

Zika virus infection

CDNA National Guidelines for Public Health Units

Revision history			
Version	Date	Revised by	Changes
1.0	30 June 2016	Developed by Zika SoNG working group	Endorsed by CDNA July 2016 Endorsed by AHPPC August 2016
1.1	16 December 2016	Revised by Health	Current references added. Updated advice on blood donation and preventing sexual transmission.

The Series of National Guidelines ('the Guidelines') have been developed by the Communicable Diseases Network Australia (CDNA) and noted by the Australian Health Protection Principal Committee (AHPPC). Their purpose is to provide nationally consistent guidance to public health units (PHUs) in responding to a notifiable disease event.

These guidelines capture the knowledge of experienced professionals and provide guidance on best practice based upon the best available evidence at the time of completion.

Readers should not rely solely on the information contained within these guidelines. Guideline information is not intended to be a substitute for advice from other relevant sources including, but not limited to, the advice from a health professional. Clinical judgement and discretion may be required in the interpretation and application of these guidelines.

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Zika virus infection

CDNA National Guidelines for Public Health Units

Cases in or linked to Northern Queensland

For confirmed and probable cases believed to have been acquired in, or who have travelled to, the Zika virus (ZIKV)-receptive area of Australia, the Public Health Unit (PHU) should notify the Communicable Diseases Branch in Brisbane (phone: 07 3328 9724) as soon as possible.

One case of locally-acquired vector-borne ZIKV infection constitutes an outbreak.

1. Summary

Public health priority

Urgent for cases known to have recently travelled in the ZIKV-receptive area of Australia (defined in Figure 1 below) either during exposure or viraemic periods. Routine for other cases.

Case management

No specific treatment is available for ZIKV infection. Most symptomatic cases are self-limiting, with oral fluids and analgesia given acutely. Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided until dengue can be ruled out, in order to reduce the risk of haemorrhage.

ZIKV cases should be advised not to travel to the ZIKV-receptive area of Australia and to avoid being bitten by mosquitoes capable of transmitting ZIKV for at least the first week after onset of symptoms or laboratory confirmation of infection. Pregnant women with ZIKV infection should be referred for specialist obstetric assessment.

Male cases should avoid unprotected sex during the infectious period and for at least six months after their return home, or for six months after the date that ZIKV infection was diagnosed – whichever is longer. Female cases should avoid unprotected sex, during the infectious period and for at least eight weeks after their return home, or for eight weeks after the date that ZIKV infection was diagnosed – whichever is longer.

Male cases should not donate sperm for at least six months from the time of their last exposure to or time of diagnosis, of the virus.

All cases cannot donate blood for a minimum of four months after recovery from all symptoms.

Contact management

Identify and manage pregnant women who were co-travellers or are sexual partners of confirmed or probable ZIKV cases. Infants born to mothers who were infected with ZIKV during pregnancy, should be tested and referred for specialist paediatric assessment. Additional contact management is required in the ZIKV-receptive area of Australia.

All men and women should follow the recommendations for prevention of sexual transmission that are relevant to their circumstances (refer to Appendix 1).

ZIKV-receptive area of Australia

In this document, the receptive area for ZIKV is considered to be the same as the dengue-receptive area* (Figure 1), as defined in the Queensland Dengue Management Plan 2015-2020¹; mainly north Queensland.

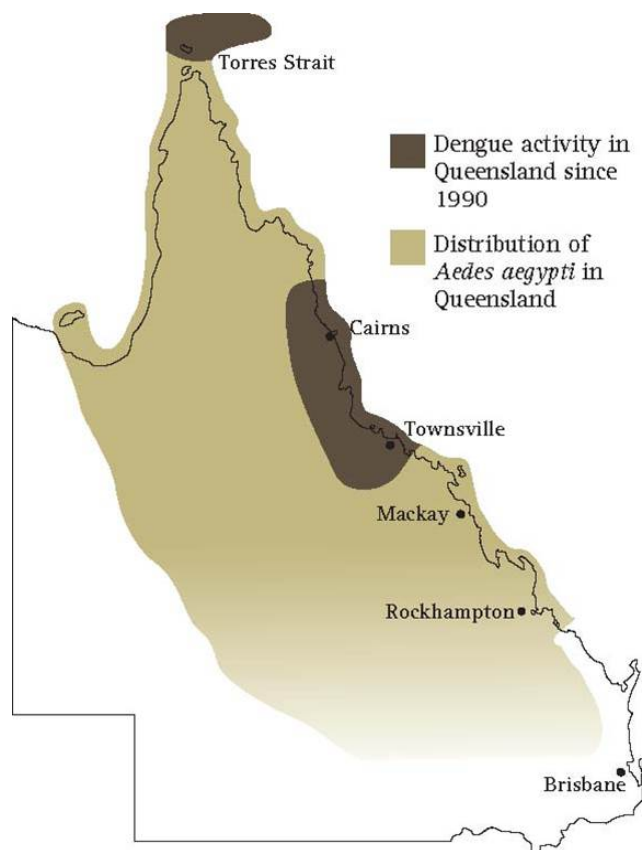
This includes residential parts* (urban or regional) of a defined geographical region in Australia where:

- *Aedes aegypti* or *Aedes albopictus* mosquitoes are considered to be present AND
- local dengue transmission has occurred in the past 20 years, OR, local public-health and entomology authorities consider there is a risk of sustained transmission.

*Note:

- Only urban or residential environments within the shaded areas are the potential receptive area.
- Data on vector distribution are patchy and subject to change.

Figure 1: ZIKV-receptive area of Australia



Source: Queensland Dengue Management Plan 2015-2020.

To date there has been no known local transmission of ZIKV in the receptive area of Australia.

* For clarification, contact the Communicable Disease Unit in Brisbane (phone: 07 3328 9724).

2. The disease

Infectious agent

Zika virus (ZIKV) is a flavivirus, closely related to dengue virus.

ZIKV was first isolated in 1947 from a rhesus monkey in the Zika Forest, Uganda, then in mosquitoes (*Aedes africanus*) in the same forest in 1948², and subsequently in a human from Nigeria, in 1952.³ The two distinct ZIKV lineages are: the African lineage and the Asian lineage, the latter of which has emerged recently in the Pacific and the Americas.⁴

The first outbreak of ZIKV infection identified outside of Africa and Asia, occurred on Yap Island, Federated States of Micronesia in 2007, is estimated to have affected over 900 people. The predominant mosquito vector was *Aedes hensilli*.⁵

From 2013, an outbreak of ZIKV infection occurred in French Polynesia, affecting more than 28,000 people.^{6, 7} Whilst most of those affected experienced mild symptoms, severe neurological complications were reported in a few patients.⁸

In 2015, ZIKV emerged in South America with widespread outbreaks reported initially in Brazil and Columbia^{9, 10}, with subsequent spread to many countries in South and Central America and the Caribbean.

Reservoir

Humans are the predominant host during outbreaks. Non-human primates such as monkeys are thought to maintain the virus in limited forest settings in Asia and Africa.^{11, 12}

Mode of transmission

ZIKV is transmitted to humans primarily through the bite of infective *Aedes* mosquitoes. It is assumed that *Ae. aegypti* is the principal vector for ZIKV transmission.

Virus has been detected from mosquitoes trapped in the wild and vector competence has been shown for *Ae. aegypti*^{11, 13} and *Ae. albopictus*.^{14, 15} Some other *Aedes* mosquito species are considered potential vectors (notably *Ae. africanus*¹⁶, *Ae. hensilli*^{5, 17, 18} and *Ae. polynesiensis*¹⁹) in particular geographic locations.

Vertical transmission

Maternal-fetal transmission of ZIKV has been well documented with a number of reports demonstrating ZIKV in amniotic fluid, as well as the blood and tissue of fetuses or infants born to women with ZIKV infections.^{20, 21, 22, 23, 24, 25, 26, 27}

Perinatal transmission could occur by trans-placental transmission or during delivery.

Breastfeeding

To date, there have been no reports of infants being infected with ZIKV through breastfeeding, however, ZIKV RNA has been detected in breast milk.²⁸

The World Health Organization (WHO) recommends that breastfeeding continues, with benefits for the infant and mother outweighing any potential risk of ZIKV transmission through breast milk.²⁹

Sexual transmission

ZIKV can be transmitted during sex by a person infected with ZIKV to their partner (female or male). Multiple instances of probable or confirmed sexual transmission have now been reported. To date almost all reports of sexual transmission have involved a symptomatic man^{30, 31, 32, 33, 34, 35}, however, transmission from asymptomatic males to female sexual partners has also been reported,^{36, 37} as has female-to-male and male-to-male sexual transmission.^{34, 38} From these cases, it is known that the sexual transmission can occur before, during or after symptoms.

The longest reported period between symptom onset and sexual transmission is 32-41 days (based on an incubation period of 3-12 days).³⁹ Zika virus RNA has also been found in the semen of five men more than 90 days after onset, and in one case up to 188 days after onset of infection.^{40, 41, 42, 43} Viral RNA has been detected in the genital tract of women on day 11 in one, and another up to day 13 in another, and was cleared by day 17 in both women.^{44, 45} It is not known if ZIKV can be transmitted from other body fluids.

For recommendations to reduce the risk of sexual transmission see *Sexual transmission advice* under *Routine prevention activities* (below).

Transfusion-derived transmission

During the outbreak in French Polynesia, 3% of blood donors were found to be positive for ZIKV by PCR while asymptomatic.⁴⁶ There is also evidence of ZIKV transmission from blood transfusions in Brazil.^{47, 48}

For further information see the section on *Blood donation* (below).

Incubation period

The incubation period in a susceptible human (i.e. the intrinsic incubation period), has been reported to be between 3-12 days, following the bite of an infective vector.⁴⁹

The extrinsic incubation period (length of time for a mosquito to become infective after ingesting ZIKV), is estimated to be 10 days. An infective vector is thought to be capable of transmitting ZIKV until it dies.

Infectious period

A person with ZIKV infection, with or without symptoms, is thought to be able to transmit the virus to vector mosquitoes during the first week of their infection.

In symptomatic cases, the infectious period is likely to start 2-3 days prior to the onset of symptoms and continues up to 10 days after symptoms end.

Clinical presentation and outcome

Most (between 60-80%) people with ZIKV infection, are thought to remain asymptomatic.

If symptomatic, infection is usually mild, and characterised by a short-lasting, self-limiting rash illness of 4–7 days duration, without complications. Exceptions are the risk of effects to fetuses in pregnant women, and the development of neurological complications (such as Guillain-Barré Syndrome [GBS]), which are discussed below.

The main symptoms of ZIKV infection are maculopapular rash, fever, arthralgia, myalgia, headache and non-purulent conjunctivitis or conjunctival injection. The rash is often itchy and centrifugal (starts on the face and then spreads down the body). Less frequently, retro-orbital pain and gastro-intestinal symptoms, such as abdominal pain, are reported.

Fetal abnormalities

There is strong scientific consensus that pregnant women who become infected with ZIKV can transmit the infection to their unborn babies, with potentially serious consequences.^{26, 27, 50, 51} Reports from several countries, most notably Brazil, where ZIKV outbreaks have occurred, indicate a coincident increase in cases of congenital abnormalities, some of which are severe, and include microcephaly.^{24, 25, 52, 53} Based on current evidence, the risk of congenital abnormalities appears to relate to all trimesters of pregnancy.^{24, 54, 55, 56, 57} Additional ongoing research is necessary in order to determine the likelihood and spectrum of adverse fetal outcomes associated with ZIKV infection.

ZIKV infection is not believed to pose a risk of birth defects for future pregnancies.

Guillain-Barré Syndrome (GBS) and other neurological conditions

GBS is recognised to be a complication of infection with a number of organisms, including *Campylobacter* spp., influenza virus, Epstein-Barr virus, HIV and *Mycoplasma pneumoniae*, as well as some non-infectious conditions.

In French Polynesia, after a local ZIKV outbreak starting in 2013, an increase in autoimmune and neurological diseases (including GBS) was observed.^{8, 58} The incidence of GBS cases during this outbreak was estimated to be 0.24 per 1,000 ZIKV infections.⁵⁸

There is a strong scientific consensus that ZIKV infection can cause GBS^{58, 59, 60, 61, 62} and other neurological conditions.^{45, 63}

Persons at increased risk of disease

Susceptibility to primary ZIKV infection is assumed to be universal. It is likely that those who have previously had ZIKV infection have immunity to re-infection.

Disease occurrence and public health significance

Knowledge of the geographical distribution of ZIKV is based on: results of sero-surveys; viral isolation studies in mosquitoes and humans; reports of travel-associated cases, and the limited number of published outbreaks. As noted above (under *Infectious agent*), before 2007, the areas with reported ZIKV circulation included tropical Africa and Southeast Asia.

An outbreak was reported on Yap Island, Federated States of Micronesia (FSM) from April to July 2007.⁵ Between 2013 and 2015, several significant outbreaks occurred in the Pacific region including French Polynesia.⁶

In 2015, ZIKV emerged in South America with widespread outbreaks reported initially in Brazil and Columbia,^{9, 10} with spread to many countries in South and Central America and the Caribbean.

Public Health Emergency of International Concern

On 1 February 2016, the WHO declared a Public Health Emergency of International Concern (PHEIC) to facilitate a globally coordinated response to investigate the suspected

association between ZIKV outbreaks and a concurrent increase in congenital abnormalities (including microcephaly) and neurological conditions (including GBS).⁶⁴

On 18 November 2016, the WHO declared the end of the PHEIC, with the Emergency Committee on Zika and microcephaly recommending that the alert phase be scaled down to one of long term surveillance and research.⁶⁵

3. Routine prevention activities

Prevention activities for ZIKV depend on reducing human exposure to vector bites and vector control measures in ZIKV-receptive areas, along with prevention of non-mosquito (e.g. sexual or transfusion-associated) transmission of ZIKV. There is no vaccine.

In north Queensland, and parts of central and southwest Queensland (where the *Ae. aegypti* are present), and in the Torres Strait where both *Ae. aegypti* and *Ae. albopictus* are known to be present, public-health vector control teams may be able to reduce the risk of local transmission through insecticide spraying and other vector-reduction strategies. Outside these areas, notification and case interviews are the minimum required public-health actions.

Travel advice

All travellers are advised to take the following mosquito bite prevention measures when travelling to areas currently affected by ZIKV or wherever mosquito-borne diseases are present. These precautions are necessary in day and night times.

- Cover as much exposed skin as possible, including by wearing light-coloured long-sleeved shirts and long pants.
- Use insect repellents, as per manufacturers' instructions.
- The most effective mosquito repellents contain Diethyl Toluamide (DEET) or Picaridin. Repellents containing oil of lemon eucalyptus (OLE) (also known as Extract of Lemon Eucalyptus), or para-menthane-3,8-diol (PMD) also provide adequate protection.
- Note that insect repellents containing DEET or picaridin, are safe for pregnant and breastfeeding women, and children older than 2 months, when used according to the product label.
- If both sunscreen and insect repellent are used, sunscreen should be applied before the repellent.
- Use insecticide-treated (such as permethrin) clothing and gear (such as boots, pants socks, and tents).
- Use bed (mosquito) nets as necessary.
- Stay and sleep in insect-screened or air-conditioned rooms.
- Seek medical advice, as soon as practicable, if unwell with a high fever and/or other relevant symptoms during or soon after travel.

People infected with ZIKV should be advised against travelling to the ZIKV-receptive area of Australia until at least a week after illness onset or laboratory confirmation of infection.

Information on ZIKV-affected countries can be found at the Australian Government Department of Health [Zika virus website](#). Given the difficulties in determining specific locations within countries where there is local ZIKV transmission, this list is likely to change over time.

Mosquito surveillance and control measures in Australia

ZIKV is not endemic in Australia, but persons infected in Latin America, the Pacific and South-east Asia are known to have travelled to Australia.

For mosquito-borne transmission to occur in Australia, the conditions required include:

- imported cases, viraemic in Australia;
- sufficient numbers of efficient local vectors (e.g. *Ae. aegypti*);
- vectors that live long enough (beyond one extrinsic incubation period) to transmit the virus (dependent on temperature and humidity); and
- access to enough people for ongoing transmission cycles with a significant proportion of exposed individuals developing sustained viraemia. It is likely that even asymptomatic cases have some capability to infect mosquitoes, as with dengue⁶⁶, though this is uncertain.

Currently the only known vectors for ZIKV in Australia are *Ae. aegypti* and *Ae. Albopictus* but *Ae. aegypti* is currently limited to towns in north, and some parts of central and southwest Queensland. Larvae develop in artificial water-holding containers close to or inside people's homes (such as buckets, tyres, pot-plant bases, roof gutters and rainwater tanks). *Ae. aegypti* is a day-biting species, with increased biting activity around sunrise and sunset, with humans being its preferred source of blood meals..

Ae. albopictus which is not established in mainland Australia (though is being actively confined to the Torres Strait Islands), breeds in artificial containers and some naturally-occurring sites such as tree holes and coconut shells. Its adults prefer to rest in heavily-shaded outdoor sites with the female taking blood from a range of mammals.

Because cases of ZIKV infection can go undiagnosed, a local outbreak of ZIKV in a receptive area may spread unnoticed before being detected. As local-area vector control around known cases may not be effective, a range of preventive activities are necessary to reduce vector breeding, survival, and biting of humans, with a particular focus on higher-risk premises to prevent ZIKV outbreaks in receptive areas. This may also include vector-control activities and education at sites where pregnant women are likely to be present, such as ante-natal services, child-care facilities and schools.

Water-filled containers should be treated with insect growth regulators (e.g. F/methoprene), Bti[†] or pesticide sprays. Emptying or removing containers (source reduction) is effective but laborious, but not efficient during large outbreaks. The response when an outbreak occurs is outlined in section *Special situations* (below).

For ZIKV infection cases outside the ZIKV-receptive area in Australia and which are not related to exposures overseas, the vector or other source of infection must be identified promptly.

[†] Bti - Bacillus Thuringiensis Israelensis

ZIKV and pregnancy

Women who are pregnant (in any trimester) or those who plan to become pregnant, are advised to defer travel to high-risk countries and consider deferral to moderate-risk countries (refer to the Department of Health [webpage](#)).

Women who do decide to travel are advised to talk to their doctor first and strictly follow mosquito bite prevention measures.

Women who have been pregnant during travel to ZIKV-affected countries are advised to seek advice from their health care provider. Testing for ZIKV is recommended in these women. Follow up with an obstetric specialist is recommended if ZIKV infection is confirmed. It is not yet possible to quantify the risk of harm that maternal ZIKV infection may pose to the fetus.

Women who are planning or at risk of pregnancy, should be advised to avoid pregnancy during travel to a high or moderate-risk ZIKV country, and to avoid unprotected sex and pregnancy, for at least eight weeks after their arrival home. Similar advice applies to a partner who has also travelled.

For men with a partner who is planning pregnancy or at risk of pregnancy, and who have travelled to a high or moderate-risk ZIKV country, or has a confirmed ZIKV infection, their partner's pregnancy should be deferred until at least six months after return, or, until six months after the date that ZIKV infection was diagnosed.

In men and women actively planning pregnancy, testing in asymptomatic individuals more than four weeks after returning from a high or moderate- risk ZIKV country may be considered in consultation with their doctor.'

Sexual transmission advice

Given the potentially serious implications of sexual transmission of the virus to a pregnant woman and the risk of local transmission in north Queensland, recommendations to reduce this risk of transmission have been developed and can be found in Appendix 1 (below).

Pregnant women should avoid unprotected sex with a male partner who has been to a high or moderate-risk ZIKV-affected country for the duration of the pregnancy, or for six months – whichever is longer.

Pregnant women should avoid unprotected sex with a female partner who has been to a high or moderate-risk ZIKV affected country for the duration of the pregnancy, or at least 8 weeks – whichever is longer.

If a female partner has travelled or been potentially exposed, she should avoid unprotected sex for at least eight weeks after the last day in a high or moderate-risk ZIKV-affected country, or for eight weeks after diagnosis.

If a male partner has travelled or been potentially exposed, he should avoid unprotected sex for at least six months after the last day in a high or moderate-risk ZIKV-affected country if no symptoms appear, or for at least six months from time of diagnosis. Men should not donate sperm for at least six months from the time of last exposure or time of diagnosis.

Further information on reducing the risk of sexual transmission refer to the [Zika virus – information for clinicians and public health practitioners](#).

Blood donation

Deferral

People who have been to a ZIKV-affected country should defer donating blood for four weeks after their return home.

A person diagnosed with ZIKV infection should be advised that they cannot donate blood for a minimum of four months after recovery from all symptoms.

A sexual contact of a person diagnosed with ZIKV infection should be advised that they cannot donate blood for a minimum of four weeks after sexual contact with someone who:

- has current ZIKV infection; or
- has recovered from ZIKV infection in the preceding six months.

For the latest information, please refer to the [Australian Red Cross Blood Service website](#).

Blood Service notification

The PHU should notify the Blood Service when an outbreak of ZIKV has been identified in their area.

4. Surveillance objectives

1. To detect and enable prompt response to:
 - 1.1. Imported cases of Zika into receptive areas of Australia (to prevent local transmission).
 - 1.2. Locally-acquired cases of Zika in Australia.
 - 1.3. Imported cases of Zika anywhere in Australia (to provide advice on issues such as pregnancy, preventing sexual transmission, travel, etc).
2. To monitor the epidemiology of Zika to inform development of prevention and control strategies.

5. Data management

Both confirmed and probable cases should be entered into jurisdictional notifiable disease databases within one working day of notification. Nationally, cases are currently classified under the designation “flavivirus infection (unspecified)”. For all cases, the Place of Acquisition field should be completed in NNDSS.

6. Communications

For confirmed and probable cases believed to have been either acquired in, or who have travelled to Australia’s ZIKV-receptive area, the PHU should notify the Communicable Diseases Branch in Brisbane (phone: 07 3328 9724) as soon as possible.

For confirmed or probable cases imported from overseas and diagnosed in non-receptive areas, routine data entry is sufficient. Case reporting to the state or territory communicable diseases branch should include case details, onset date, place of acquisition, pregnancy status and laboratory findings as described below.

For confirmed or probable cases in pregnant women, the state or territory communicable diseases branch should be notified as soon as possible.

7. Case definition

Flavivirus infection (unspecified) including Zika virus case definitions.

Zika virus case definition

Confirmed and probable cases are nationally notifiable under the disease *Flavivirus infection (unspecified)* using the Organism Name field to specify infection with Zika virus (ZIKV).

Reporting

Both confirmed and probable cases are nationally notifiable. Both confirmed and probable cases should be further sub-classified into clinical and non-clinical cases.

Confirmed case

A confirmed case requires laboratory definitive evidence only. Clinical evidence should be used to sub-classify cases as clinical or non-clinical.

Laboratory definitive evidence

- Detection of ZIKV by nucleic acid testing or virus isolation;

OR

- IgG seroconversion or a significant increase in antibody level or a four-fold or greater rise in titre of ZIKV-specific IgG, and recent infection by dengue or other epidemiologically possible flaviviruses has been excluded;

OR

- Detection of ZIKV-specific IgM in cerebrospinal fluid, in the absence of IgM to other possible infecting flaviviruses.

Probable case

A probable case requires laboratory suggestive evidence AND epidemiological evidence. Clinical evidence should be used to sub-classify cases as clinical or non-clinical.

Laboratory suggestive evidence

Detection of ZIKV-specific IgM in the absence of IgM to other epidemiologically possible flaviviruses or flavivirus vaccination in the 3 weeks prior to testing.

Notes:

1. If the date of most recent exposure was greater than 4 weeks before the specimen date, then ZIKV-specific IgG must also be positive.
2. If ZIKV-specific IgG was initially negative and subsequent testing greater than 4 weeks after exposure fails to demonstrate seroconversion the case should be rejected.

Epidemiological evidence

Clinical case

- Travel to or residence in a ZIKV receptive country¹ or area in Australia within two weeks prior to symptom onset;

OR

- Sexual exposure to a confirmed or probable case of ZIKV infection within two weeks prior to symptom onset.

Non-clinical case

- Travel to or residence in a ZIKV receptive country¹ or area in Australia within two months prior to specimen date.

OR

- Sexual exposure to a confirmed or probable case of ZIKV infection within two months prior to specimen date.

Clinical case

Both confirmed and probable cases should be further sub-classified into clinical or non-clinical cases.

Clinical evidence

An acute illness within 2 weeks of exposure with 2 or more of the following symptoms:

- fever
- headache
- myalgia
- arthralgia
- rash
- non-purulent conjunctivitis.

In the absence of clinical evidence, the case will be classified as non-clinical.

Congenital Zika virus infection case definition

Confirmed and probable cases are nationally notifiable under the disease *Flavivirus infection (unspecified)* using the Organism Name field to specify congenital ZIKV infection.

Reporting

Both confirmed and probable cases are nationally notifiable.

Confirmed Case

A confirmed case requires laboratory definitive evidence only.

Laboratory definitive evidence

Fetal (at 20 weeks gestation or more).

¹ [ZIKV-receptive countries and areas are outlined on the Global Consensus Map](http://www.healthmap.org/dengue/en/) at (www.healthmap.org/dengue/en/). Areas are considered receptive to ZIKV where the likelihood of local acquisition is placed on the map as 'uncertain' or more.

Isolation or detection of ZIKV from appropriate clinical samples (i.e. fetal blood, amniotic fluid, chorionic villus sample or post-mortem cerebrospinal fluid or tissue) by viral culture or nucleic acid testing.

Infant (within 28 days following birth).

Isolation or detection of ZIKV from appropriate clinical samples by viral culture or nucleic acid testing, with no history of travel since birth to, or residence in, a ZIKV-receptive country² or area in Australia.

Probable Case

A probable case requires clinical evidence AND epidemiological evidence.

Clinical evidence

Microcephaly^{ii,iii,iv,v,vi} or other CNS abnormalities^{vii} in the infant or fetus (in the absence of any other known cause).

Epidemiological evidence

Confirmed or probable ZIKV infection in the mother during pregnancy.

[Case definitions](#) can be found on the Department of Health's website.

8. Laboratory testing

Testing guidelines

Testing for ZIKV is recommended in persons who have a clinically-compatible illness and have travelled to an area with known ZIKV activity during the exposure period.

ZIKV testing is performed at state public health laboratories in Australia. If ZIKV infection is suspected, clinicians are advised to discuss testing with their local pathology provider. Testing for ZIKV infection may include IgM, IgG serology and PCR performed on blood, urine, amniotic fluid, cerebrospinal fluid or fetal tissues as appropriate.

Acute serum (taken soon after exposure or symptom appearance) and convalescent serum (two weeks later), should be taken wherever possible. The paired samples are important for parallel testing to:

- confirm recent ZIKV infection (especially in ZIKV PCR-negative cases);
- confirm or rule out past flavivirus infections; and
- help exclude false positive IgM and IgG tests due to cross reactivity with similar viruses such as dengue.

ⁱⁱ Head circumference <-2SD below mean for gestation.

ⁱⁱⁱ WHO Assessment of infants with microcephaly in the context of ZIKV. Interim guidance. 4 March 2016, WHO/ZIKV/MOC/16.3 Rev.1.

^{iv} WHO Growth standards for term neonates (<http://www.who.int/childgrowth/standards/en/>)

^v WHO Pregnancy management in the context of ZIKV. Interim guidance. 2 March 2016. WHO/ZIKV/MOC/16.2

^{vi} Intergrowth standards for preterm neonates (Villar, José et al. (2014). International standards for newborn weight, length, and head circumference by gestational age and sex: the Newborn Cross-Sectional Study of the INTERGROWTH-21st Project. *Lancet*; (384). 9946: 857–868)

^{vii} These include: ventriculomegaly, calcifications, abnormal sulcation and gyration, brain atrophy, callosal dysgenesis, microphthalmia, eye calcifications.

Pathology requesters should provide on the request form, details of overseas travel and clinical history (including symptom onset date), to help direct appropriate laboratory testing. Symptom onset date is extremely important to ensure that the most appropriate test is performed. Details of any previous flavivirus vaccination (e.g. Japanese encephalitis, yellow fever) or previous flavivirus illness (e.g. West Nile virus, dengue), can be useful for the pathologist in test interpretation.

Because they have similar geographic distribution(s) and symptoms, dengue and chikungunya virus infection should be considered for patients with suspected ZIKV infections. They should also be evaluated for other common causes of fever and rash in a traveller who has returned from overseas or a ZIKV-receptive area in Australia.

For further information, please refer to [Information about Zika virus testing](#).

9. Case management

A *Public Health Unit checklist* can be found at Appendix 3.

Response times

Investigation should begin on the day of notification of a confirmed or probable case, in order to determine whether a response is required from the local PHU to help prevent local transmission. If any case is suspected to have been acquired in an Australian jurisdiction but diagnosed in a different jurisdiction, the communicable diseases branch in the jurisdiction of presumed acquisition, should be notified on the same day to ensure that case/contact management and mosquito-control measures can begin promptly.

For confirmed and probable cases believed to have been acquired in, or who have travelled to, the ZIKV-receptive area in Australia, the PHU should immediately notify the Communicable Diseases Branch in Brisbane (phone: 07 3328 9724).

Response procedure

Case investigation

Investigate all confirmed and probable cases using the *Example Zika virus infection case investigation form* (Appendix 4) or similar jurisdictional-specific form.

PHU staff should ensure that action has been taken to:

- confirm the onset date, travel history and symptoms of ZIKV infection (if any);
- confirm results of laboratory tests;
- where possible, obtain the doctor's consent to contact the case or relevant care-giver;
- interview the case or carer and determine the country of acquisition and likely route of transmission; and
- provide advice about risks of transmission (e.g. sexual, blood donation, mosquito-borne, pregnancy implications), as applicable to the circumstance of the case.

For probable cases, advise the treating doctor of the need to obtain a convalescent serum sample 2-3 weeks after onset, or if asymptomatic, 2-3 weeks after initial testing, to be sent to the same public-health laboratory for testing in parallel with the acute sample.

Consider potential differential diagnoses of fever and rash in a returned traveller, see *Testing guidelines* under section *Laboratory testing* (above).

Exposure Investigation

Determine whether the case had travelled to known or possible ZIKV-affected areas during the exposure period (3-12 days prior to onset of symptoms or up to two weeks prior to laboratory confirmation by PCR of ZIKV infection).

Where a case has been diagnosed based on serology, it may not be possible to determine the viraemic period.

If the case has not travelled to a known ZIKV-affected area during the exposure period, consider local transmission of ZIKV. Determine if the case has recently received any blood products or if any of their sexual contacts have a recent history of travel to a ZIKV-affected country or the ZIKV-receptive area of Australia, and therefore, might be an unidentified source case.

If local transmission is suspected, immediately notify the communicable diseases branch in the state or territory of acquisition to arrange for expert investigation and control advice.

If a case who is considered likely to be viraemic stayed in or travelled to the ZIKV-receptive area of Australia:

- identify where the case lived/worked/visited while viraemic; and
- notify the communicable diseases branch in the state or territory of diagnosis as soon as possible so that case information can be shared with health officials responsible for communicable disease control in the ZIKV-receptive jurisdiction (currently only Queensland).

Case treatment

No specific treatment is available for ZIKV infection. Treatment is generally supportive and may include rest, fluids, and use of analgesics and antipyretics. Aspirin and other NSAIDs should be avoided until dengue can be excluded (to reduce the risk of haemorrhage).

Education

Cases should be provided with the *Zika Virus Factsheet* (Appendix 2) (below) or similar jurisdiction-specific information sheet and advised to seek medical attention if symptoms worsen.

Isolation and restriction

Infected people (confirmed and probable cases) should be advised against travelling to the ZIKV-receptive area of Australia until at least a week after the onset of their illness or laboratory confirmation of the presence or otherwise of ZIKV infection.

People with ZIKV infection should be advised to take particular precautions against being bitten by mosquitoes for up to a week from onset of illness or laboratory confirmation of ZIKV infection, in order to reduce the risk of local vector-borne transmission. In Australia, this is particularly relevant to cases in Queensland.

Additional information specifically relating to reducing sexual transmission and blood donation deferral can be found under section Routine *prevention activities*.

Pregnancy management

Pregnant women with confirmed or probable ZIKV infection, should be referred to a suitably qualified expert in diagnosis and management of the consequences of perinatal infections (e.g. obstetrician or maternal fetal medicine specialist).

For guidance on assessing pregnant women see the [Interim recommendations for assessment of pregnant women with potential exposure to Zika virus](#).

Information on managing a pregnant woman who has had a positive ZIKV test, is available in the [RANZCOG guideline Care of women with confirmed Zika virus infection during pregnancy in Australia](#).

Active case finding in the ZIKV-receptive area of Australia

Active case finding should commence following identification of a case acquired or present while viraemic in Australia's ZIKV-receptive area. This can quickly establish if an outbreak is occurring, or could occur, and therefore direct control efforts to areas where vectors may be, or become infective. Methods to actively find more cases include:

- active case finding among the household contacts and residents in the exposure area and: advising those with symptoms consistent with ZIKV infection to see their doctor for appropriate ZIKV testing; or, arranging testing directly;
- considering testing of asymptomatic co-travellers, household contacts, and pregnant women in exposure area;
- alerting general practitioners, laboratories and hospital emergency departments to the occurrence of a local case, and requesting them to consider and test for ZIKV infection in recent and future cases with compatible symptoms and ensuring appropriate ZIKV tests are ordered; and
- providing information to institutions such as schools, aged-care facilities, prisons and workplaces in the exposure area.

10. Environmental evaluation and response in the ZIKV-receptive area

For imported cases who may have been viraemic in the ZIKV-receptive area of Australia, vector control responses should be considered.

If the case is not known to have been imported and has no travel history, and sexual or blood-product transfusion-related transmission (from an imported case) has not been implicated, then local vector-borne transmission should be suspected. This situation requires urgent determination of the risk of further local ZIKV transmission.

Evaluating the risk for further ZIKV transmission should be coordinated by the PHU in consultation with the medical entomologist and/or local environmental health authority to:

- identify areas where transmission is possible;
- actively search for any further cases; and
- direct mosquito elimination activities.

Vector surveillance and control activities should be undertaken according to local procedures and guidelines.

A departure from a dengue response would take into consideration the possible wider spread by asymptomatic cases, the potential for sexual transmission, and specific measures required to protect pregnant women from vector mosquitoes.

11. Contact management

Pregnant women

Routine contact management seeks to identify pregnant women at increased risk of ZIKV infection, either from:

- travel to a high or moderate risk ZIKV country;
- co-travel with a confirmed or probable case (so potentially exposed to infective mosquitoes);
- as a sexual partner of a confirmed or probable case while the case is potentially infectious; and
- in the ZIKV-receptive area of Australia, possible local vector-borne transmission.

For guidance on assessing pregnant women see the [Interim recommendations for assessment of pregnant women with potential exposure to Zika virus](#).

Pregnant women who are sexual partners of a confirmed or probable case should be referred for specialist obstetric assessment and ZIKV testing. If found to fit the definition of a confirmed or probable case, their infection should be notified and investigated as per section *Case management*.

Infants born to mothers infected with ZIKV

Infants born to mothers who were infected with ZIKV during their pregnancy, should be tested for ZIKV infection and be referred for specialist paediatric assessment.

Australian ZIKV-receptive area

Additional contact management is required when the disease is acquired or thought to have been acquired in the Australian ZIKV-receptive area OR when the disease is acquired overseas and the case was either a resident or visitor in the Australian ZIKV-receptive area during the period of possible viraemia.

This includes all people who are epidemiologically linked by having the same potential exposure as the case, including household members and persons who work(ed) or travelled with the case. Follow-up of these contacts is also part of active case finding (see section *Case management*) (above) and might lead to the identification of other imported or locally-acquired cases.

Other contacts

If other co-travellers are identified with symptoms consistent with a ZIKV infection, they should be referred for ZIKV testing. Other circumstances may arise where asymptomatic sexual contacts and co-travellers are referred for testing.

Potential exposure to ZIKV infection through receipt of blood products or from sharing of non-genital body fluids is likely to be a rare indication for contact tracing in Australia. Additional information specifically relating to reducing sexual transmission and blood donation deferral can be found under section *Routine prevention activities*.

Prophylaxis

Chemo-prophylaxis not applicable.

Education

As with case management, contacts should be provided with the *Zika Virus Factsheet* (Appendix 2) and advised to seek medical attention if symptoms appear.

Isolation and restriction

Not applicable unless symptomatic, then the same precautions apply as found in section *Case management*.

12. Special situations

Outbreaks

ZIKV is not endemic to Australia but there is a risk, as with dengue, of local outbreaks in areas with competent mosquito vectors (i.e. the ZIKV-receptive area), beginning with a single imported case.

A confirmed case of locally-acquired vector-borne ZIKV infection anywhere in Australia, requires an outbreak response. An outbreak of ZIKV infection should be managed as per local procedures and guidelines.

In an outbreak, an incident-management team including a medical entomologist and local government representatives should be formed urgently and the outbreak managed according to local outbreak management plans.

Some additional issues that the PHU should address during an outbreak are:

- informing the wider public health network, local government and relevant Australian Government bodies (e.g. National Incident Room, Department of Agriculture) of the outbreak so that they can increase surveillance and prepare for outbreak responses;
- communicating regularly with general practitioners, hospital emergency departments and local pathology laboratories, reminding them to be alert for ZIKV cases;
- collecting and maintaining epidemiological information on cases e.g. timeline and mapping of cases;
- regularly communicating with medical entomologists and agencies charged with vector-control responsibilities so that vector-control measures can be appropriately directed;
- case finding in areas of ZIKV transmission may become the priority as the outbreak develops;
- using media alerts and updates to communicate key messages during the outbreak; and
- liaising with the Australian Red Cross Blood Service as blood donation services in outbreak locations may be restricted.

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14. Further information and resources

- Australian Department of Health Zika virus website
- Smartraveller website (Australian Department of Foreign Affairs and Trade)
- WHO/Pan American Health Organization Zika virus website
- US CDC Zika virus website
- ECDC (Europe) Zika virus infection website.

15. Appendices

- Appendix 1: Table of recommendations regarding ZIKV
- Appendix 2: Zika Virus Factsheet
- Appendix 3: Public Health Unit checklist
- Appendix 4: Example Zika virus infection case investigation form

16. Jurisdiction specific issues

[Links to State and Territory Public Health Legislation, the Biosecurity Act 2015 and the National Health Security Act 2007.](#)

Appendix 1: Table of recommendations regarding ZIKV virus prevention

Travel precautions for ALL TRAVELLERS to [Zika virus-affected countries](#)

Strictly follow good mosquito bite precautions, avoid pregnancy and avoid unprotected sex (vaginal, oral and anal)

Notes:

- The goals of this advice are to prevent a pregnant woman from becoming infected with Zika virus, and to prevent sexual transmission of Zika virus to any sexual partners.
- All people with symptoms consistent with a Zika virus infection should be tested as appropriate. Discussion with a pathologist is advised.
- Unless specified, partner refers to male or female partner.
- Low-risk countries - Advice to travellers to low-risk countries is determined by individual risk assessment. Advice for travellers to moderate and high-risk countries may be tailored based on the outcomes of an individual risk assessment. Please follow advice relevant to risk.

Traveller	Pregnancy advice	Sexual transmission advice	Testing
Pregnant female		Avoid unprotected sex while travelling in high or moderate-risk 'Zika virus-affected' country. Avoid unprotected sex for the duration of pregnancy or for 6 months (whichever is longer) with a male partner who has travelled to a 'Zika virus-affected' country. Avoid unprotected sex for 8 weeks with a female partner who has travelled to a 'Zika virus-affected' country.	Testing should be offered to all pregnant women who have potentially been exposed to Zika virus, either through travel or sex.
Female planning, or	Avoid pregnancy while travelling in high	Avoid unprotected sex for at least 8 weeks after	Testing of asymptomatic

<p>at risk of pregnancy (of childbearing age and not using reliable contraception)</p>	<p>or moderate-risk <i>'Zika virus-affected'</i> countries. Avoid pregnancy for at least 8 weeks after the last day in a high or moderate-risk <i>'Zika virus-affected'</i> country or for 8 weeks after diagnosis. Advice relating to a partner who has travelled also applies.</p>	<p>the last day in a high or moderate-risk <i>'Zika virus-affected'</i> country or for 8 weeks after diagnosis. Advice relating to a partner who has travelled also applies.</p>	<p>females planning pregnancy can be considered at least 4 weeks after the last day in a <i>'Zika virus-affected'</i> country.</p>
<p>Females not at risk of pregnancy</p>		<p>To minimise the risk of sexual transmission, avoid unprotected sex for at least 8 weeks after the last day in a high or moderate-risk <i>'Zika virus-affected'</i> country or for 8 weeks after diagnosis.</p>	<p>Test if symptoms develop</p>
<p>Male with a pregnant partner</p>		<p>Avoid unprotected sex for the duration of the pregnancy or for 6 months after the last day in a high or moderate-risk <i>'Zika virus-affected'</i> country or 6 months after diagnosis, whichever is longer.</p>	<p>Testing of asymptomatic men can be considered at least 4 weeks after the last day in a <i>'Zika virus-affected'</i> country.</p>
<p>Male with a partner planning, or at risk of pregnancy</p>	<p>Avoid pregnancy for at least 6 months after the date of return from a high or moderate-risk <i>'Zika virus-affected'</i> country or 6 months from time of</p>	<p>Avoid unprotected sex for at least 6 months after the last day in a high or moderate-risk <i>Zika virus-affected'</i> country if no symptoms appear, or at least 6 months from time of diagnosis of</p>	<p>Testing of asymptomatic men can be considered at least 4 weeks after the last day in a <i>'Zika virus-affected'</i> country if</p>

	diagnosis of infection.	infection.	pregnancy is planned.
Male with a partner not at risk of pregnancy	.	To minimise the risk of sexual transmission, avoid unprotected sex for at least 6 months after the last day in a high or moderate-risk Zika-virus affected' country, or at least 6 months from time of diagnosis of infection.	Test if symptoms develop.
Sperm Donor	Do not donate sperm for at least 6 months from the time of last exposure or from time of diagnosis.	Do not donate sperm for at least 6 months from the time of last exposure or time of diagnosis.	Testing could be considered at least 4 weeks after the last day in a <i>'Zika virus-affected'</i> country if pregnancy is planned.

Appendix 2: Zika Virus Factsheet

Zika virus is a mosquito-borne virus related to the viruses that cause dengue and other diseases of mostly tropical areas.

There were large outbreaks of Zika virus in a number of Pacific countries between 2013 and 2015, and ongoing outbreaks in the Americas.

Symptoms

Approximately only one person in five who catches Zika virus is likely to feel sick. If they do, the disease is usually mild and lasts only a few days.

People who do get sick may have:

- Skin rash that may be flat in some areas and bumpy in others
- Fever
- Pain in the joints, especially in the hands and feet, possibly with swelling
- Muscle pain
- Headache, especially with pain behind the eyes
- Conjunctivitis (inflamed eyes)
- Weakness or lack of energy.

During recent outbreaks of Zika virus in the Pacific region and the Americas, studies showed that the virus can cause certain birth defects if the mother is infected during pregnancy. Studies are ongoing to understand how and when the virus may be passed on to the baby.

There are also reports that infection is associated with increased risk of a rare condition called Guillain-Barré Syndrome that causes muscle weakness. This has been found in areas where Zika virus outbreaks are occurring and in cases of individual travellers returning from affected areas.

How it spreads

Zika virus is spread by a particular species of mosquito called *Aedes aegypti*, which is found in many tropical countries and parts of Queensland, but not elsewhere in Australia. The mosquito can spread the disease about a week after biting someone else with Zika virus. This mosquito species can also spread dengue and chikungunya viruses.

Aedes aegypti lay eggs in any containers holding fresh water around people's homes. The wrigglers develop into mosquitoes that live around buildings in urban areas and bite during the day, including the hours around dawn and dusk.

Another mosquito that can carry Zika, *Aedes albopictus*, is found in the Torres Strait and other countries.

Zika outbreaks have not occurred in Australia so far. The only cases reported here have been in people who were infected overseas.

There are reports of sexual transmission of Zika virus. Zika virus has been found in the semen of men from weeks to months after infection. However, the risk of sexual transmission is considered to be low compared to transmission risk from infective mosquitoes.

People at risk

People living in or visiting areas with current active outbreaks of Zika virus, may be at increased risk of infection.

For a list of Zika-affected countries refer to the [Department of Health webpage](#).

Preventing infection

No vaccine is available for Zika virus infection. Prevention relies on avoiding mosquito bites in areas where Zika virus occurs.

Safe-sex practices are important in preventing sexual transmission.

Because of concerns about severe outcomes for unborn babies, women who are pregnant or those seeking to become pregnant, should defer their travel to areas with current or recent local Zika virus transmission.

If they do travel to or reside in Zika-affected areas, they should strictly follow advice to avoid mosquito bites, and discuss their travel plans, and how to avoid mosquito bites, with their doctor.

To avoid mosquito bites (overseas and in Queensland where Zika could occur)

You should:

- Cover as much exposed skin as possible, including by wearing light-coloured long-sleeved shirts and long pants
- Use insect repellents, per manufacturers' instructions
- The most effective mosquito repellents contain Diethyl Toluamide (DEET) or Picaridin. Repellents containing oil of lemon eucalyptus (OLE) (also known as Extract of Lemon Eucalyptus) or para-menthane-3,8-diol (PMD) also provide adequate protection
- Note that insect repellents containing DEET or picaridin, are safe for pregnant and breastfeeding women and children older than 2 months when used according to the product label
- If you use both sunscreen and insect repellent, apply the sunscreen first and then the repellent
- Use insecticide-treated (e.g. permethrin) clothing boots, pants, socks, etc. and gear such as tents
- Use bed or mosquito nets as necessary
- Stay and sleep in insect-screened or air-conditioned rooms
- Seek medical advice, as soon as practicable, if unwell with a high fever during or soon after travel.

To avoid sexual transmission

Pregnant women should avoid unprotected sex with a male partner who has been to a high or moderate-risk Zika-affected country for the duration of the pregnancy, or for 6 months his return – whichever is longer. Pregnant women should avoid unprotected sex with a female partner who has been to a high or moderate-risk Zika-affected country for the duration of the pregnancy, or at least 8 weeks after her return – whichever is longer.

For men with a partner who is planning, or at risk of pregnancy, and the man has travelled to a high or moderate-risk Zika-affected country or has a diagnosed Zika infection, pregnancy should be deferred for until least 6 months after return, or 6 months after the date that Zika virus infection was diagnosed.

Female partners who have travelled or been potentially exposed, should avoid unprotected sex for at least 8 weeks after their last day in a high or moderate-risk Zika-affected country, or, for 8 weeks after a diagnosis of infection.

Male partners who have travelled or been potentially exposed, should avoid unprotected sex for at least 6 months after the last day in a high or moderate-risk Zika-affected country if no symptoms appear, or, at least 6 months from time of diagnosis of infection.

Please see your doctor for further advice or refer to [Zika Virus Factsheet - The Basics](#).

How Zika virus infection is diagnosed

Zika virus infection is diagnosed by blood or urine tests that detect the virus or antibodies to the virus.

For further information on testing, please refer to [Information about Zika virus testing](#).

How Zika virus infection is treated

No specific treatment is available for Zika virus infection. Supportive medical care can be provided as required (e.g. rest, fluids). Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided until dengue can be ruled out, to reduce the risk of haemorrhage.

How health authorities will prevent Zika virus spread in Australia

- continue to monitor international ports of entry to prevent the mosquitoes that can transmit Zika virus from entering or spreading to new areas;
- interview all cases to determine where and how they were infected in order to decide what further public-health measures may be necessary;
- ensure blood supply safety through restrictions on blood donation for travellers coming to Australia from areas where mosquito-borne diseases are occurring; and
- in areas where the mosquitoes *Aedes aegypti* and/or *Aedes albopictus* are present, health authorities will respond urgently to cases to prevent Zika virus spread, as they do for dengue cases. This may include controlling mosquitoes around the person's home.

What should I do if I think I may have been exposed to Zika virus?

If you have recently travelled to an area with current or recent local Zika virus transmission, please see your doctor for further advice.

If you are pregnant and have recently travelled to a Zika-affected country, or where Zika virus transmission occurred at the time of your travel, you should discuss this with your doctor. Refer to the [Department of Health website](#) for the list of Zika-affected countries.

Women who have travelled to a Zika-affected country should defer pregnancy until eight weeks after the last day that they were in that country. If any symptoms occur, please see your doctor for advice.

Men who have travelled to a transmission Zika-affected country who have a pregnant partner, should avoid unprotected sex for the duration of the pregnancy.

Please see your doctor for further advice or refer to [Zika Virus Factsheet - The Basics](#).

Can I still donate blood?

People who have been to an area with current or recent local Zika virus transmission should defer donation of blood until 4 weeks after they have returned home. If someone is confirmed to have Zika virus infection, they should defer donation for 4 months after symptoms have disappeared. A person who is a sexual contact of someone who has been diagnosed with Zika virus infection, should defer donations for 4 weeks after the time of the last sexual contact with the person who had a Zika virus infection.

Can I still donate sperm?

Men returning from Zika-affected countries should wait for at least 6 months after their return, before donating sperm.

Men who have had a confirmed Zika infection, should wait until 6 months after diagnosis, before donating sperm.

Further information

For more information, refer to:

- [The Australian Government Department of Health's Zika website](#)
- [Zika-affected countries list on the Department of Health webpage](#)
- [The United States CDC Zika pages](#)

Appendix 3: Public Health Unit checklist

Patient ID number: _____

Contact the patient's doctor to:

- Obtain patient's history
- Confirm results of relevant pathology tests or recommend that the tests be done
- Inform the doctor that you will have to contact patient or care-giver

Contact the patient (or caregiver) to:

- Confirm onset date and symptoms of the illness
- Confirm travel history or other potential exposure details
- Complete Zika virus infection case investigation form
- Provide with Zika virus Factsheet

If patient is in receptive area:

- Recommend that the patient (and their household contacts) avoid being bitten by mosquitoes while febrile (first 7 days of symptoms)
- Identify known contacts and obtain contact details
- Speak to patient's contacts or their carers to determine current symptoms and recommend testing if necessary
- Provide contacts with Zika virus factsheet

Contact laboratory to:

- Obtain any outstanding results

If no overseas travel, identify location/s of patient during exposure period (3-14 days prior to onset of symptoms)

Where local transmission is suspected:

Contact local Environmental Health Authority (vector control team) to:

- Inform them of case details and exposure information
- Work collaboratively to direct vector-control activities

Other issues:

- Assess information against case definition to confirm case
- Enter case data onto notifiable diseases database
- Report details of case and action plan to state/territory CDB
- Initiate active case finding
- Consider alerting local doctors, EDs, laboratories
- Consider local media release

Appendix 4: Example Zika virus infection case investigation form

Zika virus infection [SoNG webpage](#)

(www.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-zika.htm).

(This page contains form/s that are intended to be paper based that you can download and complete. If you are using any assistive technology and are unable to use the form please contact us using the [Online form](#) and feedback).