Arboviral diseases

Epidemiology in New Zealand

This chapter covers arthropod-borne viral infections of greatest relevance to New Zealand, except yellow fever, which is discussed in a separate chapter. Most of the viruses discussed here are transmitted by mosquito and belong to the *Flavivirus* or *Alphavirus* genus. Many species also have bird or mammal transmission options. Viral haemorrhagic fevers are specified separately.

All case notifications of arboviral infection to date have been in recent overseas travellers.

**Flaviviruses**

Murray Valley encephalitis; Kunjin; dengue 1, 2, 3, 4; Kokobera, Japanese encephalitis and West Nile virus.

**Note:** Yellow fever is also a flavivirus but is discussed in a separate chapter.

**Alphaviruses**

Ross River, Barmah Forest, Chikungunya and Sindbis.

The Sindbis-like alphavirus Whataroa virus is established in bird populations on the West Coast of the South Island. Human infection without disease has been documented serologically.

Three mosquito species that have the potential to be vectors of human disease viruses are established in New Zealand: *Culex quinquefasciatus* (possibly a vector for encephalitis viruses), *Aedes notoscriptus* (a vector for dengue virus) and *A. australis* (a vector for dengue and Whataroa viruses). All three are also potential vectors of Ross River virus. Compared with overseas species, however, these three New Zealand mosquito species are poor arboviral vectors and are unlikely to support long-term endemic transmission of arboviruses in New Zealand.

For more detailed epidemiological information, see the most recent annual reports on the Institute of Environmental Science and Research (ESR) website at www.surv.esr.cri.nz
## Case definition

<table>
<thead>
<tr>
<th>Virus</th>
<th>Clinical description</th>
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<tbody>
<tr>
<td>Ross River and Barmah Forest viruses</td>
<td>Most cases are asymptomatic. Severity is variable. Typical symptoms include a rash, particularly on palms; polyarthritis/arthralgia; myalgia; lethargy and low-grade fever. Symptoms such as arthralgia, myalgia and lethargy may occasionally persist for months.</td>
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<tr>
<td>Chikungunya virus</td>
<td>Similar to Ross River and Barmah Forest. Flu-like, with high fevers, chills and muscle aches. Other symptoms include severe headaches; a rash on the arms, legs and trunk; and nausea and vomiting. In 80 percent of cases, there is pain or inflammation in the small joints of the hands and feet; this can persist for weeks or months.</td>
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<tr>
<td>Dengue fever</td>
<td>Classical dengue fever is more commonly seen in older children and adults. Symptoms include sudden onset of fever; headache, particularly retro orbital; myalgia and arthralgia; and a fine rash, which may be itchy and usually begins on the extremities but spares the palms and soles. Other symptoms include weakness, depression, anorexia, abnormal taste, sore throat, coughing, vomiting and abdominal pain.</td>
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<tr>
<td>Dengue haemorrhagic fever</td>
<td>This can occur when a person who has previously had one type of dengue fever becomes infected by another type. It is most commonly seen in children under 15 years of age but can also occur in adults. Onset same as classical dengue followed after 2–5 days by haemorrhagic manifestations and hypovolaemic shock (dengue haemorrhagic fever/dengue shock syndrome).</td>
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<tr>
<td>Murray Valley encephalitis, Japanese encephalitis and Kunjin</td>
<td>More than 99 percent of infections are asymptomatic. Symptoms are variable but typically include sudden onset of fever, anorexia and headache. Vomiting, nausea and diarrhoea, muscle aches and dizziness may also occur. Encephalitis: photophobia, lethargy, irritability, drowsiness, neck stiffness, confusion ataxia, aphasia, intention tremor, convulsions, coma and death. 25 percent of symptomatic cases of Murray Valley and Japanese encephalitis are fatal, and a further 25 percent result in permanent disability. It is rare for encephalitis to follow Kunjin infection.</td>
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<tr>
<td>Sinbis</td>
<td>Fever, arthritis, rash.</td>
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<tr>
<td>Tick-borne encephalitis</td>
<td>Most infections are asymptomatic. Symptoms can include fever, malaise, headache, nausea, vomiting, myalgia and muscle fasciculation. Within 1 week, these symptoms resolve spontaneously, but in less than 0.5 percent of infections, there is a relapse after 2–8 days with high fever, headache, vomiting, meningitis, encephalitis or myelitis.</td>
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<tr>
<td>West Nile encephalitis</td>
<td>Most infections are symptomatic. Features can include fever, malaise, headache, arthralgia, myalgia, anorexia, nausea, vomiting, diarrhoea, coughing, sore throat, flushed face, conjunctival injection, generalised lymphadenopathy, maculopapular rash and hepatosplenomegaly. Encephalitis or myelitis occurs in less than 1 percent of cases.</td>
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</tbody>
</table>
**Laboratory test for diagnosis**
Consult ESR or LabPlus at Auckland District Health Board to discuss appropriate testing and interpretation of results.

**Laboratory confirmation requires** at least one of the following:
- isolation of the virus
- detection of arbovirus nucleic acid
- detection of arbovirus-specific IgM
- IgG seroconversion
- a significant increase (four-fold or greater) in antibody titres to specific arbovirus.

Note: Closely related arboviruses can be clinically indistinguishable and exhibit serologic cross-reactivity. Therefore, positive results of serologic tests should be investigated further by cross-neutralisation methods using a battery of viruses relevant to the region where the case was exposed.

**Case classification**
- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness in a person who has come from an endemic area.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

**Spread of infection**

<table>
<thead>
<tr>
<th>Arbovirus</th>
<th>Incubation period (days)</th>
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<tbody>
<tr>
<td>Ross River</td>
<td>7–9 (range 3–21)</td>
</tr>
<tr>
<td>Barmah Forest</td>
<td>Not clear, probably 7–10</td>
</tr>
<tr>
<td>Dengue</td>
<td>5–8 (range 3–14)</td>
</tr>
<tr>
<td>Murray Valley encephalitis</td>
<td>7–14 (range 5–26)</td>
</tr>
<tr>
<td>Kunjin</td>
<td>Unknown, possibly 5–26</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>5–15</td>
</tr>
<tr>
<td>West Nile</td>
<td>Range 3–14</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>3–12</td>
</tr>
</tbody>
</table>
Other arboviruses | Unknown, possibly 3–11

**Mode of transmission**
Bite of infected mosquito (except tick-borne encephalitis). Specific viruses are associated with specific mosquito species.

**Period of communicability**
There is no person-to-person transmission. The virus is generally not detectable in human blood after onset of symptoms. Mosquitoes remain infective for life.

**Notification procedure**
Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.

**Management of case**

**Investigation**
Confirm date of onset and symptoms of illness.

Confirm results of relevant pathology tests or recommend test to be done (advise attending medical practitioner to take convalescent sera to confirm diagnosis).

Obtain a history of travel, mosquito or other insect bite and protective measures taken against insect bites.

**Restriction**
Nil.

**Treatment**
Supportive and symptomatic.

**Counselling**
Advise the case and their caregivers of the nature of the disease and its mode of transmission. Explain that having this condition may predispose a case to dengue haemorrhagic fever, which requires them to take increased precautions against mosquito bites when travelling in regions where dengue infections occur.
Management of contacts

Advise those exposed to the same risk factors as the index case to protect against mosquitoes for at least 2 weeks after leaving the risk area. Advise also regarding the incubation period and common symptoms of arboviral infections and encourage contacts to seek early medical attention if symptoms develop.

Other control measures

Identification of source

If there is a possibility of locally acquired infection, check for other cases in the community and liaise with Ministry for Primary Industries staff to investigate potential mosquito vectors for infection. When mosquito vectors have been identified, they will be subject to surveillance or eradication to ensure they do not become established. For example, the southern saltmarsh mosquito, *Ochlerotatus camptorhynchus*, has established in several areas and is subsequently the target of eradication campaigns in the Kaipara, Whangaparoa and Wairau areas. This species is a vector for Ross River fever and possibly Barmah Forest and Murray Valley encephalitis viruses.

Disinfection

Nil.

Health education

For locally acquired cases, consider a media release and direct communication with health professionals to encourage prompt reporting of symptoms and assist with biosecurity investigations. In communications with doctors, include recommendations regarding diagnosis and treatment.

All travellers to arbovirus-endemic countries should get travel medicine advice on personal protection before travelling. This includes advice on mosquito protection in the form of repellents containing DEET, protective clothing and insecticide-impregnated mosquito nets as well as details of possible vaccines.

For further advice, consult an infectious diseases physician or ESR Kenepuru Science Centre.

Reporting

Ensure complete case information is entered into EpiSurv.

Medical officers of health should immediately notify the Ministry of Health Communicable Diseases Team if there is any suspicion that the infection was acquired locally.

If the case may have acquired an arbovirus in New Zealand, the Ministry of Health Communicable Diseases Team will notify the appropriate staff in the Ministry for
Primary Industries so that further investigation of a mosquito vector can be undertaken.

The International Health Regulations (IHR) National Focal Point in the Ministry must use the IHR Decision Instrument for any event involving cholera, pneumonic plague, yellow fever, viral haemorrhagic fevers, West Nile fever or any unusual or potentially serious public health event, and then notify the World Health Organization if required.

**References and further information**


