Japanese encephalitis Control Guideline
Control Guideline for Public Health Units

Response summary

Public health priority
Urgent

PHU response time
Respond to confirmed cases within a day of notification. Enter confirmed cases on NCIMS within one working day.

Case management
Determine possible exposures.

Control of environment
Education, consider vaccination

Revision history

Version	Date	Revised by	Changes	Approval
1.0	01/07/2012	-	-	-
1.1	16/09/2016	Communicable Diseases Branch	Minor formatting	23/09/2016
3.0	11/01/2023	One Health Branch	Information and guidance relating to local transmission of the disease, including CDNA case definition, vaccination criteria	TBC

Outline

1. Reason for surveillance

1. To identify, investigate and manage cases of disease
2. To monitor the epidemiology and so inform the development of better prevention and control strategies amongst the NSW population including vaccination of people at risk.

2. Case definitions

Prior to the 2021/22 mosquito season, Japanese encephalitis had only been diagnosed in residents who had travelled overseas except for sporadic cases of locally acquired JEV identified in the Torres Strait and Cape York Peninsula. Considering the recent outbreak of

JE cases in NSW, the surveillance case definition has been updated to better reflect the evolving changes.

Confirmed case

A confirmed case requires **laboratory definitive evidence*** from a laboratory with extensive experience in the diagnostic testing of arbovirus.

**Non-encephalitic cases detected as part of a serosurvey should not be notified*

Probable Case

A probable case requires **laboratory suggestive evidence** from a laboratory with extensive experience in the diagnostic testing of arbovirus **AND clinical evidence**.

Laboratory definitive evidence

1. Isolation of Japanese encephalitis virus (JEV) by culture
   OR

2. Detection by nucleic acid testing (NAT) specific for JEV
   OR

3. IgG seroconversion or a diagnostically significant increase in antibody level or a fourfold or greater rise in JEV-specific titres IgG proven by neutralisation or another specific test, with no history of vaccination against JEV[i]
   OR

4. Detection of JEV-specific IgM in cerebrospinal fluid (CSF), without the detection of other flavivirus-specific IgM[ii]

Laboratory suggestive evidence

1. Detection of JEV-specific IgM in CSF which is significantly greater[iii] than other flavivirus-specific IgM levels (if also detected)[ii]
   OR

2. Detection of JEV-specific IgM in serum with no history of recent JEV vaccination[i]
   a) without detection of other flaviviruses-specific IgM[ii]
   OR
   b) which is significantly greater[iii] than other flavivirus-specific IgM levels (if also detected)[ii]

   OR

3. Detection of JEV-specific IgG in serum or CSF:
   a) without detection of other flavivirus-specific IgG
   OR
   b) which is significantly greater[iii] than other flavivirus-specific IgG levels (if also detected)
   AND
   c) in the absence of JEV vaccination unless the case also has encephalitic illness compatible with JEV infection in the absence of a known alternative cause [iv]

Clinical evidence

1. Encephalitic disease: acute meningoencephalitis characterised by one or more of the following:

a) focal neurological disease, or seizures, or acute impairment in level of consciousness;
b) an abnormal computerised tomogram (CT) or magnetic resonance image (MRI) or electroencephalogram (EEG) consistent with flavivirus encephalitis;
c) presence of pleocytosis in cerebrospinal fluid[v]

OR

2. Non-encephalitic illness: acute febrile illness with headache, with or without myalgia or rash.

i. Recent vaccination is considered to be 28 days, however advice should be sought from the authorising pathologist and the clinician regarding individual circumstances. Convalescent serum should be collected where possible.
ii. E.g. Murray Valley encephalitis, West Nile/Kunjin and/or dengue virus.
iii. Public health units should seek advice from the responsible authorising pathologist with regard to the interpretation of JEV positive serology results in the presence other flaviviruses.
iv. Including but not limited to other flaviviruses (such as Murray Valley encephalitis virus, West Nile/Kunjin and dengue viruses), Herpes Simplex Virus, Varicella Zoster Virus and enteroviruses.
v. Not definitive, but ≥ 5 leucocytes/ µl is indicative.

3. Notification criteria and procedure

Japanese encephalitis (JE) cases are to be notified by laboratories on diagnosis (ideal reporting by telephone within 1 hour of diagnosis).

Both **confirmed** and **probable** cases should be entered onto NCIMS.

Patients with a clinically compatible syndrome suggestive of JE should be referred to hospital for further investigation and management.

4. The disease

Infectious agents

Japanese encephalitis is one of the arboviruses (arthropod borne viruses known to be pathogenic for humans). Japanese encephalitis virus (JEV) is a member of the genus *Flavivirus*, in the family *Flaviviridae*. Dengue, Murray Valley Encephalitis, Kunjin, Kokobera, Stratford, Alfuy, New Mapoon and Edge Hill are also flaviviruses.

Mode of transmission

JEV is transmitted by the bite of an infected mosquito, primarily *Culex* species which are commonly found in NSW and most active at dusk and dawn. The virus is maintained in a cycle between mosquitoes and amplifying vertebrate hosts, primarily pigs and wading birds.

Humans are incidental or dead-end hosts, because they usually do not develop a level or duration of viremia sufficient to infect mosquitoes. Humans cannot be infected by touching an infected animal or consuming animal products. There is no evidence for direct person-to-person spread.

Timeline

The incubation period ranges from 5 to 15 days.

Clinical manifestations

Less than 1% of people infected with JEV experience clinical disease. Symptoms may include fever, headache, myalgia, rash and diarrhoea.

Severe disease is associated with acute encephalitis/meningoencephalitis. Neurological sequelae include focal deficits such as paresis, cranial nerve pathology and movement disorders. Seizures are common, particularly in children. Rarely, there may be other presentations including acute flaccid paralysis and arthralgia.

Permanent neurological or psychiatric complications occur in 30-50% of cases with severe disease. The case fatality rate for those with severe disease can be as high as 30%.

The clinical presentation for JE can be similar to that of Murray Valley Encephalitis (MVE) and Kunjin virus.

Geographic distribution

JEV is endemic in much of Asia and parts of the Pacific. Prior to 2022, JE was normally only diagnosed in residents who had travelled overseas, however sporadic cases of locally acquired JEV had previously been identified in the Torres Strait and Cape York Peninsula. A map of the global distribution can be found at:
https://www.cdc.gov/japaneseencephalitis/maps/index.html (note this map exaggerates Australian distribution)

In late February 2022, JEV was confirmed in commercial pig farms in NSW, Queensland, Victoria and then South Australia. This is believed to be the first incursion of the virus into South-Eastern Australia. During this first season, 42 locally-acquired cases of JEV were identified, of which 13 were in NSW. Further information can be found at:
https://www.health.nsw.gov.au/Infectious/jev/Pages/default.aspx

Testing advice in NSW

A clinically compatible case with a concern for acute JEV infection should have the following samples obtained by their treating clinician:

- Blood (serum) for acute testing for Flavivirus and JEV IgM, IgG and Total Antibody (Ab)
- Whole blood for JEV PCR +/- viral culture **AND**
- Urine for Flavivirus IgM, IgG and Total Antibody (Ab), JEV PCR +/- viral culture **AND**
- Cerebrospinal fluid (CSF) (where felt safe and appropriate to do so) for Flavivirus and JEV IgM, IgG and Total Ab, JEV PCR +/- viral culture.

Convalescent sampling may be sent 3-4 weeks after the acute event for diagnostic purposes to assess for acute seroconversion or a diagnostically significant rise in JEV antibody levels. This should be performed in consultation with an Infectious Diseases Physician and or Microbiology laboratory.

The Institute of Clinical Pathology and Medical Research (NSW Health Pathology – ICPMR) at Westmead Hospital is currently the only public NSW laboratory with extensive experience in the diagnostic testing of arboviral infection.

5. Managing single notifications

Response times

Investigation

On same day of notification of a confirmed case begin follow-up investigation and notify the One Health Branch (or for after-hours escalations, CD on call) of the case details.

Data entry

Within one working day of notification enter confirmed JE cases on NCIMS.

Response procedure

The response to a notification will normally be carried out in collaboration with the case's health carers. But regardless of who does the follow-up, PHU staff should ensure that action has been taken to:

- Confirm the onset date and symptoms of the illness
- Confirm results of relevant pathology tests, or recommend the tests be done (encourage the managing doctor to take convalescent sera to confirm the diagnosis, see 'testing advice in NSW' above)
- Find out if the case or relevant care-giver has been told what the diagnosis is before interviewing them
- Seek the doctor's permission to contact the case or relevant care-giver
- Review case management
- Identify likely source of infection

Case management

Clinicians in NSW should have a strong index of suspicion for Japanese encephalitis in clinically compatible cases, particularly in the areas of Murrumbidgee, Western and Far West Local Health Districts with previous JEV detections in mosquitos, sentinel chickens, animals or human exposures.

Treatment

Supportive treatment only.

Education

The case or relevant caregiver should be informed about the nature of the infection and the mode of transmission.

Exposure investigation

All cases (whether local or overseas acquired) should be asked to recall if, in the incubation period, they had:

- Been bitten by mosquitoes **or**
- Visited regions where JE is endemic or where there have been any confirmed detections of JEV in humans, mosquitoes or animals **or**
- Participated in occupational, recreational, or any outdoor activity near potentially productive mosquito habitat, such as areas near rivers, ponds and marshes, including flood zones and wherever there are bodies of standing water **or**
- Been in proximity to domestic or feral pigs in an occupational, residential or recreational setting.

For locally acquired cases, the National Outbreak Case Questionnaire should be completed for each JE case (confirmed or probable). The National Outbreak Case Questionnaire is

available on the Infectious Diseases Network Sharepoint site under Vector-Borne Diseases > Japanese Encephalitis.

Previous vaccination against JE (including date received) and or previously confirmed infection with JE, should also be documented.

Isolation and restriction
None.

Environmental evaluation
NSW Health is currently working to better understand the risk to humans in affected local areas in Australia. Where locally acquired cases are identified, work with your Environmental Health Officers to determine if there is surveillance in the area and/or whether other support for the management of mosquitos is required. Local councils may be asked to engage in vector control activities where large numbers of mosquitos are present, or to promote mosquito warnings in areas of particularly high risk.

Contact management

Identification of contacts
Public health units should identify any potentially co-exposed contacts. Potentially exposed people are those who may have been exposed to the same source (if known) as the case (e.g. family members in the same household if case likely exposed at home). These individuals should be counselled on the signs and symptoms of JEV. They should be given advice on immunisation as prophylaxis, and education on mosquito bite prevention to help protect against JEV and other mosquito-borne illnesses.

Where exposure location is in an area of NSW not previously identified as eligible for vaccination, seek urgent advice with the One Health Branch on vaccination for contacts and community.

Communication of further risk to public
As local transmission in NSW has only recently been identified, there remains significant public interest in understanding the geography of risk and alerting the public. It is highly likely that a notification of JEV will prompt a media response, particularly when the event:

- represents the first detection of the season
- occurs in an area which has not had confirmed JEV previously
- is suggestive of transmission in an area outside the area of vaccine eligibility
- occurs in a person not eligible for vaccination
- affects a child or other vulnerable person
- is one of multiple cases in the same area

Following notification of a case that meets the confirmed or probable case definitions, the PHU should discuss relevant public communications with the One Health Branch.

Prevention

Prophylaxis – immunisation
Passive immunisation
None

Active immunisation
There are 2 JEV vaccines registered for use in Australia:

- Imojev is a live attenuated vaccine given as a single dose. It is suitable for those aged 9 months and over. It is contraindicated in pregnant women and immunocompromised people.
- Jespect is an inactivated vaccine given as a 2-dose schedule 28 days apart and recommended for pregnant women, children aged 2 months to <9 months, and immunocompromised individuals.

People at higher risk of JE infection in NSW are eligible for NSW government-funded vaccine. As eligibility criteria is a rapidly evolving field, please follow this link for the latest advice – https://www.health.nsw.gov.au/infectious/jev/pages/vaccination.aspx

The Australian Immunisation Handbook also recommends routine vaccination for:
- travellers spending one month or more in endemic areas in Asia and Papua New Guinea during the JE virus transmission season, and
- residents of the outer islands in Torres Strait and non-residents who will be living or working on the outer islands of Torres Strait for 30 days or more during the wet season.
- Vaccine for these groups is purchased by prescription from the private market.

Education

Educate the public living in or travelling to endemic countries or areas of NSW and Australia where JEV has previously been detected or where there is a risk of JEV to minimise exposure to mosquito bites.

Information should include current geographical areas of JEV transmission, animal and mosquito habitats and periods of maximum mosquito activity.

Advice should also be provided on bite prevention. This includes:
- Wearing long, loose-fitting clothing when outside
- Regular application of an effective insect repellent on exposed skin
- Using insecticide sprays, vapour dispensing units (indoors) and mosquito coils (outdoors) to clear rooms and repel mosquitoes from an area
- Ensuring accommodation is properly fitted with mosquito nettings or screens
- Removing any water-holding containers where mosquitos may breed

The best mosquito repellents contain diethyltoluamide (DEET), picaridin, or oil of lemon eucalyptus.

6. Additional resources

Teams channel
- Includes maps, line lists etc
- For access, ask for any existing PHU member to request access for you, or email the One Health Branch

Resources
- All mosquito-borne virus resources: https://www.health.nsw.gov.au/Infectious/mosquito-borne/Pages/resources.aspx
- Japanese Encephalitis Virus Factsheet: https://www.health.nsw.gov.au/Infectious/factsheets/Pages/japanese_encephalitis.aspx

Immunisation

- NSW vaccination eligibility criteria: https://www.health.nsw.gov.au/Infectious/jev/pages/vaccination.aspx
- Australian Immunisation Handbook (Japanese Encephalitis): https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/japanese-encephalitis
- ATAGI advice on intradermal vaccination: https://www.health.gov.au/resources/publications/atagi-statement-on-the-intradermal-use-of-imojev-japanese-encephalitis-vaccine?language=en