Legionellosis

Revision Dates

<table>
<thead>
<tr>
<th>Case Definition</th>
<th>Reporting Requirements</th>
<th>Epidemiology/Public Health Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2018</td>
<td>March 2018</td>
<td>March 2018</td>
</tr>
</tbody>
</table>

Case Definition

**Confirmed Case**
Clinical illness\(^{(A)}\) with laboratory confirmation of infection:
- Isolation of *Legionella* species or detection of the antigen from a lower respiratory tract specimen or a sterile site clinical specimen\(^{(B)}\);

OR

- Detection of *Legionella* nucleic acid in a lower respiratory tract specimen by polymerase chain reaction (PCR);

OR

- Seroconversion or significant (fourfold or greater) rise in *Legionella* sp. IgG antibody titre between acute and convalescent sera;

OR

- Detection of *L. pneumophila* antigen in urine\(^{(C)}\).

**Probable Case**
Clinical illness\(^{(A)}\) with one of the following:
- Single IgG antibody titre to *Legionella* sp. of >1:128;

OR

- Epidemiologically linked to a confirmed case.

\(^{(A)}\) *Legionellosis* comprises two distinct illnesses: Legionnaires’ disease characterized by myalgia, fever, cough, and pneumonia and Pontiac fever, a milder illness without pneumonia.

\(^{(B)}\) Refer to the [ProvLab Guide to Services](#) for current specimen collection requirements.

\(^{(C)}\) Cross-reactions have been demonstrated between urinary antigens of several *L. pneumophila* groups. Antigen may be excreted for months after acute infection.
Reporting Requirements

1. **Physicians, Health Practitioners and Others**
   Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone, of all **confirmed** and **probable** cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two business days).

2. **Laboratories**
   All laboratories shall report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two business days) to the:
   - Chief Medical Officer of Health (CMOH) (or designate), and
   - MOH (or designate) of the zone

3. **Alberta Health Services, First Nations and Inuit Health Branch**
   - The MOH (or designate) of the zone where the case currently resides shall forward the initial Notifiable Disease Report (NDR) of all **confirmed** and **probable** cases to the CMOH (or designate) within two weeks of notification and the final NDR (amendment) within four weeks of notification.
   - For out-of-province and out-of-country reports, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two business days):
     - name,
     - date of birth,
     - out-of-province health care number,
     - out-of-province address and phone number,
     - positive laboratory report, and
     - other relevant clinical / epidemiological information.
Etiology
Legionellosis is caused by *Legionella* bacteria, which are gram-negative bacilli.(1) There are at least 20 species of *Legionella* that cause disease in humans with the most common type being *L. pneumophila* serogroup 1 that causes the majority of clinical disease.

Clinical Presentation
Legionellosis is an acute bacterial disease with two currently recognized, distinct manifestations: Legionnaires’ disease and Pontiac fever.(2)

Legionnaires’ disease is the more severe form of Legionellosis characterized by pneumonia and progressive respiratory distress, which may lead to death. Pneumonia caused by *Legionella* cannot be accurately differentiated from pneumonia caused by other organisms.(3) Other symptoms associated with the infection include, cough, fever, chills, myalgia, gastrointestinal tract, renal and central nervous system manifestations.(1,4) Case-fatality rates are around 15%, even though treatment and diagnostics have been improved.(2)

Pontiac fever is a milder febrile illness without pneumonia. Deaths due to Pontiac Fever have not been reported. Symptoms include abrupt onset of influenza-like illness. (1) Pontiac fever is most often seen as part of a cluster or during outbreaks.(1,5)

Reservoir
*Legionella* bacteria are ubiquitous in nature, particularly in aquatic environments.(1,2) Temperatures of 25-45°C, stagnant water, presence of ciliate protozoans and amoebas, corrosion and biofilms are some of the factors that support growth of *Legionella* bacteria. Scale, which is the build-up of sediment or minerals (calcium or magnesium salts) in or on water distribution systems, household plumbing or water reservoirs also contributes to growth of *Legionella*. Outbreaks and sporadic cases have been linked to:
- hot and cold water systems,
- air conditioning cooling towers and evaporative condensers,
- humidifiers for food display cabinets or home humidifiers,
- whirlpool spas/natural pools/thermal springs,
- respiratory therapy devices,
- decorative fountains/sprinklers,
- garden hoses,
- potable water systems,
- vehicle washes,
- mist producing devices,
- water-cooled machine tools.(1,4)

Transmission
*Legionella* bacteria can be transmitted from water to humans by the inhalation of contaminated aerosols and by aspiration.(1) Person-to-person transmission does not usually occur but may be possible in rare cases.(6)

Incubation Period
The incubation period has a range of 2-14 days, usually averages 5-6 days.(4,7,8) Some cases may have an extended incubation period up to 19 days. Pontiac fever has a much shorter incubation period with a range of 5-72 hours, but most often 24-48 hours.
Period of Communicability
Unknown; person-to-person transmission is rare.(6)

Host Susceptibility
The chances of developing Legionellosis depends on host factors, production and dissemination of aerosols, concentration of Legionella bacteria in the water source, and the virulence of the particular strain of Legionella.(9) Individual risk factors for acquiring disease include:
- Older age group (>50yrs),
- Male gender,
- Heavy smoking or high alcohol intake,
- Chronic disease such as diabetes, lung, kidney or liver disease
- Immunocompromising disorders or immunosuppressant medications
- Heavy smoking and

Risk factors for exposure to Legionella include:
- Recent travel, with an overnight stay outside of the home, including a stay in a healthcare facility;
- Exposure to hot tubs; and
- Exposure to settings where the plumbing has had recent repairs or maintenance work.

Health care associated infections can occur therefore, Legionnaires disease should be considered as part of the differential diagnosis in patients who develop pneumonia during or after their hospitalization. Transplant patients, those who are immunocompromised or with certain chronic underlying health conditions are at highest risk of acquiring nosocomial Legionella infection. Legionellosis is rare in children and if infection does occur, symptoms are usually mild, asymptomatic and may go unrecognized.(1)

Incidence in Alberta
Between 2000 and 2016 there were 106 cases of Legionellosis reported in Alberta.(10) The majority of those cases were acquired locally. In the summer/fall of 2012, there was a reported increase in locally-acquired Legionellosis cases. Intense public health investigations did not reveal a common nosocomial or residential source linking the cases. Annual case counts may be accessed through the Interactive Health Data Application (IHDA) at: http://www.ahw.gov.ab.ca/IHDA_Retrieval/ihdaData.do

Public Health Management

Diagnosis
Laboratory testing for the detection of Legionella may include urine antigen testing, serum antibody testing, respiratory culture and other molecular methods (e.g. PCR). The gold standard for diagnosis is respiratory culture, which allows the identification of species and subgroups. Urine antigen testing can also be used, however it is only highly sensitive and specific for L. pneumophila serogroup 1.(1)

Refer to ProvLab Guide to Services for current specimen collection recommendations.(11)

Key Investigation
- Confirm the diagnosis. Other causes of pneumonia, such as influenza, pneumococcal or streptococcal disease, should be ruled out, if possible.
- Assess for any underlying health conditions.
- Determine where the case may have been exposed, taking into consideration the incubation period, reservoir and mode of transmission, including:
Detailed travel history including names of hotels, resorts, etc. during the 14 days prior to symptom onset.

History of relevant exposure, particularly to air conditioners, humidifiers and aerosolized water, e.g., hot tubs, jacuzzis, fountains, plant mister’s, grocery stores or cooling stations within the 14 days prior to symptom onset.

Assess if there have been any changes to the main source of water in the primary residence or travel settings, including general construction, plumbing projects, water main breaks, water line work or changes in water temperature in the last 2-4 weeks.

Conduct an epidemiologic and environmental assessment in consultation with appropriate Environmental Public Health and/or facility-based Infection Prevention and Control (IPC) personnel to help determine whether environmental sampling is indicated as part of the legionella investigation. If indicated, attempt to collect water samples from potential sources of exposure that may be contaminated and submit to ProvLab for examination (See ProvLab Guide to Services for current water sample collection requirements).

- Determine if exposure may have occurred in a community health care setting such as a doctor or dentist office/clinic, long-term care facility, assisted living or senior living facility or nursing home.
- Determine if person was a patient, resident, visitor or worker at the time of exposure in the particular setting.
- If hospitalized, attempt to determine if the exposure was in the community or nosocomial.
- Classification of nosocomial exposure:
  - Definite nosocomial exposure is defined as: a confirmed case of Legionella hospitalized continuously for 14 days before the onset of symptoms.
  - Possible nosocomial exposure is defined as: a confirmed case of Legionella who developed symptoms 2-13 days after hospital admission.

Case Management
- Routine practices are recommended for hospitalized patients.
- Supportive treatment.

Treatment of a Case
- Consultation with an Infectious Diseases Specialist is recommended.
- Treatment of Pontiac fever generally recover spontaneously in two to five days without treatment.\(^1\)

Management of Contacts
- Person-to-person transmission does not usually occur, however, symptomatic and asymptomatic contacts should be investigated if a common source is suspected (e.g. cooling tower).

Management of Outbreaks
- A Legionella outbreak is defined as two or more confirmed cases linked by time and space.
- An outbreak may be declared by the zone MOH in the manner determined most appropriate by the MOH in consultation with Alberta Health.
- For the purposes of public messaging, the term "outbreak" need not be used in order to apply the outbreak policy.
- Outbreak measures include but are not limited to the following:
  - Conduct an epidemiologic and environmental assessment and identify source of exposure.
Attempt to collect water samples from potential sources of exposure that may be contaminated and submit to ProvLab for examination (See ProvLab Guide to Services for current water sample collection requirements).

Implement measures to prevent further exposure to identified source of exposure.

Review maintenance logs for water systems for sources of exposure.

Review and implement decontamination procedures of water systems that are contaminated.

NOTE: Travel-related Legionella outbreaks can sometimes be difficult to identify especially if cases return home prior to symptom onset.

Preventive Measures

- Proper maintenance of water systems (especially artificial water sources) in which Legionella grow is the key to preventing infection with Legionella.\(^{12}\)

- General recommendations for prevention of infection include the following:
  - The elderly and those with immunocompromising conditions should avoid high risk areas such as whirlpool spas.\(^{13}\)
  - Mist-producing devices such as humidifiers, hot tubs, shower heads and whirlpool bathtubs/Jacuzzi should be cleaned and disinfected as per manufacturer instructions.\(^{14}\)
  - Home water heaters should be kept a minimum temperature of 60°C, however in order to prevent scalding, the temperature at the tap should be no higher than 49°C.\(^{14}\)
  - Tap water should not be used for respiratory therapy devices.\(^{2}\) Instead, use sterile water in the device tank and for rinsing any type of equipment used for respiratory tract treatment.
  - Keep hot and cold water systems clean and reduce stagnation by flushing unused taps\(^{9}\)
  - Cooling towers should be well maintained. Maintenance, testing and disinfection of water-cooling towers is a complex process and should be done by persons with expertise in this area.
References


