

# Leptospirosis

## NSW Control Guidelines for Public Health Units

Revision history			
Version	Date	Revised by	Changes
2.0	March 2022		Inclusion of a probable category as per changes to CDNA surveillance case definitions.
1.0	April 2020		

### Response summary

#### Public health priority

Sporadic cases: Routine. Action should be carried out as part of routine duties. Case investigation should commence within 1 working day, and data entry should be completed within 2 working days.

Outbreak: High. Act as soon as possible, generally within one working day. Data entry should be commenced within 1 working day.

#### Case management

Cases should receive appropriate antibiotics. Identify likely source.

#### Contact management

None routinely.

#### Management of co-exposed persons

Whilst person-to-person transmission is very rare, there may be individuals who have been exposed to a common source (co-exposed). Identify co-exposed individuals (e.g. those at the same workplace) and advise them of the signs and symptoms of leptospirosis to aid early diagnosis and treatment.

In response to leptospirosis linked to workplace/occupational settings, [SafeWork NSW] and [NSW Department of Primary Industries] should be involved (if relevant).

## 1. The disease

### Infectious agent

*Leptospira* spirochetes.

There are various *Leptospira* serovars which are maintained in a range of animal reservoir species. Human infections are usually acquired from the maintenance host species for each serovar.

Common serovars detected in NSW since leptospirosis became notifiable in January 1991 include:

- *Leptospira arborea* – usually infects rodents and is found worldwide. Infection with this serovar was the cause of a large outbreak of illness among berry pickers in NSW in 2018.
- *Leptospira hardjo* – usually infects cattle (both dairy and beef) and is found in most parts of the world. Illness caused by this serovar is becoming less common in NSW, compared to the number of case detections in the 1990s.

- *Leptospira pomona* – usually infects domestic and feral pigs (although cattle and sheep are occasional carriers) and is found throughout Australia. Detections of this serovar in NSW have been declining in recent years.
- *Leptospira australis* – usually infects rats and small marsupials, and is found predominantly in coastal areas of tropical Northern Australia.
- *Leptosipra canicola* – usually infects rats and bandicoots, and is found in coastal areas of North Queensland.
- *Leptospira tarassovi* – usually infects domestic pigs and cattle, and found throughout Australia.
- *Leptospira copenhageni* – usually infects rats and dogs and is found throughout Australia.

For further information on *Leptospira* serovars found in Australia, or other countries, refer to the Queensland Health Forensic and Scientific Services [Leptospirosis Reference Laboratory](#).

### Mode of transmission

Leptospirosis is transmitted by direct contact with the urine or tissues of infected animals. It can also be transmitted to humans who are in contact with water, soil or environments contaminated with infected urine, or who ingest contaminated water. The bacteria enter through cuts in the skin or through mucous membranes (such as the eyes, nose or mouth); bacteria can also be inhaled in dust (aerosols).

Human-to-human transmission occurs only very rarely. Blood is potentially infectious in the first week of the disease and urine is infectious from the end of the first week and can remain infectious for months.

Often there is a history of contact with animals or exposure to environments contaminated by the tissues or secretions of potentially infected animals. Many animals can carry *Leptospira spp.* and may be completely asymptomatic. Animal species commonly associated with leptospirosis include cattle, pigs, sheep, dogs, rodents and marsupials.

Outbreaks are usually related to exposure to water sources (e.g. flood water runoff), or environments contaminated with the tissues or secretions (e.g. urine) of infected animals.

### Incubation period

The typical incubation period is 5 to 14 days (range 2 to 30 days).

### Infectious period

Person-to-person spread very rarely occurs.

### Clinical presentation

The usual clinical presentation is fever, chills, headache, severe myalgia (particularly of the calves, thighs and lumbar region) and conjunctival suffusion. Severity varies with the infecting serovar.

About 5-15% of cases progress to severe disease, which can include:

- Weil's syndrome (jaundice, renal failure, haemorrhage and myocarditis)
- Meningitis and meningoencephalitis
- Pulmonary haemorrhage and acute respiratory distress syndrome.

The case fatality rate increases with increasing age and comorbidities.

## Persons at increased risk of disease

Leptospirosis is most commonly diagnosed in people with frequent exposure to outdoor environments including flooded areas, those doing farm work, or having direct or indirect contact with livestock and rodents. At-risk groups for leptospirosis include males and young adults, primarily linked to occupation. Occupations that are at particular risk include farmers, and meatworkers. Leptospirosis also occurs among those who have recreational exposure to freshwater (such as swimming, camping or rafting), and those with a history of travel, particularly to tropical regions. Leptospirosis risk is also increased after periods of high rainfall and flooding and in areas with poor sanitation. Leptospirosis clusters have been associated with domestic and workplace rodent infestations.

## Disease occurrence and public health significance

Leptospirosis is endemic in temperate and tropical regions and is considered an important re-emerging disease due to changing risks groups, increasing magnitude and frequency of outbreaks and the emergence of new predominant serovars. In Australia, outbreaks are rare and usually related to flooding, although a large outbreak in 2018 was linked to berry picking<sup>1</sup>. Sporadic cases typically have recreational or occupational exposures, frequently farming, abattoir or veterinary work. Globally, leptospirosis has increased in incidence over recent years, with increasing frequency and severity of outbreaks attributable to climatic, sociodemographic and environmental factors – these include climate change, flooding, population growth and rapid urbanisation (often associated with unsanitary conditions, such as inadequate waste disposal), and agricultural intensification<sup>2</sup>.

## 2. Routine prevention activities

- Promote public awareness of possible transmission risk when undertaking recreational water-based activities including wading, swimming and white water rafting.
- Provide staff working in hazardous occupations with appropriate protective equipment to prevent contamination, including when working with potentially infected animals, their tissues or secretions.
- Ensure cuts and skin abrasions are covered by watertight dressings and encourage frequent hand washing during exposure to high risk settings or environments.
- Implement rodent control measures around homes, outbuildings and other areas attracting rodents, e.g. grain or animal feed stores and refuse disposal areas.
- Animal owners should seek veterinary advice about preventing leptospirosis in companion animals or livestock. In NSW, vaccination against leptospirosis is available for cattle, pigs and dogs. Vaccination aims to reduce the burden of disease in animals but can also reduce the potential for human exposure.

## 3. Surveillance objectives

1. To monitor trends in leptospirosis with respect to time, population groups, geography, infecting serovars and risk factors.
2. To identify a likely source of infection so that the likelihood of further cases from the same source can be minimised, such as in workplace settings.
3. To detect and guide immediate action and control measures for outbreaks to prevent further transmission.
4. To guide the planning and implementation of policy, service provision, prevention strategies, and other public and animal health interventions.

## 4. Data management

Within 1 working day of a confirmed or probable case begin follow up investigation. Within 2 working days of notification, enter cases onto the NSW Notifiable Conditions Information Management System (NCIMS).

In an outbreak setting, data should be entered within 1 working day following notification.

## 5. Communications

Public health units work collaboratively with healthcare providers and patients to investigate leptospirosis case notifications, provide information and education about leptospirosis prevention, and to identify further cases with similar exposures (see Section 10 for details).

In the context of responding to a leptospirosis outbreak or cases occurring in workplace settings, the following jurisdictional government agencies should be included for information sharing and joint investigation (see Section 11 for details):

- Communicable Diseases Branch
- SafeWork NSW
- NSW Department of Primary Industries
- Local government authority
- Health authorities of neighbouring jurisdictions, when appropriate.

## 6. Case definition

### Reporting

Both **confirmed** and **probable** cases should be notified.

#### *Confirmed case*

A confirmed case requires laboratory definitive evidence.

#### *Probable case*

A probable case requires laboratory suggestive evidence.

#### *Laboratory definitive evidence*

1. Isolation of pathogenic *Leptospira* species in culture  
OR
2. A fourfold or greater rise in *Leptospira* agglutination titre between acute and convalescent phase sera obtained at least two weeks apart and preferably conducted at the same laboratory  
OR
3. A single *Leptospira* micro agglutination titre (MAT) greater than or equal to 400 supported by a positive enzyme-linked immunosorbent assay (EIA) IgM result.

#### *Laboratory suggestive evidence*

Detection of pathogenic *Leptospira* species by nucleic acid testing.

#### *Clinical evidence*

Not applicable.

#### *Epidemiological evidence*

Not applicable.

The most recent Australian national notifiable diseases [case definition](#) for leptospirosis can be found at the Department of Health website ([www.health.gov.au/casedefinitions](http://www.health.gov.au/casedefinitions)).

## 7. Laboratory testing

### Testing timeline

Appropriate specimen testing for suspected leptospirosis cases is outlined below:

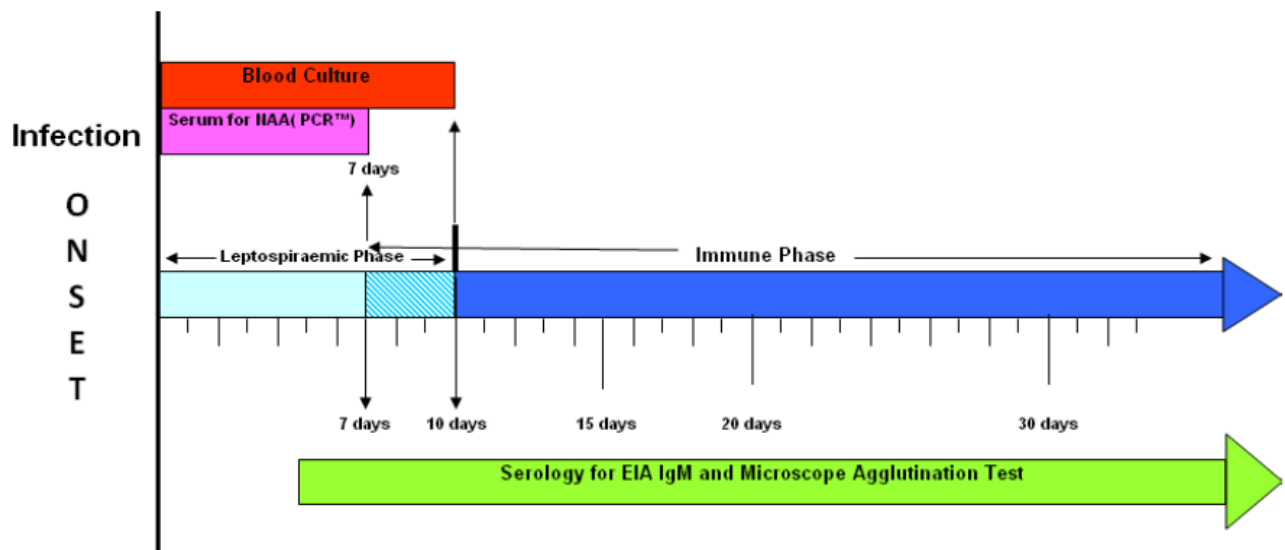
- $\leq 7$  days from symptom onset: serum (OR cerebrospinal fluid (CSF)\*) for PCR and blood for culture
- 7-10 days from symptom onset: blood for culture and serum for EIA IgM and MAT (can be done early for a baseline comparison for convalescent sample)
- $\geq 10$  days from symptom onset: serum for EIA IgM and MAT

Note that culture is the 'gold standard' for detection during the leptospiraemic phase and has greater sensitivity than PCR due to the six week culture period used.

	<b>Serum OR urine OR CSF* for PCR</b>	<b>Blood for culture</b>	<b>Serum for EIA IgM and MAT</b>
<b><math>\leq 7</math> days from onset</b>	Yes	Yes	Yes (baseline)
<b>7-10 days from onset</b>	No	Yes	Yes
<b><math>\geq 10</math> days from onset</b>	No	No	Yes

\*Specimen type is as clinically indicated

### Leptospirosis infection timeline



Source: WHO/FAO/OIE Collaborating Centre for Reference and Research on Leptospirosis. National leptospirosis surveillance report no 18. Queensland Health Forensic and Scientific Services: Coopers Plains, 2009.

### *Testing performed by specific laboratories*

The Leptospirosis Reference Laboratory (QHFSS) is located in Brisbane, Queensland.

As at April 2022, the following tests are available from private pathology service providers in NSW:

<b>Laboratory</b>	<b>Available testing</b>	<b>Specimen referral procedure</b>
Sullivan Nicolaides Pathology	PCR and serology	Send specimens to QHFSS for confirmatory MAT testing
Pathology North	EIA IgM	Send specimens to QHFSS for PCR
Australian Clinical Labs	EIA IgM	Send specimens to Monash University, School of Biomedical Sciences, Leptospirosis Laboratory for MAT testing

## **8. Case management**

### **Response times**

- **Sporadic cases:** Routine response. Initial case investigation should commence within 1 day of notification, and data entry should be completed within 2 working days of notification.
- **Outbreak:** High priority response. The responsible public health unit should act and notify Enterics & Zoonoses Branch as soon as possible, generally within 1 working day. Data entry should commence within 1 working day.

### **Response procedure**

#### *Case investigation*

Public health unit staff carry out case investigation in collaboration with the case's treating doctor and the case.

PHU staff should ensure that action has been taken to:

- Confirm results of relevant pathology tests –
  - When notified on the basis of single agglutination titre, contact the treating medical practitioner for clinical information and attempt to obtain a second sample for further serological testing. When notified on the basis of a positive enzyme-linked immunosorbent assay IgM result, await MAT testing result.
  - If the first test received is a positive IgM and MAT that is collected  $\geq 14$  days post onset then no second sample is required.
  - For further assistance see Public health unit guidance: Leptospirosis flow chart.
- Confirm the onset date and symptoms of the illness with treating doctor
- Seek the doctor's agreement to contact the case or relevant caregiver
- Find out if the case or relevant care-giver has been told what the diagnosis is before beginning the interview
- Identify the likely source of the infection (explore risk factors for infection including contact with animal products or contaminated water) and whether sick contacts have been exposed to the same source as the case using the Leptospirosis case questionnaire
- Provide education

- If the case involves an occupational exposure, see Section 11 for additional actions.

#### *Case treatment*

Clinicians should commence empiric treatment if leptospirosis is clinically suspected. Do not wait for laboratory results. Refer to latest edition of the [Therapeutic Guidelines: Antibiotic](#).

#### *Exposure investigation*

A history of possible exposures should be sought using the leptospirosis questionnaire. Attempt to identify the source of infection, such as exposure to urine or tissues of infected animals or contaminated drinking or recreational water.

It is important to determine:

- An occupational history (farmers, abattoir workers, vets, army personnel, miners, sewer workers, fruit pickers);
- Recreational exposures (water sports, caving, white-water rafting, swimming, gardening);
- A history of contact with common host animals (especially cattle, pigs, sheep, dogs and rodents);
- Travel history (especially travel to Queensland and other tropical regions).

#### *Education*

The case or relevant care-giver should be informed about the nature of the infection and the mode of transmission. To avoid future infection, cases should be advised to avoid urine or tissues of infected animals and avoid swimming or wading in potentially contaminated water or walking barefoot in mud or moist soil that may have been contaminated with animal urine.

If direct or indirect contact with urine or infected animal tissues is anticipated, skin abrasions should be covered with an occlusive dressing and gloves and other protective clothing should be worn. (refer to the [Leptospirosis Factsheet](#)).

#### *Isolation and restriction*

Exclusion of infected persons is not required. Leptospirosis is rarely transmissible from person to person. Use standard precautions in a clinical environment.

#### *Active case finding*

See Section 11 for active case finding in special situations.

## **9. Environmental evaluation**

If the case has occupational risk factors such as working with animals/animal products, fruit picking, or in an environment where rodents may be active, discuss with SafeWork NSW and NSW Department of Primary Industries, as appropriate.

## **10. Management of co-exposed persons**

### **Identification of co-exposed persons**

In occupational settings and outbreaks, active case finding among identified co-exposed persons should be considered (Section 11). The aim of identifying co-exposed persons is to alert them to the possibility that they could develop disease due to a common source exposure.

### **Co-exposure definition**

A co-exposed person is defined as anyone who may have experienced the same occupational, animal, or environmental exposures as the case, or who may have been exposed to contaminated

items associated with the case (e.g. clothing/boots). Person-to-person transmission is extremely unlikely. Co-exposed persons may include people at the workplace (including those without direct contact with animals or animal products) and home.

### **Prophylaxis**

Post-exposure antibiotic prophylaxis may be considered in an outbreak situation, particularly if the cause of illness is still under investigation, or the purported transmission pathway cannot be interrupted. The decision to initiate post-exposure antibiotic prophylaxis should be discussed with Enterics and Zoonoses Branch.

### **Education**

Leptospirosis information (Appendix 1) should be provided to co-exposed persons with advice to seek medical attention should they develop symptoms.

### **Isolation and restriction**

It is not necessary to isolate or restrict workers from attending an occupational setting. It is however imperative that all workers are informed about the risks of exposure and they are encouraged to take appropriate personal protective measures to reduce their risk (e.g. wearing waterproof boots if in contact with potentially contaminated soil/mud, covering any scratches with waterproof dressings, wearing impermeable gloves, washing hands prior to eating).

## **11. Special situations**

In addition to the generic case and co-exposed person follow-up requirements described above, further actions are required in the following instances:

### **Cases and outbreaks linked to workplace/occupational settings**

Leptospirosis case investigation may identify a plausible link with a workplace (such as an abattoir or dairy farm). Two cases or more within a three-month period in an at-risk workplace is considered a workplace outbreak.

Responses to cases occurring in workplace settings (including outbreaks) need to be carried out in collaboration between the Public Health Unit, SafeWork NSW, and the NSW Department of Primary Industries (if relevant).

Immediate responses include working with the employer and management to:

- Conduct active case finding in the at-risk setting, including urgent testing of workers with a current or recent clinically compatible illness. Laboratory-definitive evidence should be actively pursued for all suspected cases, including obtaining convalescent sera from ill workers with a single negative serology result (even if they have since recovered);
- Ensuring workers are protected from scratches and other occupational exposures (e.g. animal tissues, or floodwater runoff), through the use of appropriate protective clothing and equipment;
- Ensuring workers, including new employees, are adequately informed of the work health and safety requirements of their role, and ensuring messages are effectively communicated to people who do not speak English or may be illiterate;
- Ensuring workers are informed of the importance of seeking medical attention for illnesses with fevers and are made aware of options for accessing medical care;
- Health and safety aspects of the workplace setting are subject to ongoing review with expert oversight, to help address any new or evolving issues; and



- Where a point source is suspected or identified, preventive or control measures to reduce exposure risks (e.g. increased rodent control) are implemented as soon as is practicable.

The role of SafeWork NSW is to investigate and identify unsafe working conditions, and to monitor and enforce compliance. This may involve a site visit and discussions with the employer. SafeWork NSW may, in consultation with NSW Health and NSW Department of Primary Industries, provide information and advice to the employer.

## 12. References and additional sources of information

1. Katelaris, AL, Glasgow, K, Lawrence, K, et al. Investigation and response to an outbreak of leptospirosis among raspberry workers in Australia, 2018. *Zoonoses Public Health*. 2020; 67: 35– 43. <https://doi.org/10.1111/zph.12652>
2. Lau CL, Smythe LD, Craig SB, Weinstein P. Climate change, flooding, urbanisation and leptospirosis: fuelling the fire? *Trans R Soc Trop Med Hyg*. 2010 Oct;104(10):631-8. doi: 10.1016/j.trstmh.2010.07.002. Epub 2010 Sep 1. PMID: 20813388.
3. Lau CL, Townell N, Stephenson E, van den Berg D, Craig SB. Leptospirosis: An important zoonosis acquired through work, play and travel. *Aust J Gen Pract*. 2018 Mar;47(3):105-110. doi: 10.31128/AFP-07-17-4286. PMID: 29621837.
4. Queensland Health. WHO/OIE Collaborating Centre for Reference and Research on Leptospirosis, Australia and Western Pacific Region. Last reviewed 2020. Available at: <https://www.health.qld.gov.au/healthsupport/businesses/forensic-and-scientific-services/testing-analysis/diseases/leptospirosis>. Accessed 16/04/2021.

## 14. Jurisdiction specific issues

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

[www.health.gov.au/internet/main/publishing.nsf/Content/cda-state-legislation-links.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-state-legislation-links.htm)