Legionellosis

(Legionnaire's disease, Pontiac fever)

Te Mana Ora Protocol

This protocol is based on the Ministry of Health *Communicable Disease Control Manual*.[1]

- Users should also **familiarise themselves** with the Ministry's more detailed guidance *The Prevention of Legionellosis in New Zealand: Guidelines for the Control of Legionella Bacteria*.[2]
- Protocol users should **document** their response to **action points,** marked throughout with this arrow.

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Associated documents

Te Whatu Ora Waitaha Māori health policy

Te Whatu Ora Waitaha tikanga policy

Te Whatu Ora Waitaha interpreter procedure

Te Mana Ora privacy/nohotapu policy

Ministry of Health and Worksafe online information
https://www.health.govt.nz/your-health/conditions-and-treatments/diseases-and-illnesses/legionellosis
https://worksafe.govt.nz/topic-and-industry/legionnaires-disease/

HealthInfo fact sheet

Te Mana Ora fact sheet

Forms

Case report form

CoolingTowerQuestionnaire160727

Legionella Questionnairev4.docx

ESR0182 Legionella sample request form

ESR0039 Single human source specimen request form

Environmental assessment form 01: Potting mix/Soil/Compost

Environmental assessment form 02: Spa pool/Water fountain/Water feature

Environmental assessment form 03: Warm water systems

Environmental assessment form 04: Wet cooling systems

Worksafe NZ Notification Form

Australia/NZ Standard: cooling water system maintenance

The Illness

Legionnaires' disease (the pneumonic form of legionellosis) was first identified in the United States in the mid 1970s after a large outbreak of pneumonia (due to L. pneumophila) among war veterans in Philadelphia. Since then outbreaks have been identified worldwide often associated with cooling towers.

Epidemiology in New Zealand

Legionella bacteria are ubiquitous in the New Zealand environment, particularly in soil and aquatic environments, making it difficult to prevent pathogens from entering engineered water reticulation systems. The disease is more common in older people, smokers, chronic disease sufferers and the immunocompromised.[1] There is evidence that the disease is under-reported in New Zealand.[3] In the 2017 Canterbury Legionnaire's disease case-control study, risk factors for Legionnaire's disease were chronic obstructive pulmonary disease, history of smoking ≥10 years, and exposure to compost or potting mix. Gardening behaviours associated with *L. longbeachae* disease included having unwashed hands near the face after exposure to or tipping and trowelling compost or potting mix. Mask or glove use was not protective among persons exposed to compost-derived products.[4]

Most cases in New Zealand are caused by L. longbeachae and L. pneumophila. The primary sources of these bacteria are constructed warm-water systems (L. pneumophila) and composted vegetative material (L. longbeachae). Further information on Legionella species in New Zealand can be found in the Ministry of Health publication *The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria*.[1, 2]

In New Zealand and particularly Canterbury, the commonest cause of legionellosis is from potting mix/compost and is usually due to L. longbeachae.

The annual number of cases notified remained relatively stable between 1997 and 2009 but increased dramatically in 2010. This increase was in part at least due to increased sensitivity of laboratory identification using PCR testing.

Te Mana Ora cases: last five years

Table 1:Te Mana Ora cases by district, last 5 years

	2014	2015	2016	2017	2018
Te Whatu Ora Waitaha | Canterbury	40	39	37	72	51
Te Whatu Ora South Canterbury	1	3	2	4	
Te Whatu Ora Te Tai o Puotini | West Coast	6	4	3	4	
TOTAL	47	46	42	80	51

Table 2: Te Mana Ora cases by ethnicity, last 5 years

	2014	2015	2016	2017	2018
European	44	43	41	72	48
Māori	1	1		5	2
Pacific	2	1	1	1	
Asian		1		1	1
Other				1	
Unknown					
TOTAL	47	46	42	80	51

Clinical description[1]

Infection with Legionella is an important cause of community-acquired pneumonia and occasionally multi-systemic disease, occurring both sporadically and in outbreaks. Legionella infections can cause a spectrum of symptoms, including subclinical infection (infection with no disease).

For notification purposes, the following three categories meet the clinical criteria for a clinically compatible illness:

1. pneumonia (**Legionnaires' disease**)
2. non-pneumonic disease (eg **Pontiac fever**) – a self-limiting acute febrile illness which may be accompanied by cough
3. **extrapulmonary** disease – involving skin, joints, pericardium or other organs.

Although the most common clinical manifestation of legionellosis reported worldwide is Legionnaires' disease, non-pneumonic disease is often clinically unrecognised and therefore likely to be under-reported.

Incubation[1]

The time between exposure and the first sign of symptoms for:

- Legionnaires' disease is usually **2–10 days** but can be up to 14 days (up to 16 days has been recorded in some outbreaks[5])
- Pontiac fever is usually **24–48 hours**, but can be between 5 hours and 3 days.

Transmission[1]

Transmission is through **inhalation of aerosols of either water or dust particles** carrying Legionella bacteria, or via **aspiration of contaminated water**.

Common sources of water or soil colonised with Legionella bacteria include cooling towers, spa pools, potting mix and other compost-related products, and warm-water systems (including fittings).

Communicability

Person-to-person transmission has **not** been demonstrated.[1]

Prevention

See *The Prevention of Legionellosis in New Zealand: Guidelines for the Control of Legionella Bacteria*.[2]

Differentiating Legionnaires' Disease and Pontiac Fever

CDC website: https://www.cdc.gov/l egionella/clinicians/clinical-features.html

	Legionnaires' disease	Pontiac fever
Clinical features	Pneumonia, cough, fever	Flu-like illness (fever, chills, malaise) without pneumonia
Pathogenesis	Replication of organism	Inflammatory response to endotoxin
Radiographic pneumonia	Yes	No
Incubation period	2-14 days after exposure	24-72 hours after exposure
Etiologic agent	*Legionella* species	*Legionella* species
Attack rate	< 5%	> 90%
Isolation of organism (from the patient)	Possible	Never
Outcome	Hospitalization common. Case-fatality rate: 10%, 30% in healthcare associated cases	Hospitalization uncommon. Case-fatality rate: 0%

Notification[1]

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

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 that has laboratory suggestive evidence.

Confirmed: A clinically compatible illness that has laboratory definitive evidence.

Not a case: A case that has been investigated and subsequently found not to meet the case definition.

Note:

- A single elevated titre is a useful screen, but can be a false positive, hence the need for confirmatory testing. Public health investigations should take account of all the information available.
- A positive nucleic acid amplification test (NAAT) (PCR or other nucleic acid detection method) is very useful for rapid diagnosis and case management but may not identify the causative agent. In this situation, further testing to identify the causative agent is required (Legionella culture or convalescent serology).
- Urine antigen testing is not completely specific for Lp1 and there can be cross-reactivity with other serogroups. Therefore convalescent serology may be useful to clarify the causative species/serogroup.
- Isolation of Legionella bacteria remains the gold standard for diagnosis of legionellosis.

Laboratory testing[1]

Laboratory **definitive evidence** for a confirmed case requires at least one of the following:

- isolation (**culture**) of Legionella species from respiratory secretions or other clinical samples
- detection of Legionella species nucleic acid (by **PCR** or other detection method)
- a fourfold or greater **rise in IFA titre** against Legionella species to ≥ 256 between paired sera tested in parallel using pooled antigen at the same reference laboratory
- detection of Legionella species **antigen in urine**.

Laboratory **suggestive evidence** for a probable case requires:

- one or more **elevated** Legionella species serology titres of ≥ 512 tested using pooled antigen at a reference laboratory.

Cultural and social context

Cultural, social, work and home environments affect any person's risk of contracting a communicable disease, the likely impact of that disease on them, and their likelihood of passing the infection on others. Keep these factors in mind at every point of your investigation and follow-up.

- Request an **interpreter** if needed
- **Consider** the potential impact of cultural, social, work or home factors on a person or family's ability or willingness to provide information and/or follow public health advice
- **Tailor your advice** to the situation
- **Seek advice yourself** if unsure. Talk to:
    - Te Mana Ora Māori Relationships Manager or Pacific Relationships Manager or Communicable Diseases Manager for advice on community and primary care support people or agencies
    - Ngā Ratonga Hauora Māori for Māori patients at Christchurch Hospital or Christchurch Women's hospital
- If appropriate, and with the case and/or contact's permission, seek the **assistance** of family or other community members, community leaders, and/or support agencies if required

Management of case

Investigation

- Action on **day of notification** if L. pneumophila.
- Action **within 24 hours** if sporadic case (not L. pneumophila) eg. longbeachae.
- Complete **questionnaire** by phone, either by interviewing the case or the next of kin if the case is unavailable. If contact by phone is not possible, visit the hospital.
- Ensure the attending medical practitioner has obtained **laboratory confirmation,** including identification to species and serotype level. Samples should also be referred to the Legionella Reference Laboratory at ESR for confirmatory testing or typing (for serology, this includes both acute and convalescent paired sera).
- **Review recent cases** to see if there have been any common exposures or linkages.
- Sample the **domestic hot water cylinder** and check the temperature (refer Disinfection below). (K:\CFS\ProtectionTeam\FinalDocs\NotifiableConditions\Legionellosis\Procedures\LegionellaEnviroSamplingProcedureVersion2July2011.pdf).
- **Potting mix/compost/soil samples** may be taken depending on the risk exposure and the significance of the result to the management of the case. Discuss with MOoH if necessary.
- Take other **environmental samples** from possible sources. Use the ESR requisition form for water and other environmental samples:

Restriction

Nil

Treatment

To be coordinated by the notifying medical practitioner. See HealthPathways.

Counselling

- **Advise** the case and their caregivers of the nature of the infection and its mode of transmission.
- Provide the Te Mana Ora fact sheet

Outbreak

- In the event of a suspected outbreak, **initiate an outbreak response** with a CIMS structure and Incident Action Plan (refer to the Te Mana Ora Outbreak Response Plan).
- If a cooling tower/evaporative condenser is involved consider forming a **technical advisory group** including industry representatives (eg: from IRHACE (Institute of refrigeration heating and cooling engineers), CCCA (Climate Control Companies Association), Christchurch City Council Environmental team, WorkSafe and possibly a CHL clinical microbiologist).
- Consider **taking our own samples** (under the aegis of WorkSafe) from suspected cooling towers/evaporative condensers.
- **Inform** those in the health sector who need to know including GPs, the Emergency Dept, the Microbiology laboratory, Southern Community Laboratory, the Ministry of Health and ESR.

Outbreak Response Plan associated documents include:

- Environmental Checklist
- Outbreak Task Cards
- Incident Action Plan

Management of contacts

Definition

A contact is any person who has **experienced exposures similar to the case** within the preceding three months.

Investigation

Because there is no person-to-person spread with legionellosis, **advise** contacts about the mode of infection and encourage them to go promptly to their general practitioner if symptoms develop.

Restriction

Nil

Prophylaxis

Nil

Counselling

- **Advise** contacts of the nature of the infection and its mode of transmission.
- Provide the Te Mana Ora fact sheet

Other control measures

Identification of source[1]

- The medical officer of health is responsible for **coordinating an investigation** into the source of infection.
- Refer to *Management of case* above and The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria[2] for detailed information on investigation of cases.
- If indicated, the public health unit will **take environmental samples** to test for Legionella bacteria from potential sources. For further information on environmental testing, refer to ESR's Environmental Sampling for Legionella Bacteria.[6]
- If a **cooling tower** is implicated as a possible source consider shutting it down. If an unknown cooling tower is a possible source ask the Local Authority (Building Warrant of Fitness section) for a list of buildings in the area that have a cooling tower. (Note that Te Mana Ora is working with our Councils to develop more complete lists of cooling towers.)
- Following any **hospital-acquired** case, notify infection prevention and control and site maintenance manager for the hospital**.**
- Suspected **occupational** sources and clusters of cases should be thoroughly investigated. In the case of a suspected occupational source, WorkSafe New Zealand is responsible for investigating specific risks in a

workplace and they should be notified using the Worksafe NZ Notification Form . Sporadic cases, however, may not warrant extensive investigation because of the difficulty in identifying the specific source and the likelihood of detecting a variety of natural or constructed water-distribution systems naturally colonised with other Legionella strains.

- Even when cases appear to be sporadic, an **assessment of space–time clustering** with other cases should be considered.

Disinfection[1]

Disinfection of contaminated water sources is an important control measure (but take samples first if possible). Disinfection is obligatory when Legionella bacteria are identified in any of the following systems in levels of concern and considered to have caused or may cause disease:

- in a domestic water system
- in a cooling tower when the level is at or above 10 colony-forming units/mL (refer to AS/NZS 3666).
- in a spa pool
- in a decorative fountain etc.

- For **information on disinfection**, refer to *The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria*.[2]
- For **advice on disinfection** of any contaminated site, contact the Legionella Reference Laboratory at ESR.

Notes:

- Legionella are less likely to survive in water held at greater than 60^0C, (although ACC recommends 55^0C for domestic hot water cylinders unless there is a tempering valve on the outlet to prevent scalding).
- **Cooling tower disinfection** should be performed by a commercial ventilation/air-conditioning or water treatment company.
- **Spa pool disinfection**: either contact the Legionella Reference Laboratory at ESR or refer to the following the ESR guidance:
  - Controlling The Risks Of Infection In Spa Pools (Management Of Spa Pools) 2006. Reviewed March 2011,
  - Guidelines for the remediation of spa pools implicated in cases of legionellosis 2005. Reviewed March 2011

  Or contact a water treatment company.
- **Ensure cleaning protocols are in place** subsequently for any air conditioning, spa or hot water system causing illness, especially in an outbreak.

Health education

Medical officers of health are responsible for health education in the event of a non-occupational cluster of cases.

A fact sheet resource suitable for soil and compost product suppliers is available from WorkSafe New Zealand.

Another educational resource is the Ministry of Health pamphlet on safe gardening.

Reporting

- Ensure complete case information is entered into **EpiSurv.**
- Consider creating or updating a **Healthscape** record for any premises involved.
- **Document** your response to each **action point** (marked with this arrow) in this protocol
- In the event of a cluster of cases or outbreak**, contact** the **Ministry of Health** Communicable Diseases Team and outbreak liaison staff at **ESR,** and complete the **Outbreak Report Form.**
- If an outbreak, write a **report** for the file, and also attach to the EpiSurv outbreak report.

References and further information

1. Ministry of Health, *Communicable Disease Control Manual*. 2019, Ministry of Health: Wellington.
2. Ministry of Health, *The Prevention of Legionellosis in New Zealand: Guidelines for the control of legionella bacteria*. 2011.
3. Priest, P.C., et al., *The burden of Legionnaires' disease in New Zealand (LegiNZ): a national surveillance study.* Lancet Infect Dis, 2019. **19**(7): p. 770-777.
4. Kenagy, E., et al., *Risk Factors for Legionella longbeachae Legionnaires' Disease, New Zealand.* Emerg Infect Dis, 2017. **23**(7): p. 1148-1154.
5. World Health Organisation. *Legionellosis*. 2018; Available from: https://www.who.int/news-room/fact-sheets/detail/legionellosis.
6. Institute of Environmental Science and Research, *Environmental Sampling for Legionella Bacteria*. 2014.
7. Centers for Disease Control and Prevention. *Legionella (Legionnaire's Disease and Pontiac Fever)*. 2018; Available from: https://www.cdc.gov/legionella/index.html.
8. World Health Organisation, *Legionella and the prevention of legionellosis*. 2007.
9. New South Wales Government. *Legionnaire's disease*. 2017; Available from: https://www.health.nsw.gov.au/Infectious/legionnaires/Pages/default.aspx.
10. Public Health England. *Legionnaire's disease: guidance, data and analysis*. 2019; Available from: https://www.gov.uk/government/collections/legionnaires-disease-guidance-data-and-analysis.

Document Control

Protocol review task	Responsibility	Date completed + version no.
Advise team, Quality Coordinator (QC) of review (and planned timeframes).	Public Health Specialist (PHS)	26/11/2019
Open the protocol in EDMS Owner's view, ensure it is based on the current template, remove any blue font formatting (indicating new content for the previous version), and turn on "track changes".	PHS	20/11/2019
Review Manatū Hauora | Ministry of Health (MoH) advice, literature, other protocols, and write draft update, marking new content in blue font.	PHS	18/12/2019
Update Fact/ information sheet as necessary (or source the URL link from MoH website).	PHS	See note above
Start an EDMS **review** workflow of draft version to pre-set document members – MOsH, CD, Team Leader, and HPO for feedback. (Check members are correct before starting workflow. If not, contact QC to update.)	PHS	18/12/2019
Incorporate feedback and update draft(s) further as required.	PHS	05/02/2020
Start an EDMS **approval/ publishing** workflow of final version to Clinical Director (Authoriser).	PHS	05/02/2020
Clinical Director approval recorded in EDMS.	Clinical Director (CD)	
Document Controller (A.K.A. QC) receives EDMS notification of CD approval, and completes the following processes: ➢ Document control tasks within document, incl. header, footer and formatting. ➢ EDMS document properties/ metadata updates. ➢ Checks and updates hyperlinks on Te Mana Ora policies and procedures site. ➢ Creates .pdf (for external link), and saves to CFS folder: • Protocols – Y:\CFS\Quality\Archive\Protection\IntranetPROTOCOLS. ➢ New or reviewed document is uploaded to: • Protocols: ○ Surveillance (PHU server) website, and ○ Microsoft Teams on-call documentation group. ➢ Fact/information sheets are checked for validity: • Te Mana Ora | Te Mana Ora | CPH website, or • MoH website.	Quality Coordinator (QC)	V5, 14/12/2023
Update **paper** copies as required (on-call folder/ vehicle).	Health Protection Officer (HPO)	
Advise operational/ regional staff of update, summarising any substantial changes (text highlighted in blue font in document).	QC, or HPO, or Team Leader	V3, 18/11/2022
Once process finalised, **move** any original draft documents saved in CFS locations to: Y:\CFS\Quality\Archive\Protection\ComDisProtocolsArchive	QC	V3, 18/11/2022
Minor update notes: V4, added Pacific Relationships Manager into Cultural and Context section.	QC	V4, 16/02/2023
Minor update notes: V5, updated testing requirements in case definition as per CD Manual update.	PHS	V5, 14/12/2023