine and health. *Medical Journal of Australia* 2014; 201(1): 17-20.
326. Human Genomics Strategy Group. Building on our inheritance: Genomic technology in healthcare London, England, United Kingdom: UK Department of Health, 2012.
327. Vassy J, Korf B, Green R. How to know when physicians are ready for genomic medicine. *Science Translational Medicine* 2015; 13(7): 287fs19.
328. Kiernan J, Vallerand A. Cancer as a platform for genetics education in the undergraduate nursing curriculum. *Journal of Nursing Education* 2016; 55(4): 236-9.
329. Slade I, Subramanian D, Burton H. Genomics education for medical professionals - The current UK landscape. *Clinical Medicine* 2016; 16(4): 347-52.
330. Evans W, Relling M. Pharmacogenomics: translating functional genomics into rational therapeutics. *Science* 1999; 286(5439): 487-91.
331. Mattick J. Four ways precision medicine is making a differene. 2018. https://theconversation.com/four-ways-precision-medicine-is-making-a-difference-90459 (accessed 1 April 2019).
332. Patch C, Middleton A. Genetic counselling in the era of genomic medicine. *British medical bulletin* 2018; 126(1): 27-36.
333. Bowdin S, Gilbert A, Bedoukian E, et al. Recommendations for the integration of genomics into clinical practice. *Genetics in Medicine* 2016; 18(11): 1075.
334. Stark Z, Dolman L, Manolio TA, et al. Integrating Genomics into healthcare: A global responsibility. *The American Journal of Human Genetics* 2019; 104(1): 13-20.
335. Calzone K, Jenkins J, Nicol N, Skirton H, Feero W, Green E. Relevance of genomics to healthcare and nursing practice. *Journal of Nursing Scholarship* 2013; 45(1): 1-2.
336. Tognetto A, Michelazzo M, Ricciardi W, Federici A, Boccia S. Core competencies in genetics for healthcare professionals: Results from a literature review and a Delphi method. *BMC Medical Education* 2019; 19(1): 19.
337. Global Genomics Nursing Alliance. Welcome to the Global Genomics in Nursing Alliance. 2019. https://g2na.org/index.php (accessed 4 April 2019).
338. Health Education England. Genomics Education Programme 2019. 2019. https://www.genomicseducation.hee.nhs.uk/ (accessed 1 April 2019).

339. Nisselle A, Dunlop K, Macciocca I, et al. Readiness of clinical genetic healthcare professionals to provide genomic medicine: an Australian census. *Journal of Genetic Counselling* 2019: 1-11.

340. Nisselle A, Macciocca I, McKenzie F, Dunlop K, Metcalfe S, Gaff C, for the Australian Genomics Workforce and Education Working Group, . Technical Report Project 2: Professional status survey of genetic counsellors and clinical geneticist. Melbourne, Victoria: Australian Genomics, 2018.

341. Australian Genomics Health Alliance. Australian Genomics - Integrating genomics into healthcare. n.d. https://www.australiangenomics.org.au/about-us/australian-genomics/ (accessed 11 April 2019).

342. Long JC, Pomare C, Best S, et al. Building a learning community of Australian clinical genomics: A social network study of the Australian Genomic Health Alliance. *BMC Medicine* 2019; 17(1): 44.

343. McClaren B, Niselle A, Prichard Z, et al. Mapping existing education and training for the Australian clinical genomic workforce. Melbourne: Australian Genomics., 2018.

344. Burns B, Bilkey G, Coles E, et al. Healthcare system priorities for successful integration of genomics: An Australian focus. *Frontiers in Public Health* 2019; 7(41): 3-14.

345. Nisselle A, Martyn M, Jordan H, Metcalfe S, Gaff C. How do know your genomics educational intervention for health care providers is effective? . American Society of Human Genetics Annual Meeting. San Diego, CA, USA; 2018.

346. Camak D. Increasing importance of genetics in nursing. *Nurse Education Today* 2016; 44: 86-91.

347. Korf B, Berry A, Limson M, et al. Framework for development of physician competencies in genomic medicine: report of the Competencies Working Group of the Inter-Society Coordinating Committee for Physician Education in Genomics. *Genetics in Medicine* 2014; 16(11): 804-9.

348. Skirton H. Genetics and nursing: A whole new ball game or back to basics? *Nursing and Health Sciences* 2017; 19: 401-2.

349. Paneque M, Turchetti D, Jackson L, Lunt P, Houwink E, Skirton H. A systematic review of interventions to provide genetics education for primary care. *BMC Family Practice* 2016; 17(1).

350. Calzone KA, Kirk M, Tonkin E, Badzek L, Benjamin C, Middleton A. The global landscape of nursing and genomics. *Journal of Nursing Scholarship* 2018; 50(3): 249-56.

351. Van Riel N, Auwerx K, Debbaut P, Van Hees S, Schoenmakers B. The effect of Dr Google on doctor–patient encounters in primary care: a quantitative, observational, cross-sectional study. *British Journal of General Practice* 2017; 1(2): 1-10.

352. Househ M, Borycki E, Kushniruk A. Empowering patients through social media: the benefits and challenges. *Health Informatics Journal* 2014; 20(1): 50-8.

353. National Broadband Network. The evolution of the internet. 2019. https://www.nbnco.com.au/residential/learn/evolution-of-internet (accessed 5 April 2019).

354. Australian Bureau of Statistics. 8153.0 Internet Activity, Australia, June 2018. 2018a. http://www.abs.gov.au/ausstats/abs@.nsf/mf/8146.0?OpenDocument (accessed 5 April 2019).

355. Thomas J, Wilson CK, Park S. The Conversation – Australia's digital divide is not going away. 2018. https://theconversation.com/australias-digital-divide-is-not-going-away-91834 (accessed 5 April 2019).
356. Australian Bureau of Statistics. 8146.0 - Household Use of Information Technology, Australia, 2016-17 2018. https://www.abs.gov.au/ausstats/abs@.nsf/mf/8146.0 (accessed 4 April 2019).
357. Halcomb E, Purcell R, Hickman L, Smythe E. Telemonitoring is acceptable amongst community dwelling older Australians with chronic conditions. *Collegian* 2016; 23(4): 383-90.
358. Casella E, Mills J, Usher K. Social media and nursing practice: Changing the balance between the social and technical aspects of work. *Collegian* 2014; 21: 121-6.
359. International Council of Nurses. Position statement. Nurses and social media. Geneva, Switzerland, 2015.
360. Tower M, Blacklock E, Watson B, Heffernan C, Tronoff G. Using social media as a strategy to address 'sophomore slump'in second year nursing students: a qualitative study. *Nurse education today* 2015; 35(11): 1130-4.
361. Tower M, Latimer S, Hewitt J. Social networking as a learning tool: Nursing students' perception of efficacy. *Nurse Education Today* 2014; 34(6): 1012-7.
362. World Health Organization. Climate change and health in small island developing states: A WHO special initiative. Geneva, Switzerland WHO, 2018b.
363. Feulner G. Global challenges: Climate change. Potsdam, Germany: John Wiley & Sons Ltd, 2017.
364. Costello A, Abbas M, Allen A, et al. Managing the health effects of climate change: lancet and University College London Institute for Global Health Commission. *The Lancet* 2009; 373(9676): 1693-733.
365. Watts N, Amann M, Ayeb-Karlsson S, et al. The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health. *The Lancet* 2018; 391(10120): 581-630.
366. World Health Organization. Climate change and health - key facts. 2018. https://www.who.int/en/news-room/fact-sheets/detail/climate-change-and-health (accessed 22 March 2019 2019).
367. Haines A, Kovats RS, Campbell-Lendrum D, Corvalán C. Climate change and human health: Impacts, vulnerability and public health. *Public Health* 2006; 120(7): 585-96.
368. Paavola J. Health impacts of climate change and health and social inequalities in the UK. *Environmental Health* 2017; 16(1): 62-8.
369. Angelini K. Climate change, health and the role of nurses. *Nursing for Women's Health* 2017; 21(2): 80-3.
370. Zhang Y, Beggs PJ, Bambrick H, et al. The MJA–Lancet Countdown on health and climate change: Australian policy inaction threatens lives. *Medical Journal of Australia* 2018; 209(11): 474-.
371. Leffers J, Levy R, Nicholas P, Sweeney C. Mandate for the nursing profession to address climate change through nursing education. *Journal of Nursing Scholarship* 2017; 49(6): 679-87.
372. Leffers J, Butterfield P. Nurses play essential roles in reducing health problems due to climate change. *Nursing Outlook* 2018; 66(2): 210-3.

373. Adlong W, Dietsch E. Nursing and climate change: An emerging connection. *Collegian* 2015; 22(1): 19-24.

374. Blashki G, Armstrong G, Berry H, et al. Preparing Health Services for Climate Change in Australia. *Asia Pacific Journal of Public Health* 2011; 23(2_suppl): 133S-43S.

375. Rychetnik L, Sainsbury P, Stewart G. How Local Health Districts can prepare for the effects of climate change: an adaptation model applied to metropolitan Sydney. *Australian Health Review* 2018.

376. CSIRO, Australian Government BoM. State of the Climate. Sydney, NSW: Commonwealth of Australia, 2018.

377. Edwards B, Gray M, Hunter B. The impact of drought on mental health in rural and regional Australia. *Social Indicators Research* 2015; 121(1): 177-94.

378. Austin EK, Handley T, Kiem AS, et al. Drought-related stress among farmers: Findings from the Australian Rural Mental Health Study. *Medical Journal of Australia* 2018; 209(4): 159-65.

379. Sartore GM, Kelly B, Stain HJ, Fuller J, Fragar L, Tonna A. Improving mental health capacity in rural communities: Mental health first aid delivery in drought-affected rural New South Wales. *Australian Journal of Rural Health* 2008; 16(5): 313-8.

380. Lilienfeld E, Nicholas PK, Breakey S, Corless IB. Addressing climate change through a nursing lens within the framework of the United Nations Sustainable Development Goals. *Nursing outlook* 2018; 66(5): 482-94.

381. Sullivan-Marx E, McCauley L. Climate change, global health, and nursing scholarship. *Journal of Nursing Scholarship* 2017; 49(6): 593-5.

382. Teherani A. A health professions curriculum on sustainable healthcare education: Dentistry, medicine, nursing, and pharmacy. San Francisco: University of California, 2017.

383. International Council of Nurses. Position statement. Nurses, climate change and health. Geneva, Switzerland, 2018.

384. International Council of Nurses. Position statement. Nurses and disaster risk reduction, response and recover. Geneva, Switzerland, 2019.

385. Australian College of Nursing. Climate and the nursing profession: Position statement. Sydney, NSW: ACN, 2017.

386. Labrague L, Hammad K, Gloe D, et al. Disaster preparedness among nurses: A systematic review of literature. *International Nursing Review* 2018; 65(1): 41-53.

387. Professional Standards Authority. Right-touch reform: A new framework for assurance of professions, 2017.

388. Nursing and Midwifery Council. Realising professionalism: Standards for education and training – Part 1: Standards framework for nursing and midwifery education London, England, United Kingdom, 2018.

389. Zittel B, Moss E, O'Sullivan A, Siek T. Registered nurses as professionals: Accountability for education and practice. *Online Journal of Issues in Nursing* 2016; 21(3).

390. Practitioners' AAoN. State Practice Environment. 2018. https://www.aanp.org/advocacy/state/state-practice-environment (accessed 4/4/19 2019).

391. Francis B, Humphreys J. The Entry-Gate for Nurse Education: professionalisation of nurse education and its impact on nursing skill-mix in the NHS. British Educational Research Association Conference. Queen's University of Belfast, Northern Ireland: Education-line; 1998.

392. Vanson T, Beckett A. Evaluation of introduction of nursing associates: Phase 1 – Year 1 evaluation report 2018.

393. Saari M, Xiao S, Rowe A, et al. The role of unregulated care providers in home care: A scoping review. *Journal of Nursing Management* 2018; 26(7): 782-94.

394. College of Nurses of Ontario. Practice Guideline: Working with unregulated care providers. 2013. https://www.cno.org/globalassets/docs/prac/41014_workingucp.pdf (accessed 26 March 2019).

395. Health Education England. Multi-professional framework for advanced clinical practice in England. 2017. https://www.lasepharmacy.hee.nhs.uk/dyn/_assets/_folder4/advanced-practice/multi-professionalframeworkforadvancedclinicalpracticeinengland.pdf (accessed 27 March 2019).

396. Nadaf C. Perspectives: Reflections on a debate: When does advanced clinical practice stop being nursing? *Journal of Research in Nursing* 2018; 23(1): 91-7.

397. McInnes S, Peters K, Bonney A, Halcomb E. The influence of funding models on collaboration in Australian general practice. *Australian Journal of Primary Health* 2017; 23(1): 31-6.

398. McInnes S, Peters K, Bonney A, Halcomb E. Understanding collaboration in general practice: A qualitative study. *Family Practice* 2017; 34(5): 621-6.

399. Bird S, Thompson C, Williams K. Primary contact physiotherapy services reduce waiting and treatment times for patients presenting with musculoskeletal conditions in Australian emergency departments: An observational study. *Journal of Physiotherapy* 2016; 62(4): 209-14.

400. Masso M, Thompson C. Attributes of innovations and approaches to scalability – Lessons from a national program to extend the scope of practice of health professionals. *Journal of Multidisciplinary Healthcare* 2016; 9: 401-10.

401. Paulsen R. Taking nurse staffing research to the unit level. *Nursing Management* 2018; 49(7): 42-8.

402. Donaldson N, Bolton LB, Aydin C, Brown D, Elashoff JD, Sandhu M. Impact of California's licensed nurse-patient ratios on unit-level nurse staffing and patient outcomes. *Policy, Politics, and Nursing Practice* 2005; 6(3): 198-210.

403. Spetz J, Harless DW, Herrera CN, Mark BA. Using minimum nurse staffing regulations to measure the relationship between nursing and hospital quality of care. *Medical care research and review : MCRR* 2013; 70(4): 380-99.

404. Welsh Government. Nurse staffing levels (Wales) act 2016. Statutory guidence. 2017. http://tinyurl.com/yd5a935a.

405. The Shelford Group. Safer nursing care tool: Implementation Resource Pack. 2013. https://www.pbs.gov.au/browse/nurse?initial=o (accessed 5 April 2019).

406. Gething V. Cabinet statement: Written statement - Update on extension of the nurse staffing levels (Wales) Act 2016. Vaughan Gething, Cabinet Secretary for Health and

Social Services, Welsh Government. 2018. https://gov.wales/written-statement-update-extension-nurse-staffing-levels-wales-act-2016 (accessed 28 March 2019).

407. Ball J, Day T, Murrells T, et al. Cross-sectional examination of the association between shift length and hospital nurses job satisfaction and nurse reported quality measures. *BMC Nursing* 2017; 16(1): 26.

408. Jones A, Powell T, Vougioukalou S, Lynch M, Kelly D. Research into nurse staffing levels in Wales. Cardiff, Wales, United Kingdom, 2015.

409. Duffield C, Roche M, Merrick E. Methods of measuring nursing workload in Australia. *Collegian (Royal College of Nursing, Australia)* 2006; 13(1): 16-22.

410. Sim J, Joyce-McCoach J, Gordon R, Kobel C. Development of a data registry to evaluate the quality and safety of nursing practice. *Journal of Advanced Nursing* 2019.

411. Twigg D, Duffield C, Bremner A, Rapley P, Finn J. The impact of the nursing hours per patient day (NHPPD) staffing method on patient outcomes: A retrospective analysis of patient and staffing data. *International Journal of Nursing Studies* 2011; 48(5): 540-8.

412. Wise S, Fry M, Duffield C, Roche M, Buchanan J. Ratios and nurse staffing: The vexed case of emergency departments. *Australasian Emergency Nursing Journal* 2015; 18(1): 49-55.

413. Lesman B, Aroozoo M, Petrie A. Safe Patient Care (nurse to patient and midwife to patient ratios) Amendment Bill 2018 Victoria, Australia Department of Parliamentary Services, Parliament of Victoria, 2018.

414. Queensland Health Office of the Chief Nurse and Midwifery Officer. Nurse-to-patient ratios – Information Sheet 2016. https://www.health.qld.gov.au/__data/assets/pdf_file/0032/666419/npr-general-info-sheet.pdf (accessed 28 March 2019).

415. Aiken LH, Sloane D, Griffiths P, et al. Nursing skill mix in European hospitals: cross-sectional study of the association with mortality, patient ratings, and quality of care. *BMJ Quality & Safety* 2017; 26(7): 559-68.

416. Sim J, Crookes P, Walsh K, Halcomb E. Measuring the outcomes of nursing practice: A Delphi study. *Journal of Clinical Nursing* 2018; 27(1-2): e368-e78.

417. Chan A, Molloy L, Pertile J, Iglesias M. A review for Australian nurses: cannabis use for anti-emesis among terminally ill patients in Australia. *Australian Journal of Advanced Nursing* 2017; 34(3): 43-7.

418. Snitzman S, Bretteville-Jensen A. Public opinion and medical cannabis policies: examining the role of underlying beliefs and national medical cannabis policies. *Harm Reduction Journal* 2015; 12(46): 1-10.

419. Whiting P, Wolff RF, Deshpande S, et al. Cannabinoids for medical use: a systematic review and meta-analysis. *Jama* 2015; 313(24): 2456-73.

420. Farrell M, Buchbinder R, Hall W. Should doctors prescribe cannabinoids? *BMJ* 2014; 348: g2737.

421. Canadian Nurses Association. Harm reduction and illicit substance use implications for nursing Ottawa, Canada: CNA, 2017.

422. Martin J, Bonomo Y. Medicinal cannabis in Australia: the missing links. *Medical Journal of Australia* 2016; 204(10): 371-3.

423. Bartle J. Most Australians support decriminalising cannabis, but our laws lag behind. 2018. https://theconversation.com/most-australians-support-decriminalising-cannabis-but-our-laws-lag-behind-99285 (accessed 11 April 2019).
424. Therapeutic Goods Administration. Guidance for the use of medicinal cannabis in Australia - Overview. Canberra: Commonwealth of Australia, 2017.
425. Palliative Care Clinical Studies Collaborative. Medicinal cannabis - series 19. 2019. https://www.uts.edu.au/research-and-teaching/our-research/impacct/palliative-care-clinical-studies-collaborative/rapid-0-8 (accessed 11 April 2019).
426. Pettinato N. Medicinal cannabis: a primer for nurses,. *Nursing2017* 2017; 47(8): 40-6.
427. Australian Nursing and Midwifery Federation. ANMF Position Statement - Medicinal Cannabis,. 2019. http://anmf.org.au/documents/policies/PS_Medicinal_Cannabis.pdf (accessed 11 April 2019).
428. Ghertner R, Groves L. The opiod crisis and economic opportunity: Geographic and economic trends. Washington, D.C.: U.S. Department of Health and Human Services, 2018.
429. Manworren R, Gilson A. Nurses' role in preventing prescription opioid diversion. *The American Journal of Nurses* 2015; 115(8): 34-40.
430. United Nations Office on Drugs and Crime. World Drug Report 2012. Vienna, 2012.
431. Roxburgh A, Bruno R, Larance B, Burns L. Prescription of opioid analgesics and related harms in Australia. *Medical Journal of Australia* 2011; 195(5): 280-4.
432. National Council of State Boards of Nursing. The 2017 environmental scan. *Journal of Nursing Regulation* 2017; 7(4): 1-36.
433. Knoer SJ. Population health management: Improving the community to heal the patient. *American Journal of Health-System Pharmacy* 2017; 74(2): 30-2.
434. Therapeutic Goods Administration. Prescription strong (Schedule 8) opioid use and misuse in Australia – options for a regulatory response Consultation paper. Canberra: Australian Government, 2018.
435. Roxburgh A, Dobbins T, Degenhardt L, Peacock A. Opioid- amphetamine- and cocaine-induced deaths in Australia,. 2018. https://ndarc.med.unsw.edu.au/resource/opioid-amphetamine-and-cocaine-induced-deaths-australia-august-2018 (accessed 11 April 2019).
436. Dobbin M. Pharmaceutical misuse in Australia,. *Australian Prescriber* 2014; 37(3): 79-81.
437. Australian Government Department of Health. The Pharmaceutical Benefits Scheme, Nurse practitioner PBS prescribing. n.d. https://www.pbs.gov.au/browse/nurse?initial=o (accessed 5 April 2019).
438. Jukiewicz DA, Alhofaian A, Thompson Z, Gary FA. Reviewing opioid use, monitoring, and legislature: Nursing perspectives. *International Journal of Nursing Sciences* 2017; 4(4): 430-6.
439. Tyler L, Fox E. Regulatory requirements: Proliferation of complex demands. *American Journal of Health-System Pharmacy* 2017; 74(2): 45-7.
440. World Health Organization. Global standards for the initial educaion of professional nurses and midwives No. WHO/HRH/HPN/08.6,. Geneva.: Nursing and Midwifery Human Resources for Health 2009.

441. Halcomb EJ, Newton PJ. Research in Nursing. In: Daly J, Speedy S, Jacksin D, eds. Contexts of Nursing 5th edition Chatswood, NSW: Elsevier Australia 2017: 129-43.

442. Furlong E, Smith R. Advanced nursing practice: Policy, education and role development. *Journal of Clinical Nursing* 2005; 14: 1059-66.

443. International Council of Nurses. Position statement. Antimicrobial resistance. Geneva, Switzerland, 2017.

444. Ralph N, Birks M, Cross W, Chapman Y. "Settling for less": Designing undergraduate nursing curricula in the context of national accreditation. *Collegian* 2017; 24(2): 117-24.

445. World Health Organization. Global Strategic directions for strengthening nursing and midwifery 2016-2020. Geneva, Switzerland, 2016.

446. Senate Community Affairs References Committee. The patient profession: Time for action, Report on the inquiry into nursing. Canberra, ACT: Australian Government, 2002.

447. Australian Government Department of Health. Nursing workforce sustainability: Improving nurse retention and productivity. Canberra, Australia Commonwealth of Australia 2014.

448. Coyne I, Comiskey CM, Lalor JG, Higgins A, Elliott N, Begley C. An exploration of clinical practice in sites with and without clinical nurse or midwife specialists or advanced nurse practitioners, in Ireland. *BMC Health Services Research* 2016; 16(1): 151.

449. Universities Australia. 2019-20 Pre-Budget submission, 2019.

450. Cashin A, Buckley T, Donoghue J, et al. Development of the nurse practitioner standards for practice Australia. *Policy, Politics, and Nursing Practice* 2015; 16(1-2): 27-37.

451. Arja S. Undergraduate medical education and curricula. *Immunotherapy Research Journal* 2017; 1(1): 1-2.

452. Australian Medical Council Limited. Standards for assessment and accreditation of primary medical programs by the Australian Medical Council 2012. Kingston, ACT: Medical Board of Australia 2012.

453. General Medical Council. Training pathways: Analysis of the transition from the foundation programme to the next stage of training. Manchester: General Medical Council, 2017.

454. Jardine et al. Milestone guidebook for residents and fellows Chicago, IL: Accreditation Council for Graduate Medical Education, 2017.

455. Brownie S, Bahnisch M, Thomas J. Competency-based education and competency-based career frameworks: Informing Australian health workforce development. Adelaide, Australia: University of Queensland Node of the Australian Health Workforce Institute in partnership with Health Workforce Australia, 2011.

456. Garneau A, Lavoie P, Grondin M. Dichotomy and dialogue in conceptualizations of competency in health professionals' education. *Journal of Nursing Education and Practice* 2017; 7(6): 18-26.

457. Brightwell A, Grant J. Competency-based training: Who benefits? *Postgraduate Medical Journal* 2013; 89(1048): 107-10.

458. Imison C, Castle-Clarke S, Watson R. Reshaping the workforce to deliver the care patients need. London, England Nuffield Trust and in Association with NHS Employers, 2016.

459. Australian Nursing and Midwifery Accreditation Council. Program accreditation. 2016. https://www.anmac.org.au/program-accreditation/program-accreditation.

460. Nursing and Midwifery Board of Australia. Approved programs and study. 2019. https://www.nursingmidwiferyboard.gov.au/accreditation/approved-programs-of-study.aspx (accessed 4 April 2019).

461. Australian Nursing and Midwifery Federation. Australian Nursing and Midwifery Federation policy. Nursing education: Enrolled nurse: Australian Nursing & Midwifery Federation, 2016.

462. Australian Nursing and Midwifery Federation. Australian Nursing and Midwifery Federation policy. Nursing education: Registered nurse, 2016.

463. Brown C, Baker M, Jessup M, Marshall A. EN2RN - transitioning to a new scope of practice. *Contemporary Nurse* 2015; 50(2-3): 196-205.

464. Nursing and Midwifery Board of Australia. Nurse practitioner standards for practice. Melbourne, VIC: Nursing and Midwifery Board of Audtralia, 2014.

465. Leidel S. Nurse practitioners in Australia: strategic errors and missed opportunities. *Medical Journal of Australia* 2014; 201(2): 85-6.

466. Halcomb E, Smyth E, Moxham L, Traynor V, Fernandez R. Bachelor of Nursing Honours programs in Australia: Current trends and key challenges. *Collegian* 2018; 25(4): 429-34.

467. Giddens JF, Brady DP. Rescuing nursing education from content saturation: The case for a concept-based curriculum. *Journal of Nursing Education* 2007; 46(2): 65-9.

468. Bruckel J, Carballo V, Kalibatas O, et al. Use of spaced education to deliver a curriculum in quality, safety and value for postgraduate medical trainees: Trainee satisfaction and knowledge. *Postgraduate Medical Journal* 2016; 92: 137-44.

469. Byrne C. Nursing curriculum trends. 27th International Nursing Research Congress; 2016; Cape Town, South Africa; 2016.

470. Kecskes Z, Mitchell I. Teaching future doctors for modern health care: Medical education over time - are we keeping up? *The Medical Journal of Australia* 2017; 206(4): 158-9.

471. Chen BY, Kern DE, Kearns RM, Thomas P, Hughes MT, Tackett S. From modules to MOOCs: Application of the six-step approach to online curriculum development for medical education. *Academic Medicine: Journal of the Association of American Medical Colleges* 2019: 1-32.

472. Hamdy H. Medical college of the future: From informative to transformative. *Medical Teacher* 2018; 40(10): 986-9.

473. Hajhashemi K, Anderson N, Jackson CM, Caltabiano N. Online learning: Increasing learning opportunities *International E-Journal of Advances in Education* 2017; 3(7): 184-9.

474. Swigart V, Liang Z. Digital resources for nursing education: Open courseware and massive open online courses. *International Journal of Nursing Sciences* 2016; 3(3): 307-13.

475. Cadogan N. Life in the fastlane: FOAM. 2019. https://litfl.com/foam-free-open-access-medical-education/ (accessed 4 April 2019).

476. Nickson CP, Cadogan MD. Free Open Access Medical education (FOAM) for the emergency physician. *Emergency Medicine Australasia* 2014; 26(1): 76-83.

477. Cadogan M, Thoma B, Chan TM, Lin M. Free Open Access Meducation (FOAM): The rise of emergency medicine and critical care blogs and podcasts (2002–2013). *Emergency Medicine Journal* 2014; 31(1): 76-7.

478. Carroll CL, Bruno K. Social media and free open access medical education: The future of medical and nursing education? *American Journal of Critical Care* 2016; 25(1): 93-6.

479. Nurse Uncut. #FOANed Free Open Access Nursing education – not just another hashtag. 2017. https://www.nurseuncut.com.au/foaned-free-open-access-nursing-education-not-just-another-hashtag/ (accessed 4 April 2019).

480. Ross P. FOANed (Free Open Access Nursing Education). Nursing Education Network: Nursing Education Network 2016.

481. Anderson T, Dron J. Learning technology through three generations of technology enhanced distance education pedagogy. *European Journal of Open, Distance and e-learning* 2012; 15(2).

482. Swift A. E-learning may be no better than traditional teaching for continuing education of health professionals. *Evidence Based Nursing* 2018; 0(2): 1.

483. Halcomb et, al. Supporting Career Progression through Academic Mentorship (STREAM): Final Report of the Project Developing and Implementing a Leadership Capacity Building Program for Teaching and Learning in Nursing. Sydney, NSW: Australian Governement Office for Learning and Teaching 2014.

484. Halcomb EJ, Andrew S, Peters K, Salamonson Y, Jackson D. Casualisation of the teaching workforce: Implications for nursing education. *Nurse Education Today* 2010; 30(6): 528-32.

485. Bittner NP, Bechtel CF. Identifying and describing nurse faculty workload issues: A looming faculty shortage. *Nursing Education Perspectives* 2017; 38(4): 171-6.

486. Booth TL, Emerson CJ, Hackney MG, Souter S. Preparation of academic nurse educators. *Nurse Education in Practice* 2016; 19: 54-7.

487. Baldwin A, Bentley K, Langtree T, Mills J. Achieving graduate outcomes in undergraduate nursing education: following the Yellow Brick Road. *Nurse Education in Practice* 2014; 14: 9-11.

488. NHS England. The NHS Long Term Plan. London, England: NHS, 2019.

489. Beech J, Bottery S, Charlesworth A, et al. Closing the gap: Key areas for action on the health and care workforce: The Health Foundation, The King's Fund, Nuffieldtrust,, 2019.

490. Council of Deans of Heatlh Scotland. Pre-registration nursing & midwifery provision in Scotland. 2016. https://councilofdeans.org.uk/2016/08/pre-registration-education-for-scotland/ (accessed 4 April 2019).

491. Scottish Government. Setting the direction for nursing and midwifery education in Scottland: The Stratigic Aims from the Chief Nursing Officer's Education Review Edinburgh, Scotlnd 2014.

492. Royal College of Nursing Wales. The future of nursing education in Wales. Cardiff: Royal College of Nursing Wales, 2016.
493. National Council of State Boards of Nursing. The NCSBN 2019 Environmental Scan: 40th Anniversary Edition. *Journal of Nursing Regulation* 2019; 9(4): S1-S40.
494. Council on Social Work Education. Envisioning the future of social work: Report of the CSWE futures task force. Alexandria, VA, United States, 2018.
495. Deloitte Access Economics. The future of work. Occupational and education trends in nursing in Australia, 2018.
496. Woods M. Australia's Health Workforce: strengthening the education foundation. Canberra, Australia: COAG Health Council, 2017.
497. Mason J. Review of Australian Government Health Workforce Programs. Canberra, Australia: Australian Government, 2013.
498. Nursing Council of New Zealand. Trends in the New Zealand nursing workforce: 2012-2016. Wellington, New Zealand 2017.
499. World Health Organization. Transforming and scaling up health professionals' education and training: World Health Organization guidelines 2013. Geneva, Switzerland, 2013.
500. Orgel H. Improving LGBT cultural competence in nursing students: An integrative review. *The ABNF Journal* 2017; Winter: 14-8.
501. Vaona A, Banzi R, Kwag K, et al. E-learning for health professionals. *Cochrane Database Systematic Reviews* 2018; 1: 1-89.
502. Chan Z, Cheng W, Fong M, et al. Curriculum design and attrition among undergraduate nursing students: A systematic review. *Nurse Education Today* 2019; 74: 41-53.
503. DeCoste-Lopez J, Madhok J, Harman S. Curricular innovations for medical students in palliative and end-of-life care: A systematic review and assessment of study quality. *Journal of Palliative Medicine* 2015; 18(4): 338-49.
504. Downey K, Asselin M. Accelerated master's programs in nursing for non-nurses: An integrative review of students' and faculty's perceptions. *Journal of Professional Nursing* 2015; 31(3): 215-25.
505. Laskaratos F, Gkotsi D, Panteliou E. A critical review of the core medical training curriculum in the UK: A medical education perspective. *JRSM Open* 2014; 5(1): 2042533313514049.
506. Saud H, Chen R. The effect of competency-based education on medical and nursing students' academic performance, technical skill development, and overall satisfaction and preparedness for future practice: An integrative literature review. *International Journal of Health Sciences Education* 2018; 5(1): 1-13.
507. Stievano A, Caruso R, Pittella F, Shaffer F, Rocco G, Fairman J. Shaping nursing profession regulation through history – A systematic review. *International Nursing Review* 2018: 17-29.
508. Taylor A, Lehmann S, Chisolm M. Integrating humanities curricula in medical education: A literature review. *MedEdPublish* 2018; 6: 1-12.
509. Morrison A. Scope of nursing practice and decision making framework tool kit. Geneva, Switzerland: International Council of Nurses, 2010.
510. Sherwood J. What is cultural competence? . 2019. https://sydney.edu.au/nccc/about-us/what-is-cultural-competence.html (accessed 1 April 2019).

511. Nursing and Midwifery Board of Australia. Enrolled nurses standards for practice: Nursing and Midwifery Board of Australia, 2016.

512. Nursing and Midwifery Board of Australia. Registered nurses standards for practice: Nursing and Midwifery Board of Australia, 2016.

513. Nursing and Midwifery Board of Australia. Registered Nurse Standards for Practice. Melbourne, Victoria: Nursing and Midwifery Board of Australia, 2016.

514. International Council of Nurses. Position statement. Scope of Nursing Practice. Geneva, Switzerland: International Council of Nurses, 2016.

515. Hajikowicz S, Cook H, Littleboy A. Our future world: Global megatrends that will change the way we live. Canberra, Australia: CSIRO, 2012.

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Appendix 2 Search terms

Stage 1 search terms – academic literature

Number	Search term
1	“nurs* education” OR “nurs* train*” (limit to abstract)
2	trend OR future OR innovation OR plan OR forecast (limit to abstract)
3	“literature review” OR “systematic review” OR review
4	1 AND 2 AND 3 (limit by peer reviewed; time period; language and countries in-scope; sort by relevance)
5	educat* OR train* AND “health care professional” AND trend OR future OR innovation OR plan OR forecast
6	AND curricul* AND “nurs*education” OR “medical education” OR “allied health”
7	“literature review” OR “systematic review” OR review
8	5 AND 6 AND 7 (limit by peer reviewed; time period; language and countries in-scope; sort by relevance)

Stage 2 search terms – academic literature

Number	Search term
1	“sub-topic key words” (refer to Figure 3)
2	trend OR future OR innovation OR plan OR forecast
3	“nurs* education” OR “nurs* train*”
4	“literature review” OR “systematic review” OR review
5	1 AND 2 AND 3 AND 4 (limit by peer reviewed; time period; language and countries in-scope; sort by relevance)
6	“enrolled nurs*” OR “registered nurs*” OR “nurse practitioner*” OR “baccalaureate nurs*” OR “baccalaureate prep*” OR “diploma nurs*” OR “diploma prep*”
7	NOT midwi* OR student* OR “assistant nurs*” or trainee
8	trend OR future OR innovation OR plan OR forecast
9	Australia*
10	1 AND 6 AND 7 AND 8 (limit by peer reviewed; time period; language and countries in-scope; sort by relevance)
11	1 AND 6 AND 7 AND 8 AND 9 (limit by peer reviewed; time period; language and countries in-scope; sort by relevance)

Grey literature search terms

Number	Search term
1	“nurs* education” OR ”nurse* train*”
2	trend OR future OR innovation OR plan OR forecast
3	.gov
4	In-scope country identifiers (Australia, UK, US, Canada and New Zealand)
5	1 AND 2 AND 3 AND 4
6	.edu
7	1 AND 2 AND 4 AND 6
8	.org
9	1 AND 2 AND 4 AND 8

Appendix 3 Exclusion criteria

Criteria	Comment
Sources which described non current issues, despite inclusions relating to education and training, skills or attributes of health care professionals.	Any studies which are not addressing current or emerging issues are out of scope.
Books, chapters	The six week timeframe resulted in a focus on immediately accessible sources, if e-book versions were not available then these sources were not pursued.
Letters, book reviews, propaganda.	These sources were felt to not add materially to the review.
Studies that focused on post-registration training and continuing professional development.	This was not the focus of Topic 4 any such studies were excluded.
Studies that provide detailed information about a specific domain of nursing education e.g. mental health nursing education.	This level of detail would extend the search parameters and reduce capacity to meet the project timeframe.
Studies of educational strategies.	This was not the focus of Topic 4.
Studies that address sub-topics that were addressed through either Topic 1, 2 or 3 literature reviews, e.g. interprofessional education is considered in Topic 3.	This was to prevent duplication of effort.
Sources that were not contemporaneous	The future-oriented focus of the subject required contemporary literature.

Appendix 4 Sources identifying the current and emerging issues influencing pre-registration nursing education – United Kingdom

Country / title	Description of the source	Findings
United Kingdom NHS England, 2019. The NHS Long Term Plan.[488]	NHS strategic planning document developed to guide health system developments in the next 10 years. While not specific to nursing education there is a comprehensive chapter on workforce.	▪ The NHS Long Term Plan recognises that there is a mismatch between service demands and workforce supply. ▪ The plan proposes a range of targets and measures to improve workforce supply. For example, expanding the number of nursing and other undergraduate places; increased funding for clinical placements, more apprenticeships and a new online nursing degree. ▪ Concerns from professional bodies have been raised in response to this recommendation about the balance of academic and practical skills required in nursing training. ▪ The plan proposes an online nursing degree from 2020 at a reduced cost to students, alongside exploring 'earn and learn' support premiums to, predominately mature, students on more flexible undergraduate degrees in mental health or learning disability nursing, with the aim of having an additional 4,000 people in training by 2023/24.
United Kingdom Beech et al., 2019. Closing the gap – Key areas for action on the health and care workforce.[489]	This report was produced in response to broader strategic planning occurring such as 'The NHS Long Term Plan'. It addresses workforce challenges as the scale of these issues is argued to be the most significant threat to the delivery and quality of care over the next 10 years. It focuses on nursing and general practice and has a particular focus on training and education. The report draws on published literature and data, in addition to a series of consultations with national and professional leaders and a roundtable of key stakeholders. Modelling was also undertaken to inform certain sections of the report.	▪ Issues relating to the training pipeline are examined in depth as well as international recruitment, return to practice strategies and the development of existing staff. Implications for social care area are also identified. ▪ A lack of coordination between higher education institutions, commissioners of training and the NHS is identified as being problematic. ▪ There is no longer national control over the number of training places offered in nursing and allied health subjects. ▪ Attrition during training is a significant issue with the report noting: 'In nursing, of UK students who began a three-year degree due to finish in 2017, a quarter (24 per cent) left or suspended their studies' (p. 7). ▪ Recommends that bodies commissioning undergraduate and postgraduate medical, nursing and allied health professional courses monitor quality, success and the balance of training. ▪ Discusses evidence that the skills of the current NHS workforce are not aligned with patient needs and identifies three policy levers: initial education, licensing and

Country / title	Description of the source	Findings
		certification; continuous professional development and re-licensing; and expanding scope of practice. ▪ Technology, safe staffing, role enhancement and workforce design within primary care are identified as future education and training issues. ▪ Safe staffing levels were identified as a key issues in promoting patient safety and quality of care but needed to be extended beyond the acute sector to community, mental health and primary care. ▪ Presents evidence supporting advanced practice roles and recommends more formal national regulation of advanced practice (the Royal College of Nursing has a voluntary credentialing process for nurses with advanced skills). There is growing scope for advanced nursing practice in primary care. ▪ Improved mental health service provision in primary care is urgently required. ▪ The ethical issues relating to international recruitment of nurses and health workers from less developed countries were noted, however the NHS is likely to rely on this strategy to address short-term workforce shortages. ▪ The intersection of health and social care necessitates collaborative workforce planning between the NHS and care sector.
United Kingdom Health Education England, 2019. The Topol Review: preparing the health care workforce to delivery digital future online.[211]	An independent report on behalf of the Secretary of State for Health and Social Care of a review into the impact of technological developments on clinical staff, including implications for required skills and curricula, education and training of future NHS staff. The review was supported by three expert panels in genomics, digital medicine and artificial intelligence and robotics.	▪ The role of the patient is central to the integration of new technologies into health care. ▪ The major technological advances affecting health care arise from developments in digital medicine, genomics and artificial intelligence and robotics and include: telemedicine, smartphone apps, sensors and wearables for diagnostics and remote monitoring, reading the genome, speech recognition and natural language processing, virtual and augmented reality, automated image interpretation using AI; interventional and rehabilitative robotics, predictive analysis using AI and writing the genome. ▪ Areas such as genomics, data analytics and AI need to become prominent in undergraduate curricula for health care professionals. Future health care professionals also need to understand the possibilities of digital health care technologies and the ethical and patient safety considerations. ▪ Education providers must ensure that students gain sufficient digital literacy to support their prospective career pathway.

Country / title	Description of the source	Findings
United Kingdom The Policy Institute, 2018. Futureproofing our NHS: A generational shift: Views from a Student-led Health Commission.[210]	The Policy Institute at the King's College London established a student-led health commission from various faculties to identify potential improvements to the NHS. They included young people anticipated to be service users in 15 years' time. The focus was on health and social care in the UK and generating fresh insights about current and future challenges faced by the NHS.	▪ Major trends identified included a progressively ageing population with complex and chronic care conditions; a rise in non-communicable diseases including obesity and diabetes; advances in technology and the digital era with reference to electronic health records and the 'use of technology to build networks and encourage social inclusion'. ▪ Three main themes guided the analysis and ensuring recommendations: shared health, workforce and normovation. ▪ Shared health is about access to health care and the support that people need to lead healthier lives. For example; providing health promotion support beyond clinical settings. ▪ Workforce issues focused on workforce redesign and achieving work-life balance. Introducing more flexibility, empowering staff and fostering autonomy over work would contribute positively to patient safety despite increasing demand. ▪ The increasing engagement of patients in decisions about their health care needs and preferences was also raised as an important issue. ▪ Normovation refers to 'the integration of innovation into everyday practice'. The report argued for a cultural shift within the NHS to support innovation.
United Kingdom All-Party Parliamentary Group on Global Health (APPG), 2016. Triple Impact: How developing nursing will improve health, promote gender equality and support economic growth.[138] *Note - APPGs are informal groups of Members of the Couse of Commons and the*	The report is directed at the UK Government, the Commonwealth, Europe, WHO and the World Bank to work together to strengthen nursing globally as this will have the triple impact of 'improving health, promoting gender equality and supporting economic growth.' Information underpinning this review emerged from a series of interviews or 'witness sessions' conducted by the APPG. The Royal College of Nursing, the International Council of Nurses and the Commonwealth Nurses and Midwives Federation all provided expert input.	▪ The role of nurses in achieving universal health coverage is critical because of the scale of the nursing workforce. ▪ The diverse roles nurses occupy, however, will rely on the nurses being capable and facilitated to work to their full scope of practice. ▪ Wide-ranging recommendations emerged, for example: develop nurse leaders and nurse leadership; enable nurses to work to their full potential; promote partnership and mutual learning between the UK and other countries. ▪ The review recognises the differences in education needs in different contexts and countries. ▪ Key issues in education include the growth in competency-based and system-based education and training, the increased interest in competency-based regulation and the need for training in new models of care that require high levels of teamwork and greater patient, carer and community engagement.

Country / title	Description of the source	Findings
House of Lords, UK Parliament with a common interest in particular issues. The report is not an official publication of the UK Government.		▪ The importance of 'health systems' understanding for all health professionals is noted and its association with leading change and improvements in health care delivery. ▪ Concludes by outlining the role of the UK: raising awareness of the potential of nursing, investing in education and training, supporting nursing leadership and ensuring the involvement of nurses in policy-making.
United Kingdom Imison et al., (on behalf of the Nuffield Trust and in association with NHS Employers), 2016. Reshaping the workforce to deliver the care patients need.[458]	Commissioned by NHS Employers, this report provides recommendations for national and local entities to reshape the health care workforce. It is based on literature, stakeholder interviews, case studies and a survey of local Health Education England leaders. The focus of the report is directed toward the post-registration period however, it does address medical and nursing school curricula. The interrelationship between changing health needs and workforce development and planning is highlighted.	▪ Reshaping the workforce is necessary to support emerging models of care. Patient needs should drive decisions about changes to the workforce. ▪ There is an imperative to move from the current 'illness-based and provider-led system' to a focus on the patient, preventive care and care delivered closer to where the patient lives. ▪ Workforce gaps are identified in primary care. ▪ There is strong focus on coordinated care that encompasses barriers between acute and primary care, health and social care and generalists and specialists. ▪ The health care workforce of the future needs to meet changing population demands. ▪ Options discussed include developing skills of the existing workforce (particularly the non-medical workforce), extending the skills of registered personnel (particularly in relation to chronic disease management) and introducing advanced practice roles. ▪ Risks relating to the development of extended roles are highlighted as is the importance of 'careful role and service redesign', the need for national competence frameworks for staff in extended and advanced roles and understanding of regulatory issues relating to new roles. ▪ Support roles are a cost-effective solution to mitigating the impact of RN workforce shortages. ▪ Patients' more active role in their own care is identified as a future issue as is advances in 'medical and information technologies'.
United Kingdom Willis, 2015. Raising the Bar, Shape of Caring: A Review of the Future Education and	Report developed post release of several high-profile national reports about system failures (Willlis, 2012; Francis, 2013, Berwick, 2013, etc.). This review assesses whether the current system of education and training in the NHS is appropriate.	▪ General trends identified include: new technology, pharmaceutical advances, genetic engineering, evidence-based practice, new ways of working with an ageing population requiring complex care and increasing consumer expectations of the care system. ▪ The future role of RNs and care assistants will increasingly be in delivering care outside of hospitals; supporting preventive health and social care and assisting

Country / title	Description of the source	Findings
Training of Registered Nurses and Care Assistants.[24]	Thirty-four recommendations arise from this review that are grouped into eight themes: 1. enhancing co-production and the voice of the patient; 2. valuing care assistants; 3. widening access for care assistants to enter the nursing profession; 4. assuring flexibility in nursing; 5. assuring a high-quality learning environment in under-graduate nursing education; 6. assuring predictable and sustainable access to ongoing learning and development for RNs; 7. supporting and enabling research, innovation; 8. evidence-based practice and funding and commissioning levers to support future education and training.	patients in self-management; and coordinating complex care needs, particularly of older people. ▪ The nursing profession will champion whole-person care and will require a balance between specialisation and generalism. ▪ Efforts are needed to enhance the leadership and confidence of the nursing workforce and their role in research and innovation. ▪ Establishment of a new nursing role 'care assistant' was recommended that would be positioned between the existing unregulated care assistant role and the RN workforce, to support the RN in the provision of care in both health and social care settings. ▪ The care assistant role would require a competency-based career and education framework and use an e-portfolio tool to record attainment of competencies on a national database. The role is intended to be transferable across health and social care organisations with work-based learning routes supported. ▪ A standardised skills passport for nurses was also recommended. ▪ The introduction of an additional field of practice in community nursing was addressed (in addition to the existing four fields model). ▪ There is a need to attract nurses into clinical academic careers and a possible strategy is the establishment of Doctoral Training Centres. ▪ The development of a model for education that engaged patients and carers in the design, delivery and assessment of nursing education was recommended. ▪ The development of a national assessment framework for pre-registration nurses should be explored. ▪ The importance of integrating technology into the education and training of nurses was discussed. ▪ Issues relating to flexible routes into nursing and post-registration education are not addressed as they are out of scope for the Topic 4 literature review, as is developments in interprofessional education (addressed by the Topic 3 literature review). However mention is made of the recognition that specialist knowledge and skills are needed for nurses caring for older people but solutions are directed at the post-registration period.

Country / title	Description of the source	Findings
Scotland Scottish Government, 2017. The Chief Nursing Officer Commission on Widening Participation in Nursing and Midwifery Education and Careers – Final Report.[21]	Prepared by the Chief Nursing Officer Commission based on a rapid review of the literature on policy and practice and report on nurse education (referenced within the report) and extensive consultation with stakeholders.	▪ The report provides a range of findings specific to pre-registration nursing and midwifery education. However, the issues addressed are predominantly about maximising participation in nursing and midwifery education and careers.
Scotland Council of Deans of Health, 2016. Pre-registration nursing & midwifery provision in Scotland.[490]	A working group of the Council of Deans of Health produced this paper setting out the current policy context for pre-registration nursing curricula and key commitments from Council of Deans of Health Scotland members.	▪ Asserts the Council's commitment to ongoing engagement with NHS Scotland about the future of pre-registration nursing education in Scotland and continued input into the Nursing and Midwifery Council's UK-wide review of preregistration standards. ▪ Position is informed by earlier key documents by NHS Scotland including *Setting the Direction for Nursing and Midwifery Education in Scotland* and *Everyone Matters: 2020 Workforce Vision*.
Scotland Scottish Government, 2014. Setting the Direction for Nursing and Midwifery Education in Scotland.[491]	Strategic document setting the direction to prepare the future nursing and midwifery workforce. The document informs the implementation steps to move toward the Scottish Government's 2020 health goals. Developed in collaboration between the Chief Nursing Officer, the Chair of the Scottish Executive Nurse Directors and the Chair of the Scottish Heads of Academic Nursing and Allied Health Professions.	▪ The strategy addresses education and training broadly. ▪ There are six strategic aims for nursing and midwifery education in Scotland, Strategic Aim 3 is to 'deliver dynamic pre-registration nursing and midwifery education'. Examples of actions to address this include: ensure curricula is designed to be responsive to changing service requirements; embed health informatics and technology in pre-registration curricula; ensure curricula prepare nurses and midwives to self-manage, adapt and continue learning throughout their careers.
Wales Royal College of Nursing Wales, 2016. Royal College of Nursing Wales Education Strategy 2016 – The Future of Nursing Education in Wales.[492]	Strategic document developed under the leadership of Professor Donna Meade through a consultative review process including two education summits. The report focuses on the educational needs of the current and future workforce.	▪ Emphasis on adapting undergraduate education to meet changing service needs and new models of care. ▪ Population factors and care settings including: ageing population with complex multi-morbidity, increasing burden of chronic disease and need for patient self-management, care complex in acute settings, chronic disease focus in primary care settings; lifestyle related conditions; overlap between health and social care; workforce shortages. ▪ Professional factors for example: preparing the workforce for new models of care, addressing nursing skill mix and its effect on patient outcomes, importance for RNs of critical thinking skills, problem-solving and clinical decision-making; false distinction

Country / title	Description of the source	Findings
		between clinical skills and 'hands-on' care; confusion between roles; regulatory roles and cultural competence. ▪ Digital and technology analytics: increasing reliance on data, information and information technology. ▪ Policy and legislative context: government policy influences nursing education strategy e.g. increased policy emphasis on primary care workforce for Wales. ▪ Results from the 'Voice of Nursing' consultation generated three themes: the need for nursing to reconnect with the public regarding its core values of care and compassion and the crucial role of education in promoting professional values; the importance of generating knowledge through research (translational science focus) and resilience (nurses need to be flexible and resilient to respond to workforce changes). ▪ Wide-ranging recommendations for education provision, for example: mentorship for UG nurses; guidance on safe staffing and skill mix; development of skills in digital technology and analytics; support for clinical academic careers; credentialing of advanced nursing practice including educational requirements; education for advanced practice which provides a generalist skill set to facilitate nurses working across different settings etc.

Appendix 5 Sources identifying the current and emerging issues influencing pre-registration nursing education – United States and Canada

Country / title	Description of the source	Findings
United States National Council of State Boards of Nursing, 2019. The NCSBN 2019 Environmental Scan: 40th Anniversary Edition.[493]	The NCSBN supports US Boards of Nursing in addressing emerging professional issues by issuing an annual environmental scan. The scan encompasses emerging social, regulatory and international issues for regulators. It also provides an in-depth assessment of the current issues influencing the workforce, nursing education, health care delivery, technological advancements, policy and legislation.	▪ The RN workforce is ageing with a steady growth in those who may take retirement, including Certified Nurse Practitioners. ▪ The trend reported in the 2017 Environmental Scan (note below) continued with an increase in RNs entering nursing with a Bachelor of Science in Nursing (BSN) degree. ▪ There is an increasing trend of nurses working in ambulatory care, nursing home/extended care and home health settings. ▪ There is an increase in the number of Certified Nurse Practitioners working in community health. ▪ Telehealth continues to be increasingly used. ▪ Technological changes account for the predicted 'seismic shifts' in nursing education highlighting the importance of data literacy. ▪ Integration of clinical decision-making and reasoning into teaching was identified as 'the future in nursing education'. ▪ Faculty shortage remains a problem. ▪ There is ongoing interest in evidence-based approaches to measuring outcomes of nursing education. ▪ Issues relating to limitations in access to care arising from physician shortages and the capacity of the Advanced Practice Registered Nurses in addressing these, particularly in primary care settings were identified. ▪ In some states, restrictions on practice were reported as limiting advanced nurse roles. ▪ Access and care challenges in rural areas were a potential area where Advanced Practice Registered Nurses and NPs could contribute, particularly if restrictions on NP practice were eliminated. ▪ The role of NPs in addressing the 'opioid crisis' was reported as NPs are now able to obtain a 'prescribing waiver' for medication-assisted treatment for opioid addiction. ▪ Key technological developments include: telehealth (particularly to expand access to vulnerable populations in non-traditional settings); remote patient monitoring; the use of big data, cloud computing and artificial intelligence; personalised health care based on developments in clinical genetics and genomics as well as advances in information sharing arising from developments in blockchain networks. ▪ The increasing use of medicinal cannabis and its implications for nursing were discussed.

Country / title	Description of the source	Findings
		▪ Issues relating to workplace sexual harassment and barriers to nurses reporting abuse were raised.
United States National Council of State Boards of Nursing, 2018. The Nursing Regulatory Environment in 2018: Issues and Challenges.[245]	This article highlights the issues and challenges affecting the US nursing regulatory environment. It summarises the key issues emerging from the 2018 National Council of State Boards of Nursing Environmental Scan.	▪ The major findings focus on: nursing workforce issues, emerging health care settings and role, scope of practice issues, new treatment methods influencing nursing education and societal issues affecting nursing practice. ▪ The new workforce settings identified included home and community based care models, community based microhospitals, pop-up clinics to improve access to vulnerable groups and uninsured populations and telehealth. ▪ Deficits in the rural workforce were being addressed through new roles such as community health workers (a role positioned between home health aides and certified nurse assistants) who assist in providing care, for example 'follow-up after acute care discharge' and community paramedics. ▪ The rise in competency-based, as opposed to time-based, education was noted. ▪ Professional identity formation and its role in ethical reasoning is raised as an issue for nursing education to address along with precision medicine (arising from advances in genomics and big data analytics) and team-based care, particularly in the context of increasing demands for primary care services. ▪ Social issues influencing nursing practice and therefore education include: an increase in violence against nurses, caring for patients using cannabis and the impact of widespread opioid use (both illicit and prescription based misuse).
United States National Council of State Boards of Nursing, 2017. The 2017 Environmental Scan.[432]	This scan assesses the impact of innovations in health care, technology, politics and society and identifies significant regulatory issues for the nursing profession. It notes how health care workforce roles must change and evolve over time in response to a multiplicity of factors including political directions and societal expectations.	▪ The supply and demand of nurses in the US including workforce shortages, the impact of generational change caused by the imminent retirement of baby boomers and the potential impact of robotic nurses on future projections (as evidenced from workforce modelling in Japan) is discussed. ▪ Changes in nursing education have resulted from the Institute of Medicine 'Future of Nursing' report (IOM, 2011) and the recommendation for an 80% Bachelor of Science in Nursing (BSN) workforce by 2020. For example there has been an increase in nursing coalitions working on shared curricula; a growth in BSN programs and a move toward competency models or outcomes-based curriculum (the pre-registration nursing curriculum is not standardised but there is an increased focus on models that generate standardised outcomes).

Country / title	Description of the source	Findings
		▪ The variability of nursing programs and lack of regulatory oversight by accreditation authorities is raised. ▪ The impending shortage of nursing faculty significantly impacts the future of nursing education. ▪ Curriculum developments include the move toward competency-based education and the use of flipped classroom models, use of gamification and online / distance education. ▪ Key technological developments include: telehealth; mobile phone applications and wearable sensors to provide patient assessment data; expanded use of robots including robotic drones; artificial intelligence (computer-assisted diagnosis); the use of genomics to personalise health care and the 'uberfication' of health care through the emergence of on-demand health care. ▪ Future technological skills for nurses include interpretation of continuous data instead of episodic in-person assessment data generated by patient monitoring devices; communication with patients using web-based communications and using big data. ▪ Nurse educators need to be prepared to address the new skills required of nurses in a digital health era. ▪ Access and quality issues may be mitigated in part by removal of barriers to nurses' full scope of practice, as can greater engagement of patients in their own care, strengthening primary care and improving care and coordination of chronic diseases. ▪ Achieving a better balance between primary care and acute care content in undergraduate education is advocated. ▪ A range of regulatory risks were identified for nurses that affect practice, for example the rise of social media use and the importance of confidentiality, as well as nursing's contribution to reducing prescription opioid misuse and the implications arising from greater mobility of health workers.
United States National League for Nursing, 2017. A Vision for Expanding US Nursing Education for Global Health Engagement.[220]	The report was developed by a Strategic Action Group convened by the NLN based on a diverse range of sources. It is a commentary on the importance of multiple perspectives on global health issues necessary to inform nursing education.	▪ A key issue is that developed countries like the US are having to care for migrants and refugees resettling. This not only is driving changes in health care delivery but also the educational preparation of nurses. This includes understanding of 'transnational health issues, social determinants and solutions'. ▪ The challenge for nursing education is 'linking global and local learning'. Strategies to aid this include: nurses working with vulnerable population groups in their own country, studying in less developed countries and working with internationally educated health care colleagues that have migrated to the US.

Country / title	Description of the source	Findings
	While global issues are discussed the focus of the report is on how these issues impact nursing in the US.	▪ The issue of competencies for all types of nursing programs is addressed as is the importance of teaching students about vulnerable populations especially indigenous peoples, refugees and migrants which requires cultural competency. An understanding of the global burden of disease is important contextual knowledge. ▪ Recommendations are provided for academic leadership, faculty and the NLN. For example academic leaders should support domestic and international nursing education partnerships, faculty should use 'population data to generate evidence for curricular change, policy development, and community engagement and the NLN can recommend embedding global health competencies into undergraduate and graduate curriculum'.
United States Valiga, 2012. Nursing Education Trends: Future Implications and Predictions.[25]	Provides an overview of trends in contemporary nursing education informed by recent reports, position statements from professional associations, national conferences and other resources.	▪ Discusses learner-centred environments in nursing education. ▪ Competencies required for the future are in the fields of genetics/genomics; evidence-based practice; informatics and interdisciplinary practice. ▪ Refers to the Institute of Medicine, 'The future of nursing: leading change, advancing health. Washington, DC: National Academies Press; 2010 (p.4-31) which recommended nurse education provides: 'a better understanding of and experience in care management, quality improvement methods, systems-level change management, and the reconceptualised roles of nurses in a reformed health care system'. There is also reference to the challenge for nursing education to be competency-based and instil 'a commitment to lifelong learning'. ▪ There is increasing interest in assessing the outcomes of educational programs particularly in critical and integrative thinking, decision-making, persuading and influencing and improving patient care. ▪ Developments in open-source learning, mobile applications, online learning etc. will revolutionise higher education. ▪ The trend toward concept-based curricula in nursing education is outlined with a more integrated approach to learning organised around core concepts such as 'mobility' or 'pain'.
United States Council on Social Work Education, 2018.	The Council on Social Work Education (CSWE) developed this report to inform a strategic planning exercise to set the direction for future social work education. The CSWE is a national association and accreditation body	▪ Key drivers of change affecting the future of social work at a societal level: diversity, racism and increasing intolerance in society; income inequality and class separation; complexity of health and the changing health-care system (need for a leadership role in addressing the social determinants of health, improving health outcomes, eliminating health disparities and reducing health care expenditures); longevity and growth of the ageing population;

Country / title	Description of the source	Findings
Envisioning the future of social work: Report of the CSWE Futures Task Force.[494]	based within the US which reviews and accredits programs provided by educational institutions.	information technology and big data; environmental change (including displacement of communities, food and water scarcity and mosquito-borne disease); privatisation and the future of work (automation, extensions of the retirement age, etc.).
Canada Canadian Association of Schools of Nursing, 2017. Registered Nurse Education in Canada Statistics 2015-2016: Registered Nurse Workforce, Canadian Production: Potential New Supply.[146]	This annual report provides nursing workforce data to support planning in both service delivery and education sectors. These data are drawn from the 'National Student and Faculty Survey of Canadian Schools of Nursing' which is a longitudinal national collection of nursing education data. It is issued to 137 schools of nursing in Canada offering pre-licensure education (117 completed the survey a response rate of over 85%). Further methodological information is included in the report.	▪ Data is provided on program elements, e.g. numbers graduating from nursing programs and approaches to program delivery, it also addresses issues relating to nursing faculty e.g. information on recruitment and retirement. ▪ Distance education is defined as programs which offer wholly electronically or in a blended model that incorporates online and face-to-face delivery. 55.6% of all programs used some form of distance education. For 'entry to practice' baccalaureate programs, just over 35% used some form of distance education. ▪ Supply of RN faculty is a major factor affecting the number of nurses that can be included in pre-registration or 'entry to practice' programs. Of the permanent faculty 39.3% were 55 years or older and 21.9% were 60 years or older. There is an imminent shortage of qualified faculty if current 'entry to practice' enrolments are maintained.

Appendix 6 Sources identifying current and emerging issues influencing pre-registration nursing education – Australia and New Zealand

Country / title	Description of the source	Findings
Australia Deloitte Access Economics, 2018. The future of work: Occupational and education trends in nursing in Australia.[495]	This is a commissioned report for a private operator, Keypath Education, who provides access to online degrees for several Australian and international universities. The report examines how occupational and education trends are developing across the Australian nursing workforce. The report was based on a mix of publicly available data and information sources, consultations with academics and employment forecasting.	The major trends affecting nursing are: ▪ Changing population demographics including ageing and increasing prevalence of chronic diseases and mental illnesses. ▪ Needs for more complex and specialised roles for nurses, particularly in relation to chronic disease management. This may also necessitate the development of less skilled roles to support the work of ENs and RNs. ▪ Shift from hospital to community settings which will generate demand for more independent decision-making and advanced practice roles, particularly in rural and remote areas. ▪ New health technologies enabling remote real-time patient monitoring via wearable devices and biometric sensors and telehealth. ▪ Increased engagement of patients in self-care. ▪ Increasing use of electronic health records and as a result data analytics, particularly predictive analytics to support diagnosis, intervention and triaging of care (with the associated patient privacy and data security issues) means a requirement for digital literacy. ▪ There is an increased demand for RNs. ▪ Further post-graduate study in nursing is thought to facilitate the development of advanced skills and build leadership capacity.
Australia Ralph et al., 2014. Future-Proofing Nursing Education: An Australian Perspective.[17]	This paper provides a PESTEL analysis to identify future priorities in Australian health care as well as a review of the curriculum content of undergraduate nursing education programs. Methods included a literature search of both grey and peer-reviewed literature from July 2001 to July 2013 and a search of the Australian Health Practitioner Regulation Agency (AHPRA) to identify UG programs of study (90 identified). After a	▪ Key findings are the existence of preparation-practice gaps when comparing health care trends or priorities and nursing curricula in undergraduate programs. ▪ Twelve categories were identified through the PESTEL analysis and over 40 issues or codes established. Key themes identified in each PESTEL category are listed below. ▪ Politics: targeting priority areas; quality improvement measures; optimising the health system for the future (e.g. integrating health and aged care services). ▪ Economics: rising health care expenditure, economic literacy. ▪ Society: demand for health services; national health priority areas; building partnerships (with the wider community).

Country / title	Description of the source	Findings
	culling process curricula were obtained from 34 institutions and analysed in relation to the findings from the PESTEL analysis.	▪ Technology: technological literacy. ▪ Environment: climate change and health. ▪ Law: nursing role extension. ▪ The importance of curriculum content that is 'nationally and globally relevant' is noted.
Australia Woods, 2018. Review of Australia's Health Workforce: strengthening the education foundation.[496]	This Independent review of accreditation systems within the National Registration and Accreditation Scheme for health professions was undertaken on behalf of the Australian Health Minister's Advisory Council.	▪ This Report identifies opportunities to strengthen the education foundation of the health workforce by increasing the efficiency and effectiveness of accreditation functions and improving the relevance and responsiveness of health profession education. A range of recommendations related to accreditation governance matters. ▪ The Review proposes that the COAG Health Council oversees a policy review process to identify health workforce directions and reforms that align workforce requirements with broader health and social care policies.
Australia Mason, 2013. Review of Australian Government Health Workforce Programs.[497]	This report reviews programs funded and administered through the Health Workforce Division of the Australian Government Department of Health and Ageing, and supplements a review of Health Workforce Australia as part of the National Partnership Agreement on Hospital and Health Workforce Reform, and the ongoing Productivity Commission review of health workforce. Despite this broad remit, recommendations pertaining to nursing education are included in detail.	▪ Recommendations are made for the reform of a number of programs, organised thematically: 'ensuring a capable and qualified workforce; increasing the supply of workers in all health professions; supporting the Indigenous health workforce; addressing health workforce shortages in regional, rural and remote Australia. ▪ Effort is required to enhance nursing workforce retention, particularly offering nurses the opportunity to upskill and assume more senior and diverse roles. ▪ Implications of educational investment for future workforce mix are discussed e.g. current limitations on the education of ENs limit use of this workforce if not addressed. ▪ Better access to educational opportunities for nurses in remote areas is required. ▪ Establishment of a National Nursing and Midwifery Educational Advisory Network (NNMEAN) was recommended to consider issues such as 'supply planning, education and employment, new and/or extended roles, scholarship priorities, inter-professional collaboration and undertaking or commissioning research'.
New Zealand Nursing Council of New Zealand, 2017. Trends in the New Zealand Nursing Workforce: 2012-2016.[498]	Report on recent trends in the nursing workforce based on data gathered through re-registration processes, including a workforce survey.	▪ Tracks six specific 'nursing populations' of interest: nurses aged 55 and over; nurses aged under 30; male nurses; Maori nurses; Pacific nurses; NPs. ▪ Reports a growth in primary care as a practice area. ▪ New Zealand experienced a growth in the 55 and over workforce in both absolute and relative numbers (relative to other parts of the nursing workforce) and this age group comprises almost a third of all nurses. ▪ The Nurse Practitioner workforce grew consistently over the surveyed timeframe, although it remains less than half a percent of the total nursing workforce.

Country / title	Description of the source	Findings
New Zealand National Nursing Organisations, 2014. Report from the National Nursing Organisations to Health Workforce New Zealand.[22]	Document is intended to inform and partner with the Health Workforce New Zealand board and the sector to achieve a long-term national nursing workforce strategy. The National Nursing Organisations' group comprises the nation's key nursing stakeholder organisations.	▪ Challenges facing New Zealand's health system and its nursing workforce specifically are outlined. ▪ Nine principles are proposed to guide the development of a long-term national strategy for nursing workforce planning. ▪ Recommendations relate to three main categories: workforce planning needs; nursing pipeline growth including employment of new graduates; and advanced practice development.

Appendix 7 Sources identifying current and emerging issues influencing pre-registration nursing education – International

Author / title	Description of the source	Findings
WHO, 2016. Global Strategic Directions for Strengthening Nursing and Midwifery 2016-2020.[445]	Strategic document that discusses evidence-based global trends and details nurses' role in achieving the WHO goals of universal health coverage and the Sustainable Development Goals. Opportunities for improvements in nursing and midwifery education are identified. Outlines a vision and guiding principles to maximise the contribution of nursing and midwifery to global health for use by any entity working on nursing and midwifery. Four themes are presented: ▪ 'Ensuring an educated, competent and motivated nursing and midwifery workforce within effective and responsive health systems at all levels and in different settings. ▪ Optimising policy development, effective leadership, management and governance. ▪ Working together to maximise the capacities and potentials of nurses and midwives through intra and interprofessional collaborative partnerships, education and continuing professional development. ▪ Mobilising political will to invest in building effective evidence-based nursing and midwifery workforce development'.	▪ General issues addressed include: the imperative of universal access to health care; the global shortage of human resources for health and equitable access to care for marginalised and vulnerable populations. ▪ Achievements in primary care are noted including the capacity of primary health care in addressing the needs of people with disabilities, chronic conditions, noncommunicable diseases and those needing palliative care; as well as capacity building in emergency and disaster response, infection control, mental health and substance abuse. ▪ In terms of nursing education progress is reported in: adoption of competency-based training and in developing advanced nursing and midwifery practice. Competency-based curricula that meets local and national changing health needs is recommended. ▪ The importance of nurses working to their full scope of practice is raised as well as technological advances and their impact on practice and education, particularly the integration of skills in information and communication technologies. ▪ The need to raise the involvement of nurses and midwives in policy and decision-making in relation to education, service planning and workforce management is identified as a country responsibility.
WHO, 2013. Transforming and Scaling Up Health Professionals' Education and Training, World Health Organization Guidelines 2013.[499]	Developed in response to the global shortage of health professionals, this report outlines optimal strategies to finance health professionals' education and prepare them for the 21st century. These guidelines were peer-reviewed by an international panel of experts as outlined in the report.	▪ A range of key policy issues and possible responses are identified relating to: education and training institutions; accreditation and regulation; financing and sustainability; monitoring, implementation and evaluation; and governance and planning. A series

Author / title	Description of the source	Findings
		of recommendations to transform and scale up health professionals' education and training are provided. ▪ Relevant issues include the importance of adapting curricula to evolving health care needs and enhancing the skills of faculty and teaching staff. ▪ It is inadequate to adapt curricula to the changing environment and technologies without training health professionals to adapt to cultural variations and values as well as attitudes to the different health problems of populations. ▪ Considerations of competencies highlighted the importance of teamwork and interprofessional education (IPE is addressed in the Topic 3 literature review). ▪ The advantages of e-learning and blended learning courses were identified particularly by increasing access to education and alleviating professional isolation.

Appendix 8 Reviews informing the PESTEL analysis

Political

Author / title	Type of review	Description of the review / included studies	Findings
Ashley et al., 2016. Transitioning from acute to primary health care nursing: an integrative review of the literature.[112]	Integrative	Explored the transition experiences of acute care nurses entering employment in primary health care settings. Eight studies were included in the review.	With nurses transitioning into either community or home nursing settings, three themes were identified: (1) a conceptual understanding of transition, (2) role losses and gains, and (3) barriers and enablers. There is a lack of research specifically exploring the transitioning of acute care nurses to primary health care settings.
Fillingham et al., 2014. Early training in tackling patient obesity: A systematic review of nurse education.[116]	Systematic	A review of educational interventions in undergraduate nurse training regarding obesity, investigating the interventions' effectiveness. Eight studies from seven countries were included.	There is limited research in this area and the few studies available are not methodologically robust. It is not possible to identify effective educational interventions for nursing students on weight management. Further research in this area is recommended.
Halcomb et al., 2019. Nurse-delivered interventions for mental health in primary care: A systematic review of randomised controlled trials.[95]	Systematic	Explore the evidence for general practice nurses to provide mental health interventions for adults with mental illness within their scope of practice. Included nine RCTs (four from the UK, two from the Netherlands, and one each from the US, Canada and Australia).	Seven of the nine RCTs demonstrated significant improvement in at least one outcome (e.g. depression symptoms, anxiety symptoms, functional outcomes, medication use, and consumer satisfaction) following the intervention. Sustained improvements were demonstrated in some studies.
Hudson et al., 2016. Cultural expressions of intergenerational trauma and mental health nursing implications for US health care delivery following refugee resettlement: An integrative review of the literature.[60]	Integrative	Explored cultural expressions of intergenerational trauma among refugees following resettlement to determine practice implications for health care practitioners working in health care delivery in the US. Eight articles met the selection criteria.	Practitioners need to consider cultural influences of intergenerational trauma in processing grief related to loss. Future research is recommended to help understand communication patterns between varying ethnic groups in relation to intergenerational trauma.
James et al., 2019. Lifestyle risk communication by general practice nurses: An integrative literature review.[111]	Integrative	Examined the experiences and perspectives of general practice nurses regarding communication with patients about lifestyle risk factors. Fifteen articles were included in the review.	The paucity of evidence relating to the experiences of nurses providing lifestyle risk counselling was highlighted. There is a need to upskill the general practice nursing workforce to enhance the provision of lifestyle risk communication. For general practice nurses to deliver effective lifestyle risk

Author / title	Type of review	Description of the review / included studies	Findings
			communication, ongoing and effective training, funding and infrastructure supports needs to be in place.
McCann and Brown, 2018. The inclusion of LGBT+ health issues within undergraduate health care education and professional training programmes: A systematic review.[27]	Systematic	Examined the education and training requirements of undergraduate students and health professionals regarding the inclusion of LGBT+ health issues. Twenty-two articles were included in the review (15 from the US).	Concluded that the inclusion of LGBT+ health-related issues within the health curriculum is highly important, as is continuing professional development programmes and the implications for education and training, clinical practice and research.
Mills et al., 2018. Experiences and outcomes of health professional students undertaking education on Indigenous health: A systematic integrative literature review.[77]	Integrative	To explore the experiences and outcomes of health professional students when undertaking education on Indigenous health. Ten of the 12 studies included in the review were conducted in Australia.	Found significant variability in the ways Indigenous health issues were taught and integrated into health programs, particularly with regards to quality, methodological rigour of evaluation, pedagogical approaches and student experiences.
Newton, 2017. A review of the scientific literature informing the development of models of primary care in mental health.[96]	Not stated	Reviewed international scientific literature on primary care mental health model development. Forty-nine papers published between 1984 and 2017 were included in the review, primarily from the UK and US.	Appropriate training, through both formal and informal channels, should be reviewed for all primary care staff, not only GPs when new models of primary care for mental health are developed. Knowledge sharing helps build and cement relationships between care providers and breaks down care 'siloes'. Careful planning and a clear strategy of implementation is required regardless of the model of primary care for mental health.
Norful et al., 2017. Utilization of registered nurses in primary care teams: A systematic review.[114]	Systematic	A review of primary care RN roles and responsibilities undertaken to make recommendations for maximising RNs' contributions in team-based primary care models. 18 studies were included in the review, from Australia (8), the US (5), Canada (2), New Zealand (1), Spain (1) and South Africa (1).	Suggested that employing RNs in primary care has the potential to increase patient access to a primary care provider because RNs can supplement some of the provider workload. However, this must be supported by clear practice protocols and nursing policy to ensure safe, and effective nursing care.

Author / title	Type of review	Description of the review / included studies	Findings
Orgel, 2017. Improving LGBT cultural competence in senior nursing students: An integrative review.[500]	Integrative	Reviewed best practice for improving the cultural competence of undergraduate nursing students towards the LGBT population. Fourteen articles were used in the review, all of them rated at the highest level for quality of the evidence.	A multi-method approach including formal educational strategies, contact with LGBT individuals and interactive experiences may best improve nursing students' LGBT cultural competence. Interventions such as panel discussions, guest speakers and community outreach are most important.
Rozendo et al., 2017. A critical review of social and health inequalities in the nursing curriculum.[32]	Critical	Examined how social and health inequalities have been addressed in the nursing curriculum. Twenty articles included in the review (15 from the US).	Highlighted that nurses need critical knowledge of how to confront the root causes of inequalities so they can tackle them. Whilst nursing education initiatives align with WHO recommendations to address disparities, there is a need to identify existing conceptual and practical content on inequalities in the nursing curriculum through future research.
Ryan and Scior, 2014. Medical students' attitudes towards people with intellectual disabilities: A literature review.[54]	Not stated	A review on medical students' attitudes to people with intellectual disabilities. Twenty-four studies were identified evaluating the effects of pedagogical interventions on students' attitudes (nine from the UK and eight from the US).	Results suggest that medical students' attitudes to people with intellectual disabilities were responsive to interventions. However, the evidence is restricted due to research limitations and findings should be interpreted with caution. Future high quality research into this topic is recommended.
Stewart and O'Reilly, 2017. Exploring the attitudes, knowledge and beliefs of nurses and midwives of the health care needs of the LGBTQ population: An integrative review.[72]	Integrative	Reviewed the knowledge, beliefs and attitudes of nurses and midwives of the health care needs of LGBTQ patients and their influence on equal and non-discriminatory care for LGBTQ individuals. Twenty-four articles were included in the review.	Found that nurses and midwives possess a wide spectrum of attitudes, knowledge and beliefs which impact the care received by LGBTQ patients. The authors recommend that LGBTQ issues be included within undergraduate nursing and midwifery education or as part of continued professional development.

Social

Author / title	Type of review	Description of the review / included studies	Findings
Banerjee et al., 2017.	Scoping	Reviewed enhanced placements in dementia for health care professionals in training including	All programs reported positive impact from case study designs but data quality was weak. Highlighted the need for inter-

Author / title	Type of review	Description of the review / included studies	Findings
How do we enhance undergraduate health care education in dementia? A review of the role of innovative approaches and development of the Time for Dementia Programme.[202]		longitudinal integrated clerkships and senior mentor programmes. Eight programs were identified (seven from the US).	professional undergraduate health care education to enable future health care professionals to be able to understand and manage people with the long-term conditions.
Hartin et al., 2018. Bullying and the nursing profession in Australia: An integrative review of the literature.[255]	Integrative	An overview of bullying in the nursing profession in Australia. A total of 23 papers were included in the review.	Highlighted the many ways in which the experience of bullying in the nursing profession manifests itself and the implications for the profession as a whole. In order to implement effective anti-bullying strategies for both nurses and organisations there must be an understanding of the contributing factors that allow the problem to persist in the first place.
Hopkins et al., 2018. To the point: medical education, technology, and the Millennial learner.[216]	Systematic	An overview of generational learning and teaching methods which maximise Millennial learning. Includes a special focus on the obstetrics and gynaecology curriculum.	Highlights the importance of understanding the attitudes, ideas, and priorities of Millennials to tailor educational methods to stimulate and enhance learning.
Lever et al., 2019. Health consequences of bullying in the health care workplace: A systematic review.[248]	Systematic	A review of both the mental and physical health consequences of bullying for health care. Forty-five papers were included in the review.	Rates of perceived bullying amongst health care staff are high (26.3%). Bullying is associated with negative mental and physical health consequences and increased sick leave. However no review focused on health and occupational implications for this population.
McGowan and Murray, 2016. Exploring resilience in nursing and midwifery students: a literature review.[257]	Integrative	A review of quantitative studies only to explore the concepts of 'resilience' and 'hardiness' in nursing and midwifery students in educational settings and to identify educational interventions to promote resilience. Eight studies were included.	There is only weak evidence that resilience and hardiness is associated with slightly improved academic performance and decreased burnout. The studies were limited by poor methodological quality. Further research in this area is needed.
Morphet et al., 2018. Prevention and management of occupational violence and	Scoping	Examined the evidence relating to the effectiveness of interventions to prevent and manage workplace	There is good evidence that consumer risk assessment, staff education in recognition of at risk behaviours and communication and de-escalation, and aggression management

Author / title	Type of review	Description of the review / included studies	Findings
aggression in health care: A scoping review.[256]		violence perpetrated by consumers in health care. Twenty papers were included in the review.	teams, reduced the incidence of workplace violence in health care. Further research is needed to demonstrate the effect of widely used interventions such as zero tolerance policies, incident reporting and duress alarms.
Nowrouzi-Kia et al., 2018. Antecedent factors in different types of workplace violence against nurses: A systematic review.[243]	Systematic	Identified the antecedent factors in different types of workplace violence against nurses to understand its impact in order to promote safe working conditions in health care. Thirteen articles were included in the review.	The review supports the need for intervention-based organisational and state level policies that are evidence-based to mitigate or prevent workplace violence against nurses. Future studies need to be rigorously evaluated to develop robust solutions and offer recommendations.
Rawlins, 2017. Faculty and student incivility in undergraduate nursing education: An integrative review.[250]	Integrative	Described faculty-to-student and student-to-faculty incivility in undergraduate nursing education. Seventeen studies were included in the review. Ten were quantitative studies and seven were qualitative.	Results highlighted that incivility has harmful physical and psychological effects on both faculty and students, and also disturbs the teaching-learning environment. Causes of uncivil acts are highlighted to provide groundwork for schools of nursing to implement strategies for mitigating incivility.
Zhu et al., 2019. Nursing students' experiences with faculty incivility in the clinical education context: A qualitative systematic review and meta-synthesis.[34]	Systematic	A synthesis of the evidence on the experiences and perceptions of incivility during clinical education of nursing students. Eighteen studies were included in the meta-synthesis.	Concluded that hospitals and universities should have an immediate response person or system to help nursing students to confront incivility and create an open communication environment. However, confidence in the synthesised findings was low.

Technological

Author / title	Type of review	Description of the review / included studies	Findings
Barr et al., 2018. Current practice for genetic counselling by nurses: An integrative review.[29]	Integrative	Examined current practice of genetic counselling by nurses. Studies evaluated using the CASP method and 10 studies were included in the review.	Some nurses do engage in genetic counselling, but how they engage is not consistent, nor is there consensus about what should be the scope of practice. The authors recommend further investigation into credentialing, role recognition support and education for nurse genetic counselling.
Caffery et al., 2017. Outcomes of using telehealth for the provision of health care to Aboriginal and Torres Strait	Systematic	Examined reported outcomes of health services delivered by telehealth to Indigenous Australians. Fourteen articles, describing 11 distinct telehealth	Reported outcomes demonstrate the potential of telehealth for health service delivery for Indigenous Australians. Telehealth has improved social and emotional wellbeing, clinical outcomes and access to health services for Indigenous Australians.

Author / title	Type of review	Description of the review / included studies	Findings
Islander people: A systematic review.[273]		services, were selected based on the inclusion criteria.	However, the findings of this review are compromised by the predominance of descriptive studies and small sample sizes in many of the included studies.
Camak, 2016. Increasing importance of genetics in nursing.[346]	Not stated	Examined the empirical literature related to the incorporation of genetic research and genetic competency needed by the nurse in practice. Twenty articles, six research studies, four professional documents and 10 information articles or reports were selected for inclusion.	Practicing nurses lack understating and skill in the application of genetics and genomic technologies to patient care. The authors conclude that nurses are inadequately prepared to apply genetic advancements in screening at risk patients and addressing the needs of the patient or family facing a genomic health compromise.
Dunleavy et al., 2019. Mobile digital education for health professions: Systematic review and meta-analysis by the Digital Health Education Collaboration.[276]	Systematic	Evaluated the effectiveness of mLearning interventions for delivering health professions education in terms of learners' knowledge, skills, attitudes, and satisfaction. Twenty-nine studies, including 3,175 learners, met the inclusion criteria (25 RCTs and four cluster RCTs).	The review shows that mobile learning is at least as or potentially more effective than traditional learning. Effort should be made to expand health professions education using mobile devices.
Jones et al., 2014. Using mobile phones and short message service to deliver self-management interventions for chronic conditions: A meta-review.[266]	Meta-review	Evaluated the current evidence on the use of mobile phones and SMS to deliver self-management interventions for chronic conditions. A meta-review was conducted of the 11 systematic reviews identified. Reviews were assessed using the AMSTAR tool.	Mobile phone text messaging was reported to significantly improve adherence to appointments and antiretroviral therapy, short-term smoking quit rates, and selected clinical and behavioural outcomes. The authors concluded that mobile phones and SMS show promise as a technology to deliver self-management interventions to improve outcomes of chronic care management. However, the quality of future studies and systematic reviews needs to be improved.
Kachouie et al., 2014. Socially assistive robots in elderly care: A mixed method systematic literature review.[313]	Systematic	Explored the role of Socially Assistive Robots (SAR) in elderly care and its impact on elderly well-being. Eighty-six studies were included in the review.	Results highlighted the positive effects of SAR in elderly well-being. It also has the potential to decrease the workload on caregivers. Robots that are capable of enhancing broader aspects of well-being of elderly people are more acceptable than the ones with less coverage. Future high quality research is recommended in this area.

Author / title	Type of review	Description of the review / included studies	Findings
Lee et al., 2018. Mobile technology in undergraduate nursing education: A systematic review.[26]	Systematic	Explored the use of mobile technology in nursing education. Seven RCTs and seven quasi-experimental studies were identified.	Concluded that we are in the early stages of implementing mobile technology in nursing education due to the limited implication of mobile technology and inconsistent research conclusions. Called for more rigorous primary empirical studies to further evaluate the effective use of mobile devices in nursing education.
Maalouf et al., 2018. Robotics in nursing: A scoping review.[299]	Scoping	A review of the different tracks in which robots are used in nursing. Sixty-nine articles were used in the review.	Two main categories of robots were identified: assistive robots and social assistive robots. The authors highlight the need to intensify research on human robot interaction, and analysis the psychological barriers that need to be overcome to achieve more tolerance and higher acceptance of robots.
Marcolino et al., 2018. The impact of mHealth interventions: systematic review of systematic reviews.[265]	Systematic	A systematic review of systematic reviews to assess the impact or effectiveness of mobile health (mHealth) interventions in different health conditions and in the processes of health care service delivery. Included 23 systematic reviews. Seventeen reviews included studies performed in low- and middle-income countries. Methodological quality was assessed using the AMSTAR checklist.	mHealth is growing in popularity but the evidence for efficacy is still limited. In general, the methodological quality of the studies included in the systematic reviews is low. For some fields, its impact is not evident, the results are mixed, or no long-term studies exist. Exceptions include the moderate quality evidence of improvement in asthma patients, attendance rates, and increased smoking abstinence rates.
McKay et al., 2018. Evaluating mobile phone applications for health behaviour change: A systematic review.[267]	Systematic	Investigated approaches to the evaluation of health apps to identify any current best practice approaches. Thirty-eight articles were included.	The review was unable to suggest a single best practice approach to evaluate mobile health apps. Few measures identified included sufficient information or evaluation, leading to potentially incomplete and inaccurate information for consumers seeking the best app for their situation. In order to harness the potential of mobile health apps for behaviour change and health, better ways to assess the quality and effectiveness of apps is needed.
Mehta and Pandit, 2018. Concurrence of big data analytics and health care: A systematic review.[292]	Systematic	Determined the scope of big data analytics in health care including its applications and challenges in its adoption in health care. It also identified strategies to overcome the challenges. Fifty-eight articles were included in the review.	There is a lack of evidence of real-world use of big data analytics in health care. Qualitative data in usability studies describe potential benefits of big data analytics but do not take into account quantitative study results. Once the scope of big data analytics is defined; its characteristics and features are understood; and challenges are properly tackled, its application

Author / title	Type of review	Description of the review / included studies	Findings
			will maximise the health care value through promoting the extensive usage of insights.
Moffatt and Eley, 2010. The reported benefits of telehealth for rural Australians.[274]	Narrative	Identified the reported benefits attributed to telehealth for people living and professionals working in rural and remote areas of Australia. The review included 143 articles.	Rural Australians have reportedly benefited from telehealth. Telehealth offers improved access and quality of clinical care available to rural Australians through telemedicine and it may contribute to decreasing urban–rural health disparities. The review also suggested that professional development opportunities and support from specialists through the use of telehealth may contribute to improved rural medical workforce recruitment and retention.
O'Connor and Andrews, 2015. Mobile technology and its use in clinical nursing education: A literature review.[269]	Not stated	Summarised and reviewed the available literature on mobile technology used in undergraduate clinical nursing education. Of the 24 studies selected for the literature review, 13 were undertaken in the US; four in Canada; two each in the UK, Taiwan, and Australia; and one in Sweden.	There is a lack of clear definitions and theory in the current body of evidence; the variety of mobile devices and applications used; the benefits of mobile platforms in nursing education; and the complexity of sociotechnical factors, such as the cost, usability, portability, and quality of mobile tools, that affect their use in undergraduate clinical nursing education.
Paneque et al., 2016. A systematic review of interventions to provide genetics education for primary care.[349]	Systematic	Evaluated genetics educational interventions in the context of primary care. Eleven studies were included in the review.	Practitioner knowledge was improved in five of the studies and confidence improved in six, however there was no evidence in change of practice. There are insufficient studies of relevant quality to inform educational interventions in genetics for primary care practitioners.
Papadopoulos et al., 2018. Views of nurses and other health and social care workers on the use of assistive humanoid and animal-like robots in health and social care: A scoping review.[312]	Scoping	An overview of the existing evidence related to the views of nurses and other health and social care workers about the use of assistive humanoid and animal-like robots. Nineteen articles were reviewed.	There is a limited number of studies exploring the views of health care workers about the use of robots. This review highlighted that health care workers have mixed views regarding the use of robots and have concerns about patient safety and privacy. Further research is required in this area.
Speyer et al., 2018.	Systematic	Described telehealth interventions delivered by allied health professionals and nurses in rural and	The majority of studies had strong methodological quality. Meta-analysis results slightly favoured telehealth interventions

Author / title	Type of review	Description of the review / included studies	Findings
Effects of telehealth by allied health professionals and nurses in rural and remote areas: a systematic review and meta-analysis.[260]		remote areas, and compared the effects of telehealth interventions with standard face-to-face interventions. Forty-three studies were included in the review. The methodological quality of studies was rated using the QualSyst critical appraisal tool and the NHMRC Evidence Hierarchy levels.	compared with face-to-face interventions, but did not show significant differences. Interventions using a combined physical and cognitive approach appeared to be more effective. The authors concluded that telehealth services may be as effective as face-to-face interventions.
Talwar et al., 2017. Genetics/genomics education for nongenetic health professionals: A systematic literature.[33]	Systematic	Summarised and evaluated the existing genetics/genomics education programs for nongenetic health professionals. Forty-four studies were included.	The majority of studies adopted a pre/post-test design and lacked follow-up data collection. Most studies reported participants' improvements in one or more of the following areas: knowledge, attitudes, skills, intention, self-efficacy, comfort level, and practice. The authors call for an enhancement in methodological quality to strengthen education initiatives in the area of genetics/genomics education programs.
Tognetto et al., 2019. Core competencies in genetics for health care professionals: Results from a literature review and a Delphi method.[336]	Not stated	Identified core competencies in genetics for non-geneticists, both physicians and non-physicians. Two studies were selected for the review.	The authors identify three curricula in genetics for non-genetic health professionals. The curricula are intended as an exhaustive and ready-to-use material for post-graduate courses about genetics/genomics. The educational program is divided into three domains: knowledge, abilities and attitudes.
Vaona et al., 2018. E-learning for health professionals.[501]	Systematic	Assessed the effects of e-learning programmes versus traditional learning in licensed health professionals for improving patient outcomes or health professionals' behaviours, skills and knowledge. Evidence was rated using the GRADE approach. Sixteen randomised trials were included involving 5,670 health professionals.	E-learning may make little or no difference in patient outcomes or health professionals' behaviours, skills or knowledge. Even if e-learning could be more successful than traditional learning in particular medical education settings, general claims of it as inherently more effective than traditional learning may be misleading.
Westra et al., 2017. Big data science: A literature review of nursing research exemplars.[280]	Systematic	Identified, analysed, and synthesised exemplars of big data nursing research applied to practice and disseminated in key nursing informatics, general biomedical informatics, and nursing research journals. Included 17 studies.	Nurses are beginning to conduct big data research applied to practice. However, big data and data science research needs to be expanded to include a variety of scientific, governmental, and industry data resources. Research in this area needs to be expanded.
Whitehead and Seaton, 2016. The effectiveness of self-management mobile phone	Systematic	Assessed the effectiveness of mobile phone and tablet apps in self-management of key symptoms of long-term conditions. Nine papers were reviewed.	The evidence indicates the potential of apps in improving symptom management through self-management interventions. The use of apps in mHealth has the potential to improve health

Author / title	Type of review	Description of the review / included studies	Findings
and tablet apps in long-term condition management: A systematic review.[268]		Studies were included from four geographic regions (Europe, n=3; Oceania, n=2; Asia, n=3; United States, n=1).	outcomes among those living with chronic diseases through enhanced symptom control. Further research in this area is recommended.

Environmental

Author / title	Type of review	Description of the review / included studies	Findings
Labrague et al., 2018. Disaster preparedness among nurses: a systematic review of literature.[386]	Systematic	A synthesis of peer-reviewed publications that measure nurses' preparedness for disaster response. Seventeen articles were used for the review.	Nurses are insufficiently prepared and do not feel confident responding effectively to disasters. The authors suggest that there should be an emphasis on hospitals to implement policies to address lack of disaster preparedness among their employees. Further research is recommended in this area.
Rokkas et al., 2014. Disaster preparedness and response: Challenges for Australian public health nurses – A literature review.[28]	Not stated	Examined issues currently facing disaster nursing focusing on the challenges for Australian public health nurses responding to and preparing for disasters within Australia. The number of articles included is not stated, but they came from a variety of sources including grey literature.	Disaster education within nursing is ad hoc in Australia, with a lack of consistent and accessible programs and no disaster education in the undergraduate nursing curriculum. With a lack of research in disaster nursing, it is difficult to make recommendations regarding specific competencies, roles, and functions. More research is required in this area.

Legal and regulatory

Author / title	Type of review	Description of the review / included studies	Findings
Birks et al., 2016. Registered nurse scope of practice in Australia: an integrative review of the literature.[30]	Integrative	Reviewed literature relating to the scope of practice of the Australian registered nurse published between 2007 and 2014. Twenty-nine publications were included in the review.	The significant influence of local context on nursing scope of practice may limit attempts to develop a standardised conceptual definition. Clearly articulated, consistent scopes of practice are needed for the various categories of nursing work and for the many forms of advanced practice specialisations.
Chan et al., 2017.	Not stated	Described the potential benefits of medicinal cannabis in emesis control and the position of nurses	The information available in relation to the long-term therapeutic effects of cannabis is very limited. Further research

Author / title	Type of review	Description of the review / included studies	Findings
A review for Australian nurses: cannabis use for anti-emesis among terminally ill patients in Australia.[417]		looking after palliative patients who are on medicinal cannabis treatment in Australia.	is required on the needs of patients who use medicinal cannabis for anti-emesis and their experience in receiving cannabis treatment in Australia.
Saari et al., 2018. The role of unregulated care providers in home care: A scoping review.[393]	Scoping	Identified patient care activities offered by unregulated care providers in home care. Included 28 eight studies originating from Canada, Sweden, Belgium, the UK, the US and New Zealand.	Unregulated care providers provide care outside their training, including care once provided by nurses. Guidelines are needed to clearly articulate the responsibilities of nurses transferring care activities to unregulated care providers.
Whiting et al., 2015. Cannabinoids for medical use: A systematic review and meta-analysis.[419]	Systematic	A review of the benefits and adverse events (AEs) of cannabinoids. Seventy-nine trials were included involving 6,462 participants.	There was moderate-quality evidence to support the use of cannabinoids for the treatment of chronic pain and spasticity and low-quality evidence suggesting that cannabinoids were associated with improvements in nausea and vomiting due to chemotherapy, weight gain in HIV infection, sleep disorders, and Tourette syndrome. Cannabinoids were associated with an increased risk of short-term adverse events.

Appendix 9 Examples of excluded reviews relating to curriculum

Author / title	Type of review	Description	Findings
Chan et al., 2019. Curriculum design and attrition among undergraduate nursing students: A systematic review.[502]	Systematic	Reviewed the issue of undergraduate nursing student attrition in relation to curriculum design. The systematic review included 16 papers (including 2 quantitative, 9 qualitative, and 5 mixed-methods studies) published between 1999 and 2018 that were reviewed and evaluated using the MMAT. Studies were conducted in the UK (8), the US (3) and 1 each in Australia, Scotland, Iran, Finland and the Netherlands. Sample sizes in the studies ranged from 11 to 1,259.	Identified four themes: pre-enrolment criteria for recruiting nursing students; curriculum content; clinical placement-related policies; and student support services. To engage students, reduce attrition and increase the nursing workforce, several institutional-level risk factors should be addressed, including academic failure, poor clinical performance, stress, and unrealistic expectations of nursing.
DeCoste-Lopez et al., 2015. Curricular innovations for medical students in palliative and end-of-life care: A systematic review and assessment of study quality.[503]	Systematic	Described and evaluated evidence for curricular innovations in palliative care for medical students, to inform curricular design and understand recent trends in the field. The systematic review included 48 studies describing unique curricula from the US (22), the UK (7), Canada (4), Taiwan (3), 2 each from Australia, Croatia, and Germany and 1 each from Brazil, Hungary, India, Ireland, Japan, and Poland. Thirty-nine articles were included quantitative evaluation, with a mean MERSQI score of 9.9 (on a scale of 5 to 18).	Recent innovations in palliative care education for medical students encompass various learner levels, settings, educational modalities, and topics. Incorporation of interdisciplinary faculties is a key strength of palliative care education and can provide a model for interdisciplinary collaboration in other parts of the medical curriculum. Improvement in study quality is needed and could be achieved through, for example, the examination of longer-term outcomes, use of better-validated measures of effectiveness, and assessment of higher-level outcomes.
Downey and Asselin, 2015. Accelerated master's programs in nursing for non-nurses: An integrative review of students' and faculty's perceptions.[504]	Integrative	Integrative review identified student characteristics and student, graduate and faculty perceptions of those who participate in accelerated master's-level entry programs in nursing for non-nurses. Included 15 studies published between 1974 and 2012 and conducted in the US (12), Australia (2) and Canada (1).	Those who participate in accelerated master's programs in nursing for non-nurses are largely Caucasian females who are older, mature, and academically accomplished, however male participation rates in these programs exceed rates in traditional programs. There is limited literature related to student, graduate and faculty perceptions of such programs.
Laskaratos et al., 2014. A critical review of the core medical training curriculum in	Other	Systematically evaluated the UK's Core Medical Training curriculum. Included 29 articles and textbooks, the majority	While the focus was on a two-year core postgraduate medical training program in the UK, it is suggested that the systematic evaluation approach used 'is transferable to the

Author / title	Type of review	Description	Findings
the UK: a medical education perspective.[505]		published from 1995 onward (with some earlier seminal works also included).	evaluation of other undergraduate or postgraduate curricula'.
Saud and Chen, 2018. The effect of competency-based education on medical and nursing students' academic performance, technical skill development, and overall satisfaction and preparedness for future practice: An integrative literature review.[506]	Integrative	Reviewed competency-based education in medical and nursing programs, examining effect on academic performance, technical skill development, overall satisfaction and preparedness for future practice. The integrative review included 11 papers published between 2007 and 2017. Studies investigated cohorts of nursing students (4), medical students (4) and current practicing physicians (3) and were from a diverse range of countries including Australia, the US and Canada.	Competency-based education was well-received by students. The model is an effective framework and is at least as equally effective as traditional didactic model in developing competencies and improving academic and clinical performance.
Stievano et al., 2018. Shaping nursing profession regulation through history – a systematic review.[507]	Systematic	Examined factors that historically influenced developments in nursing regulation globally to inform an understanding of current issues. The systematic review included 14 papers published between 2006 and 2016 (inclusion was based on assessment using the Joanna Briggs Institute Qualitative Assessment and Review Instrument). 7 papers provided an international perspective while the remaining 7 focused on the US, New Zealand, the UK and China.	Key factors influencing developments in nursing regulation related to demographics and economics, education, changing patterns of migration and internationalisation, nursing practice, policy and regulation and significant societal changes. Formulation of new nursing regulatory models requires effective collaboration and incorporation of an international perspective.
Taylor et al. 2018. Integrating humanities curricula in medical education: a literature review.[508]	Other	Reviewed evidence on integration of humanities curricula into medical education. Included 156 articles (108 were commentaries or reflections, 48 described a humanities based intervention implemented primarily in high-income countries, with 22 of these reporting outcomes on trainee knowledge, attitudes or behaviours).	Despite extensive discussion of the role of the humanities within medical education, limited rigorous evaluation of its use in practice has been undertaken. Of the relatively few studies that evaluated curricular interventions, most qualitatively measured learner satisfaction.

Appendix 10 Journal Impact Report

Journals are listed alphabetically with journal impact factors/scores and category rankings.

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Academic Medicine	4.801	1/41 5/94	EDUCATION, SCIENTIFIC DISCIPLINES HEALTH CARE SCIENCES & SERVICES	2.37	71/979	EDUCATION
ACORN: Journal of Perioperative Nursing in Australia	Not ranked	N/A	N/A	0.25	14/22 32/50	MEDICAL–SURGICAL ADVANCED AND SPECIALISED NURSING
Aggression and violent behavior	2.23	13/61 34/135	CRIMINOLOGY & PENOLOGY PSYCHOLOGY, MULTIDISCIPLINARY	3	29/249 25/185	CLINICAL PSYCHOLOGY PATHOLOGY AND FORENSIC MEDICINE
American Journal of Critical Care	2.055	11/118 24/33	NURSING CRITICAL CARE MEDICINE	1.63	2/18	CRITICAL CARE
American Journal of Health-System Pharmacy	1.872	185/261	PHARMACOLOGY & PHARMACY	0.97	107/216 207/302	HEALTH POLICY PHARMACOLOGY
American Journal of Human Genetics	8.855	12/171	GENETICS & HEREDITY	8.34	12/311 4/91	GENETICS GENETICS (CLINICAL)
American Journal of Infection Control	1.929	81/181 66/88	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH INFECTIOUS DISEASES	1.81	56/216 135/478	HEALTH POLICY PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
American Journal of Obstetrics and Gynecology	5.732	2/82	OBSTETRICS & GYNECOLOGY	3.5	5/166	OBSTETRICS AND GYNAECOLOGY
Annals of surgery	9.203	1/200	SURGERY	5.14	3/385	SURGERY

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Asia-Pacific Journal of Public Health	1.013	124/157 154/181	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	1.06	257/478	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Australasian Emergency Nursing Journal	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Australasian Journal on Ageing	1.08	26/36 47/53	GERONTOLOGY GERIATRICS & GERONTOLOGY	0.99	11/32 57/94	COMMUNITY AND HOME CARE GERIATRICS AND GERONTOLOGY
Australian and New Zealand journal of public health	1.889	56/157 85/181	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	1.49	173/478	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Australian Health Review	1.036	64/79 84/94	HEALTH POLICY & SERVICES HEALTH CARE SCIENCES & SERVICES	1.09	101/216	HEALTH POLICY
Australian Journal of Advanced Nursing	0.511	106/115 109/118	NURSING - SSCI NURSING - SCIE	0.7	18/50 51/104	ADVANCED AND SPECIALISED NURSING GENERAL NURSING
Australian Journal of Primary Health	0.935	130/157 68/79	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH HEALTH POLICY & SERVICES	0.97	107/216 272/478	HEALTH POLICY PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Australian Journal of Rural Health	0.858	82/115 85/118	NURSING - SSCI NURSING - SCIE	0.74	14/33 320/478	FAMILY PRACTICE PUBLIC HEALTH, ENVIRONMENTAL AND

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
						OCCUPATIONAL HEALTH
Australian Prescriber	Not ranked	N/A	N/A	0.73	153/230	PHARMACOLOGY (MEDICAL)
BMC family practice	2.032	5/19 54/155	PRIMARY HEALTH CARE MEDICINE, GENERAL & INTERNAL	2.12	2/33	FAMILY PRACTICE
BMC Health Services Research	1.843	53/94	HEALTH CARE SCIENCES & SERVICES	2.18	34/216	HEALTH POLICY
BMC Medical Education	1.511	101/239 21/41	EDUCATION & EDUCATIONAL RESEARCH EDUCATION, SCIENTIFIC DISCIPLINES	1.71	162/979	EDUCATION
BMC medicine	9.088	10/155	MEDICINE, GENERAL & INTERNAL	7.32	8/841	GENERAL MEDICINE
BMC Nursing	Not ranked	N/A	N/A	1.78	11/104	GENERAL NURSING
BMJ - British Medical Journal	23.562	4/155	MEDICINE, GENERAL & INTERNAL	1.51	89/841	GENERAL MEDICINE
BMJ (Clinical Research Ed.)	Not ranked	N/A	N/A	Not ranked	N/A	N/A
BMJ Open	2.413	43/155	MEDICINE, GENERAL & INTERNAL	2.59	37/841	GENERAL MEDICINE
BMJ Quality and Safety	7.226	1/94 1/79	HEALTH CARE SCIENCES & SERVICES HEALTH POLICY & SERVICES	4.18	5/216	HEALTH POLICY
British Journal of Educational Technology	2.729	23/239	EDUCATION & EDUCATIONAL RESEARCH	2.92	47/979	EDUCATION

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
British Journal of General Practice	3.261	2/19 28/155	PRIMARY HEALTH CARE MEDICINE, GENERAL & INTERNAL	0.85	9/33	FAMILY PRACTICE
British medical bulletin	3.356	26/155	MEDICINE, GENERAL & INTERNAL	3.29	21/841	GENERAL MEDICINE
British Medical Journal Quality and Safety	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Clinical Infectious Diseases	9.117	3/88 11/155	INFECTIOUS DISEASES IMMUNOLOGY	5.42	8/263 6/108	INFECTIOUS DISEASES MICROBIOLOGY (MEDICAL)
Clinical Medicine	1.497	80/155	MEDICINE, GENERAL & INTERNAL	0.75	207/841	GENERAL MEDICINE
Clinics in geriatric medicine	2.378	32/53	GERIATRICS & GERONTOLOGY	2.42	27/94	GERIATRICS AND GERONTOLOGY
Collegian (Royal College of Nursing, Australia)	1.153	60/115 63/118	NURSING - SSCI NURSING - SCIE	1.32	22/104	GENERAL NURSING
Communications of the ACM	3.063	9/104 13/103	COMPUTER SCIENCE, SOFTWARE ENGINEERING COMPUTER SCIENCE, THEORY & METHODS	1.94	43/195	GENERAL COMPUTER SCIENCE
Contemporary Nurse	0.673	97/115 100/118	NURSING - SSCI NURSING - SCIE	0.9	43/104	GENERAL NURSING
Critical Social Thinking: Policy and Practice	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Disability and Health Journal	1.863	16/69 24/65	REHABILITATION - SSCI REHABILITATION - SCIE	1.86	131/478	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Education for Primary Care	Not ranked	N/A	N/A	0.28	415/478	PUBLIC HEALTH, ENVIRONMENTAL AND

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
						OCCUPATIONAL HEALTH
Emergency Medicine Australasia (EMA)	1.353	14/26	EMERGENCY MEDICINE	0.92	31/77	EMERGENCY MEDICINE
Emergency Medicine Journal	2.046	9/26	EMERGENCY MEDICINE	1.33	18/77 31/84	EMERGENCY MEDICINE CRITICAL CARE AND INTENSIVE CARE MEDICINE
Environmental Health	4.376	17/181 38/242	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH ENVIRONMENTAL SCIENCES	Not ranked	N/A	N/A
Euro Observer - Newsletter of The European Observatory on Health Care Systems,	Not ranked	N/A	N/A	Not ranked	N/A	N/A
European Academic Research	Not ranked	N/A	N/A	Not ranked	N/A	N/A
European Journal of Clinical Investigation	3.086	32/155 57/133	MEDICINE, GENERAL & INTERNAL MEDICINE, RESEARCH & EXPERIMENTAL	2.63	41/119 159/398	CLINICAL BIOCHEMISTRY BIOCHEMISTRY
Evidence Based Nursing	Not ranked	N/A	N/A	0.27	8/11	FUNDAMENTALS AND SKILLS
Family Practice	1.675	71/155 11/19	MEDICINE, GENERAL & INTERNAL PRIMARY HEALTH CARE	1.8	4/33	FAMILY PRACTICE
Focus	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Frontiers in Public Health	Not ranked	N/A	N/A	1.77	139/478	PUBLIC HEALTH, ENVIRONMENTAL

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
						AND OCCUPATIONAL HEALTH
Gastrointestinal Nursing	Not ranked	N/A	N/A	0.21	34/50 16/22	ADVANCED AND SPECIALISED NURSING MEDICAL–SURGICAL
Genetics in Medicine	9.937	8/171	GENETICS & HEREDITY	6.36	6/91	GENETICS(CLINICAL)
Harm Reduction Journal	2.5	13/35	SUBSTANCE ABUSE	2.56	70/478 111/487	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH PSYCHIATRY AND MENTAL HEALTH
Health Affairs	4.843	4/94 4/79	HEALTH CARE SCIENCES & SERVICES HEALTH POLICY & SERVICES	3.62	7/216	HEALTH POLICY
Health informatics journal	1.833	55/94 16/25	HEALTH CARE SCIENCES & SERVICES MEDICAL INFORMATICS	1.8	24/62	HEALTH INFORMATICS
Health Information and Libraries Journal	1.19	44/88	INFORMATION SCIENCE & LIBRARY SCIENCE	1.02	50/202 39/62	LIBRARY AND INFORMATION SCIENCES HEALTH INFORMATICS
Health Policy	2.293	22/79 40/94	HEALTH POLICY & SERVICES HEALTH CARE SCIENCES & SERVICES	2.38	23/216	HEALTH POLICY
Health care Informatics Research	Not ranked	N/A	N/A	1.56	10/25 28/62	HEALTH INFORMATION MANAGEMENT HEALTH INFORMATICS
Higher Education Research and Development	2.006	52/239	EDUCATION & EDUCATIONAL RESEARCH	2.01	110/979	EDUCATION

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Human Resources for Health	2.446	3/27 16/79	INDUSTRIAL RELATIONS & LABOR HEALTH POLICY & SERVICES	2.34	16/117 84/478	PUBLIC ADMINISTRATION PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Immunotherapy Research Journal	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Internal Medicine Journal	1.785	66/155	MEDICINE, GENERAL & INTERNAL	1.37	65/121	INTERNAL MEDICINE
International E-Journal of Advances in Education	Not ranked	N/A	N/A	Not ranked	N/A	N/A
International Journal of Geriatric Psychiatry	2.94	6/36 42/142	GERONTOLOGY PSYCHIATRY	2.69	104/487 21/94	PSYCHIATRY AND MENTAL HEALTH GERIATRICS AND GERONTOLOGY
International Journal of Human-Computer Interaction	1.259	12/22 11/16	COMPUTER SCIENCE, CYBERNETICS ERGONOMICS	1.87	10/34 30/87	HUMAN FACTORS AND ERGONOMICS HUMAN-COMPUTER INTERACTION
International Journal of Integrated Care	1.837	36/79 54/94	HEALTH POLICY & SERVICES HEALTH CARE SCIENCES & SERVICES	1.86	149/1028 44/241	SOCIOLOGY AND POLITICAL SCIENCE HEALTH (SOCIAL SCIENCE)
International Journal of Medical Informatics	2.957	21/94 35/148	HEALTH CARE SCIENCES & SERVICES COMPUTER SCIENCE, INFORMATION SYSTEMS	3.56	9/62	HEALTH INFORMATICS
International Journal of Mental Health Nursing	2.033	11/115 12/118	NURSING - SSCI NURSING - SCIE	1.93	6/37	PHYCHIATRIC MENTAL HEALTH

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
International Journal of Nursing Practice	1.142	62/115 65/118	NURSING - SSCI NURSING - SCIE	1.14	31/104	GENERAL NURSING
International Journal of Nursing Sciences	Not ranked	N/A	N/A	0.78	48/104	GENERAL NURSING
International Journal of Nursing Studies	3.656	1/115 1/118	NURSING - SSCI NURSING - SCIE	3.5	3/104	GENERAL NURSING
International Medical Journal	Not ranked	N/A	N/A	0.2	475/841	GENERAL MEDICINE
International Nursing Review	1.496	33/115 37/118	NURSING - SSCI NURSING - SCIE	1.49	19/104	GENERAL NURSING
International Psychogeriatrics	2.261	11/36 52/127	GERONTOLOGY PSYCHOLOGY, CLINICAL	2.03	61/249 10/39	CLINICAL PSYCHOLOGY GERONTOLOGY
JAMA - Journal of the American Medical Association	47.661	3/155	MEDICINE, GENERAL & INTERNAL	7.3	9/841	GENERAL MEDICINE
JMIR mHealth and uHealth	4.541	7/94 2/25	HEALTH CARE SCIENCES & SERVICES MEDICAL INFORMATICS	Not ranked	N/A	N/A
Journal of Advanced Nursing	2.267	7/115 7/118	NURSING - SSCI NURSING - SCIE	2.37	6/104	GENERAL NURSING
Journal of Aging Research	Not ranked	N/A	N/A	1.68	42/94	GERIATRICS AND GERONTOLOGY
Journal of Business and Behavioral Sciences	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Journal of Clinical Nursing	1.635	30/115 33/118	NURSING - SSCI NURSING - SCIE	1.71	15/104	GENERAL NURSING
Journal of Genetic Counselling	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Journal of graduate medical education	Not ranked	N/A	N/A	0.84	179/841	GENERAL MEDICINE

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Journal of Intellectual and Developmental Disability	1.176	22/40 43/69	EDUCATION, SPECIAL REHABILITATION - SSCI	0.83	428/979 138/249	EDUCATION ARTS AND HUMANITIES (MISCELLANEOUS)
Journal of Medical Internet Research	4.671	1/25 6/94	MEDICAL INFORMATICS HEALTH CARE SCIENCES & SERVICES	4.5	4/62	HEALTH INFORMATICS
Journal of multidisciplinary health care	Not ranked	N/A	N/A	1.72	14/104	GENERAL NURSING
Journal of Nursing Education	1.185	56/115 59/118	NURSING - SSCI NURSING - SCIE	1.04	333/979 37/104	EDUCATION GENERAL NURSING
Journal of Nursing Education and Practice	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Journal of Nursing Management	1.912	15/115 16/118	NURSING - SSCI NURSING - SCIE	2.03	1/29	LEADERSHIP AND MANAGEMENT
Journal of Nursing Regulation	Not ranked	N/A	N/A	1.21	8/35 5/19	ISSUES, ETHICS AND LEGAL ASPECTS NURSING (MISCELLANEOUS)
Journal of Nursing Scholarship	2.662	2/115 2/118	NURSING - SSCI NURSING - SCIE	2.8	4/104	GENERAL NURSING
Journal of Physiotherapy	4.542	2/65 4/77	REHABILITATION - SCIE ORTHOPEDICS	1.34	68/163	PHYSICAL THERAPY, SPORTS THERAPY AND REHABILITATION
Journal of Psychiatric and Mental Health Nursing	1.702	26/115 29/118	NURSING - SSCI NURSING - SCIE	1.65	8/37	PHYCHIATRIC MENTAL HEALTH
Journal of Rehabilitation Medicine	1.802	29/65 47/81	REHABILITATION - SCIE SPORT SCIENCES	1.97	18/111 35/163	REHABILITATION PHYSICAL THERAPY, SPORTS THERAPY AND REHABILITATION

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Journal of Research in Nursing	Not ranked	N/A	N/A	0.45	8/10	RESEARCH AND THEORY
Journal of Telemedicine and Telecare	3.046	19/94	HEALTH CARE SCIENCES & SERVICES	2.1	19/62	HEALTH INFORMATICS
Journal of the American Association of Nurse Practitioners	1.136	64/115 67/118	NURSING - SSCI NURSING - SCIE	1.05	36/104	GENERAL NURSING
Journal of the American Medical Directors Association	5.325	4/53	GERIATRICS & GERONTOLOGY	4.21	1/104 4/216	GENERAL NURSING HEALTH POLICY
Journal of the Australian Traditional-Medicine Society	Not ranked	N/A	N/A	0.09	77/91	COMPLEMENTARY AND ALTERNATIVE MEDICINE
Journal of the Royal Society of Medicine	2.654	38/155	MEDICINE, GENERAL & INTERNAL	0.94	156/841	GENERAL MEDICINE
Journal of Transcultural Nursing	1.242	52/115 55/118	NURSING - SSCI NURSING - SCIE	0.96	42/104	GENERAL NURSING
Lancet	53.254	2/154	MEDICINE, GENERAL & INTERNAL	8.6	4/841	GENERAL MEDICINE
Medical Care	3.338	7/79 16/94	HEALTH POLICY & SERVICES HEALTH CARE SCIENCES & SERVICES	2.88	54/478	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Medical Care Research and Review	2.315	21/79 39/94	HEALTH POLICY & SERVICES HEALTH CARE SCIENCES & SERVICES	2.22	31/216	HEALTH POLICY
Medical Education	4.405	2/41 9/94	EDUCATION, SCIENTIFIC DISCIPLINES HEALTH CARE SCIENCES & SERVICES	1.83	130/979	EDUCATION

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Medical Journal of Australia	4.227	19/155	MEDICINE, GENERAL & INTERNAL	1.02	143/841	GENERAL MEDICINE
Medical Teacher	2.45	8/41 31/94	EDUCATION, SCIENTIFIC DISCIPLINES HEALTH CARE SCIENCES & SERVICES	1.44	216/979	EDUCATION
Methods of Information in Medicine	1.531	85/148 17/25	COMPUTER SCIENCE, INFORMATION SYSTEMS MEDICAL INFORMATICS	1.53	7/50 11/25	ADVANCED AND SPECIALISED NURSING HEALTH INFORMATION MANAGEMENT
Milbank Quarterly, The	6	2/94 2/79	HEALTH CARE SCIENCES & SERVICES HEALTH POLICY & SERVICES	2.74	15/216 60/478	HEALTH POLICY PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
MIT Technology Review	Not ranked	N/A	N/A	Not ranked	N/A	N/A
New England Journal of Medicine	79.26	1/155	MEDICINE, GENERAL & INTERNAL	14.75	2/841	GENERAL MEDICINE
New Zealand Medical Journal	Not ranked	N/A	N/A	0.61	251/841	GENERAL MEDICINE
Nurse Education in Practice	1.313	47/115 50/118	NURSING - SSCI NURSING - SCIE	1.54	18/104 199/979	GENERAL NURSING EDUCATION
Nurse Education Perspectives	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Nurse Education Today	2.067	10/118 10/115	NURSING - SSCI NURSING - SCIE	2.11	8/104 92/979	GENERAL NURSING EDUCATION
Nurse Educator	1.245	51/115 54/118	NURSING - SSCI NURSING - SCIE	1	346/979 4/11	EDUCATION FUNDAMENTALS AND SKILLS

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
Nursing (0360-4039, title includes year of publication, e.g. Nursing2017)	Not ranked	N/A	N/A	0.13	17/23 5/6	EMERGENCY ASSESSMENT AND DIAGNOSIS
Nursing and Health Sciences	1.237	53/115 56/118	NURSING - SSCI NURSING - SCIE	1.31	23/104	GENERAL NURSING
Nursing Clinics of North America	0.812	89/115 92/118	NURSING - SSCI NURSING - SCIE	0.72	49/104	GENERAL NURSING
Nursing Education Perspectives (National League for Nursing)	Not ranked	N/A	N/A	1.21	27/104 269/979	GENERAL NURSING EDUCATION
Nursing for Women's Health	Not ranked	N/A	N/A	0.39	66/104	GENERAL NURSING
Nursing Forum	Not ranked	N/A	N/A	1.17	30/104	GENERAL NURSING
Nursing Inquiry	1.159	59/115 62/118	NURSING - SSCI NURSING - SCIE	1.44	20/104	GENERAL NURSING
Nursing Management	Not ranked	N/A	N/A	0.19	24/29 27/29	LEADERSHIP AND MANAGEMENT LEADERSHIP AND MANAGEMENT
Nursing Outlook	2.425	4/115 4/118	NURSING - SSCI NURSING - SCIE	1.73	12/104	GENERAL NURSING
Nursing science quarterly	0.83	85/115 88/118	NURSING - SSCI NURSING - SCIE	0.44	63/104	GENERAL NURSING
Nursing Standard	Not ranked	N/A	N/A	0.08	614/841	GENERAL NURSING
Ochsner Journal	Not ranked	N/A	N/A	1.15	125/841	GENERAL MEDICINE
Online Journal of Issues in Nursing	Not ranked	N/A	N/A	0.89	16/35	ISSUES, ETHICS AND LEGAL ASPECTS
Online Journal of Nursing Informatics	Not ranked	N/A	N/A	0.33	16/19 55/62	NURSING (MISCELLANEOUS)

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
						HEALTH INFORMATICS
Papers and Publications: Interdisciplinary Journal of Undergraduate Research	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Patient Education and Counseling	2.785	8/98 46/180	SOCIAL SCIENCES, INTERDISCIPLINARY PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	2.83	30/841	GENERAL MEDICINE
Plos One	2.766	15/64	MULTIDISCIPLINARY SCIENCES	3.01	16/177 42/186	GENERAL AGRICULTURAL AND BIOLOGICAL SCIENCES GENERAL BIOCHEMISTRY, GENETICS AND MOLECULAR BIOLOGY
Policy, Politics, and Nursing Practice	Not ranked	N/A	N/A	1.04	9/29 14/35	LEADERSHIP AND MANAGEMENT ISSUES, ETHICS AND LEGAL ASPECTS
Postgraduate medical journal	2.078	52/155	MEDICINE, GENERAL & INTERNAL	1.53	87/841	GENERAL MEDICINE
Public health	1.441	89/157 116/181	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	1.36	197/478	PUBLIC HEALTH, ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Quality in Primary Care	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Research in Developmental Disabilities	1.82	8/40	EDUCATION, SPECIAL	2.18	54/249	CLINICAL PSYCHOLOGY

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
		19/69	REHABILITATION - SSCI		64/283	DEVELOPMENTAL AND EDUCATIONAL PSYCHOLOGY
Rural and Remote Health	1.096	113/156 148/180	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	1.05	1/3 101/241	EMERGENCY MEDICAL SERVICES HEALTH (SOCIAL SCIENCE)
SAGE Open	Not ranked	N/A	N/A	0.59	10/122 83/213	GENERAL ARTS AND HUMANITIES GENERAL SOCIAL SCIENCES
Science	41.058	2/64	MULTIDISCIPLINARY SCIENCES	15.85	1/87	MULTIDISCIPLINARY
Science translational medicine	16.71	2/133 9/190	MEDICINE, RESEARCH & EXPERIMENTAL CELL BIOLOGY	8.07	6/841	GENERAL MEDICINE
Social Indicators Research	1.648	27/98 42/147	SOCIAL SCIENCES, INTERDISCIPLINARY SOCIOLOGY	1.6	32/213 193/1028	GENERAL SOCIAL SCIENCES SOCIOLOGY AND POLITICAL SCIENCE
Social Science & Medicine	3.007	15/156 5/42	PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH SOCIAL SCIENCES, BIOMEDICAL	3.38	3/126 8/241	HISTORY AND PHILOSOPHY OF SCIENCE HEALTH(SOCIAL SCIENCE)
Studies in health technology and informatics	Not ranked	N/A	N/A	0.47	20/25 163/199	HEALTH INFORMATION MANAGEMENT BIOMEDICAL ENGINEERING
Technological Forecasting and Social Change	3.131	7/57 38/140	PLANNING & DEVELOPMENT BUSINESS	3.42	24/340 21/202	BUSINESS AND INTERNATIONAL MANAGEMENT APPLIED PSYCHOLOGY

Journal title	JCR impact factor[1]	JCR ranking[1]	JCR category[1]	CITE SCORE[2]	CITESCORE Ranking[2]	CITESCORE Category[2]
The American Journal of Nurses	Not ranked	N/A	N/A	Not ranked	N/A	N/A
The virtual mentor	Not ranked	N/A	N/A	Not ranked	N/A	N/A
World Review of Political Economy	Not ranked	N/A	N/A	Not ranked	N/A	N/A
Worldviews on Evidence-Based Nursing	2.143	8/115 8/118	NURSING - SSCI NURSING - SCIE	2.35	7/104	GENERAL NURSING

[1]Journal Citation Reports 2017. Available from InCites Journal Citation Reports website[1]

[2]CiteScore™ 2017. Available from Scopus website[2]

[1] https://jcr.incites.thomsonreuters.com

[2] https://www-scopus-com.ezproxy.uow.edu.au/sources.uri?zone=TopNavBar&origin=sbrowse

Journal Citation Report (JCR) impact factor

The JCR impact factor shows how often the average article is cited in a given journal, based on a two-year window. JCR impact factor uses Web of Science data.

2017 Journal Impact Factor = (2017 citations to items in 2016 + 2017 citations to items in 2015) / (citable items in 2016 + citable items in 2015).

More information: View the Journal Citation Reports: A Primer on the JCR and Journal Impact Factor (PDF, 344Kb)[3]

CiteScore

CiteScore shows how often the average article is cited in a given journal, based on a three-year window. CiteScore uses Scopus data.

2017 CiteScore = Citation count 2017 / Documents published 2014 – through to 2016

More information: Journal Metrics - FAQs website[4]

[3] https://clarivate.com/wp-content/uploads/2017/10/JCR_Primer.pdf
[4] https://journalmetrics.scopus.com/index.php/Faqs

Glossary

Term	Definitions
Artificial Intelligence (AI)	AI is the field that deals with the conception development and implementation of informatics tools based on intelligence technologies which attempt to capture the complex process of human though and intelligence.[316]
Big Data	Very large data sets that are difficult to process using typical data processing, such as a conventional relational database system. Big data sets can be useful to predict health care needs and trends.[316]
Competence	Competence refers to the effective application of a combination of knowledge, skill and judgement demonstrated by an individual in daily practice or job performance. In nursing definitions, there is wide-ranging agreement that, in the performance of nursing roles standards required in employment, competence reflects the following: ▪ Knowledge, understanding and judgement: ▪ A range of skills – cognitive, technical or psychomotor and interpersonal; and a range of personal attributes and attitudes.[509]
Cultural competence	Cultural competence is the ability to participate ethically and effectively in personal and professional intercultural settings. It requires being aware of one's own cultural values and world view and their implications for making respectful, reflective and reasoned choices, including the capacity to imagine and collaborate across cultural boundaries.[510]
Cloud Based	Cloud based services are those provided on servers at remote locations via the Internet. The 'cloud' is the ability to host a software platform service from a remote location that can be freely accessed and used anywhere via Internet access.[316]
Digital Literacy	The American Library Association defines "digital literacy" as the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.[316]
Electronic Health Record (EHR)	An Electronic Health Record (EHR) is defined as "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting". An electronic health record is accessible by health care providers and in some instances the patient.[316]
Enrolled Nurse (EN)	The enrolled nurse works with the registered nurse as part of the health care team and demonstrates competence in the provision of person-centred care. Core practice generally requires the EN to work under the direct or indirect supervision of the RN…ENs engage in analytical thinking, use information and/or evidence, and skilfully and empathetically communicate with all involved in the provision of care, including the person receiving care and their family and community and health professional colleagues.[511] Also known in other countries as: ▪ Diploma Nurse ▪ Diploma-Prepared Nurse ▪ Licensed Practical Nurse ▪ Licenced Vocational Nurse ▪ Practical Nurse ▪ Registered Practical Nurse.[464]

Term	Definitions
Evidence Based Practice (EBP)	Evidence-Based Practice (EBP) is "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research".[316]
Health Literacy	The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make informed and appropriate health decisions.[316]
Information Literacy	The American Library Association defines "information literacy" as a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.[316]
Nurse Practitioner (NP)	The nurse practitioner is an advanced practice nurse endorsed by the Nursing and Midwifery Board of Australia who has direct clinical contact and practises within their scope under the legislatively protected title 'nurse practitioner' under the National Law. Also known as an Advanced Practice Nurse (note there is inconsistency in the use of this title and can also refer to registered nurses who perform at a high level).[464]
PESTEL Analysis	A PESTEL analysis has a long history of use in the field of business and strategic management.[11] The acronym refers to the political, economic, social, technological, environmental and legal or regulatory influences external to an organisation or entity. It is used in environmental scanning and has been applied in analyses of diverse industries to capture both international and national trends.[12]
Registered Nurse (RN)	Registered Nurse practice is person-centred and evidence-based with preventative, curative, formative, supportive, restorative and palliative elements.[512] Also known in other countries as: ▪ Baccalaureate-Prepared Nurse ▪ Baccalaureate Nurse.[513]
Robotics	The design, development and use of robotics and machines to carry out tasks typically performed by people.[316]
Scope of nursing practice	The scope of nursing practice is not limited to specific tasks, functions or responsibilities but is a combination of knowledge, judgement and skill that allows the nurse to preform direct caregiving and evaluate its impact, advocate for patients and for health, supervise and delegate to others, lead, manage, teach, undertake research and develop health policy for health care systems. The scope of practice is dynamic and responsive to changing health needs, knowledge development and technological advances.[514]
Telehealth	Telehealth is the use of information and communication technologies to deliver health care when patients and care providers are not in the same physical location. This can include using phone, video, texting or personal messaging.[316]
Trend	A trend is defined as an important pattern of social, environmental and economic activity that will play-out in the future.[515]