Legionellosis
National guidelines for public health units

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The Series of National Guidelines have been developed in consultation with the Communicable Disease Network Australia and endorsed by the Australian Health Protection Committee. Their purpose is to provide nationally consistent advice and guidance to public health units in responding to a notifiable disease event. These guidelines capture the knowledge of experienced professionals, built on past research efforts, and provide advice on best practice based upon the best available evidence at the time of completion.

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1. Summary

Public health priority
Respond to probable and confirmed cases. Enter probable and confirmed cases on the state notifiable
disease database within 1 working day. Respond to *Legionella pneumophila* on the day the notification
is received, or within one working day for other species.

Case management
Interview patient or nearest relatives/friends about possible exposures. Environmental investigation of
possible sources is indicated if exposures are shared by more than one case of *L. pneumophila*.

Contact management
Nil.

2. The disease

**Infectious agents**

**Mode of transmission**
Infection with *L. pneumophila* is caused by inhalation of aerosolised contaminated water. Aerosols of
less than five microns can reach the lower depths of the lungs. The mode of transmission of *L. longbeachae*
from potting mix and other sources is less clear. Person to person transmission of Legionnaires’ disease has not been documented.

**Timeline**
The typical incubation period is 2 to 10 days, but more commonly 5 to 6 days.

**Infectious period**
Not applicable

**Clinical presentation**
Legionnaires’ disease usually presents as pneumonia that can vary from mild to fatal.
Pontiac fever, a milder syndrome associated with anorexia, malaise, myalgia and headache followed
by fever and chills, but not pneumonia or death, has also been reported following exposure to
*Legionella* bacteria.

3. Risk assessment

**Routine prevention activities**
The prevention of *L. pneumophila* infection focuses on minimising the risk of the growth of *Legionella*
in cooling towers through maintenance, water quality, education of building operators, legislation and
enforcement. Warning labels about safe handling are placed on most bags of potting mix under an
industry code of practice.

**Threat and vulnerability**
Legionnaires’ disease was first identified in the United States in the mid 1970s after a large outbreak
of pneumonia among war veterans in Philadelphia. Since then outbreaks have been identified
worldwide. Outbreaks in Australia have been mainly caused by contaminated aerosols generated by
cooling water systems (CWSs) (the aquatic environment within the cooling towers that are part of air
conditioning systems on large buildings are conducive to the proliferation of *L. pneumophila*) and
other sources of misted water such as shower heads and spa pools. Although exposure to *Legionella*
is fairly ubiquitous, some people are at high risk for overt disease, including people with pre-existing lung disease or immune suppression, smokers and people with a history of substantial alcohol use. An ageing population and increased use of immunosuppressive therapy may increase the number of vulnerable people within the community over time.

**Risk mitigation**
Public health legislation in many Australian jurisdictions requires that building owners or occupiers have processes in place to minimise contamination of CWSs and warm water systems. Publicly available information about the safe use of potting mix may help reduce exposures to *L. longbeachae*. Notification of cases of Legionnaires’ disease allows public health unit staff to identify clusters and identify and control sources of infection.

### 4. Surveillance objectives
- To identify and control common sources of infection
- To monitor the epidemiology of Legionnaires’ disease and so inform the development of better prevention strategies.

### 5. Data management
Within one working day of notification enter confirmed and probable cases onto the notifiable diseases database. Within one working day of notification of the serogroup of the organism, update the database. Document potential exposure locations in the notifiable diseases database.

### 6. Communications
Notify the State/Territory Communicable Diseases Branch of the case’s age, sex, onset date and geographical areas of exposure. Where an exposure occurred outside the PHU area, also notify the relevant PHU. The CDB should report to the National Incident Room cases whose exposure were overseas, for referral to the relevant national authority.

### 7. Case definition
The current national surveillance legionellosis case definition can be found at: [www.health.gov.au/casedefinitions](http://www.health.gov.au/casedefinitions)

### 8. Laboratory testing
**Testing guidelines**
- Routine testing of patients is at the discretion of the treating doctor, however in a cluster of *L. pneumophila* infection, PHUs should encourage 1. urinary antigen testing of patients suspected to have Legionnaires’ disease because infection will be rapidly diagnosed and the test is specific, and 2. sputum (or where available bronchial washing or lung biopsy) culture to enable matching of any isolates with any available environmental samples.
- There are currently more than 50 species, but the most commonly identified in Australia are *L. pneumophila*, which may be found in cooling water systems, spa pools and warm water systems and *L. longbeachae*, which may be found particularly in potting mix and soil. Other species identified in Australia include *L. micdadei* and *L. bozemanii*.
- Most urinary antigen test kits are sensitive for *L. pneumophila* type 1 but some may cover a broader range of *L. pneumophila* serogroups and * Legionella* species.
- Many cases are diagnosed by serological tests, hence the diagnosis is usually retrospective. Seroconversion often does not occur until 3-6 weeks after onset.
• Cultures can take up to 14 days. Though commonly found in aquatic habitats, *Legionella* species are fastidious organisms, requiring specific conditions for culture in the laboratory.

### 9. Case investigation

#### Response times

On same day of notification of a probable or confirmed case of *L. pneumophila* infection and within one working day of notification of infection with other species, begin the follow-up investigation using the Legionnaires’ Disease Investigation form (Appendix 1).

#### Response procedure

**Case investigation**

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, especially urinary antigen and sputum culture
- Find out if the case or relevant care-giver has been told what the diagnosis is before beginning the interview
- Seek the doctor’s permission to contact the case or relevant care-giver
- Identify likely source(s) of clusters.

A history of possible exposures should be sought. Ask about exposures in the 2 to 10 days before onset. If the onset is not clear, it may be necessary to expand the time frame. Questions should be asked about the following exposures.

For *L. pneumophila*:

- Cooling water systems, in, for example, commercial premises such as shopping centres and clubs
- Warm water systems which supply water at less than 50°C after one minute at the point of use
- Other sources of water aerosols, e.g., vegetable mist machines, gardening spray systems, car washes, fountains etc
- Spa pools.

For *L. longbeachae*:

- Gardening activities, particularly the use of potting mix.

If a *L. pneumophila* case has a history of exposure outside the public health unit’s jurisdiction, advise the relevant public health unit.

#### Case management

For *L. pneumophila*, if not already done, encourage the clinicians caring for the case to collect specimens of urine and sputum for analysis. Where cases are clustered, ensure that clinical isolates are sent to the state reference laboratory for typing. Refer to *Therapeutic Guidelines: Antibiotic* for treatment options.

#### Education

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

#### Isolation and restriction

None.

#### Active case finding
Usually none for sporadic cases. Where a case’s work place is suspected to be the source of infection, consider alerting others in the workplace about the risk and, should symptoms arise, to seek medical attention and to alert the PHU.

10. Control of environment

An environmental investigation of possible sources is not generally required after a single notification. However the decision to investigate should be made at the individual PHU level, taking local factors into consideration. For example, a notification may give Environmental Health Officers (EHOs) an opportunity to check registers of CWSs held by councils, and provide information to managers of premises while testing any suspected CWS.

Water from implicated systems should be sampled and submitted for analysis. Positive samples should be held and matched against any human isolates.

Where an epidemiological investigation points to a possible source as:

- **A CWS**, then an EHO should inspect the CWS; where failures in compliance are identified, ensure that the CWS is cleaned and disinfected and that the CWS is re-evaluated within two weeks (but not within one week) of cleaning or disinfection. Unregistered CWS or warm-water systems should be reported to the local council or other relevant authority.
- **A spa pool**, then an EHO should inspect the spa system, sample the pool water, swab the filter for *Legionella*, and arrange for it to be cleaned and disinfected.
- **A warm water system**, then an EHO should assess the system and arrange for it to be cleaned and disinfected.
- **A fountain**, then the EHO should inspect the fountain, sample it and arrange for it to be cleaned and disinfected.
- **A car wash using warm stored water**, then the EHO should inspect the system, take samples from multiple sites, document the system diagrammatically and photographically for later analysis, and arrange for it to be cleaned and disinfected, or for the water heater to be turned off and disconnected and an alternative system to be used, depending on the risk assessment.

Expert advice should be sought on the cleaning and decontamination of water systems.

11. Contact management

**Identification of contacts**
Contacts of cases are not at risk of disease, unless they share the same environmental exposure.

**Prophylaxis**
Nil.

**Education**
Nil routine.

**Isolation and restriction**
Nil.

12. Special situations

**Clusters**
Where more than one case of Legionnaires’ disease reports a common exposure (within 100 metres over a 3 month period), an outbreak investigation should be initiated. This includes:

- carefully interviewing cases/carers about all possible exposures
- mapping movements of cases during the exposure period
• an urgent environmental assessment including a search for possible sources of aerosol generation that are likely to have travelled to the vicinity in which the cases were potentially exposed. Potential sources of aerosol generation may include:
  • Cooling water systems (CWS) -- both registered and unregistered
  • Fountains
  • Warm water systems
  • Spa pools
  • Car washes.
Potential CWS sources of aerosols are typically in the surrounding 500 metres of the common exposure area, but in determining the investigation area, consider:
  • distances from the common point of exposure, building height, CWS height, direction of discharge, wind direction, prevailing weather conditions at the time of likely exposure (temperature, inversion layers and relative humidity) and logistics of the number of CWS selected
  • the jurisdiction’s register, but be aware of the likelihood for unregistered CWS in buildings in the vicinity.
  • potential for higher health risk, e.g., where many susceptible people could be exposed
  • known history of poor performance / compliance
• liaising with the environmental testing laboratory regarding samples. Positive samples should be held and matched against isolates from linked cases.
• notifying the public health unit media manager. Consider issuing a media release to encourage people with symptoms who may have been exposed to a likely source to seek medical care.
• Initiate active surveillance by faxing GPs, respiratory and infectious disease physicians to assist in case finding; reviewing Emergency Department data for cases of atypical pneumonia; and where well defined and readily contactable exposed groups can be identified (such as a workplace), issuing a fact sheet or letter to members of the group.
• communicating the findings of the investigation to health care workers and the community
• when outbreaks cross more than one public health unit area, the coordinator should be the public health director (or delegate) in whose jurisdiction the implicated source was found. Where interviews are required of cases who live outside the coordinating public health unit’s area, the PHU for the area in which the case resides is responsible for interviewing the case, unless otherwise agreed by the directors of each PHU. Where a statewide outbreak is identified, the coordinator will be appointed by the Director of the State/Territory Communicable Diseases Branch.

The PHU should work with local councils to identify potential sources of aerosols. Where the investigation identifies unregistered CWS or warm-water system, provide feedback to local council.

13. Additional sources of information

• WHO 2007. Legionella and the prevention of legionellosis
• Control of Communicable Diseases Manual
• Victorian DHS Blue Book

14. Appendices

• Legionnaires Disease Investigation Form
• Fact sheet “Legionnaires’ disease”
15. **Jurisdiction specific issues**

Links to State and Territory Public Health Legislation, the Quarantine Act, and the National Health Security Act 2007.