

# Legionellosis

## Revision Dates

Case Definition	August 2011
Reporting Requirements	August 2011
Remainder of the Guideline (i.e., Etiology to References sections inclusive)	March 2007

## Case Definition

### Confirmed Case

Clinical illness<sup>[1]</sup> with laboratory confirmation of infection:

- Isolation of *Legionella* species or detection of the antigen from respiratory secretions, lung tissue, pleural fluid or other normally sterile fluids

OR

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

OR

- A single IgG antibody titre to *Legionella* sp. of > 1:128

OR

- Detection of *L. pneumophila* serogroup 1 in respiratory secretions, lung tissue or pleural fluid by direct fluorescent antibody testing

OR

- Detection of *L. pneumophila* antigen in urine by radioimmunoassay or EIA<sup>[2]</sup>.

### Probable Case

Clinical illness<sup>[1]</sup> with one of the following:

- Detection of *Legionella* nucleic acid (e.g., PCR) in an appropriate clinical specimen

OR

- Epidemiologically linked to a confirmed case.

<sup>[1]</sup> Legionellosis comprises two distinct illnesses: Legionnaires' disease characterized by fever, myalgia, cough, and pneumonia and Pontiac fever, a milder illness without pneumonia.

<sup>[2]</sup> 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 listed in Sections 22(1) or 22(2) of the *Public Health Act* shall notify the Medical Officer of Health (MOH) (or designate) of all confirmed and probable cases in the prescribed form by mail, fax or electronic transfer within 48 hours (two days).

### 2. Laboratories

All laboratories, including regional laboratories and the Provincial Laboratory for Public Health (PLPH), shall in accordance with Section 23 of the *Public Health Act*, report all positive laboratory results by mail, fax or electronic transfer within 48 hours (two days) to the:

- Chief Medical Officer of Health (CMOH) (or designate),
- MOH (or designate) and
- Attending/ordering physician.

### 3. Alberta Health Services and First Nations Inuit Health

- The MOH (or designate) of the zone where the case currently resides shall forward the preliminary 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-zone reports, the MOH (or designate) first notified shall notify the MOH (or designate) of the zone where the client currently resides by mail, fax or electronic transfer and fax a copy of the positive laboratory report within 48 hours (two days).
- 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 days) including:
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province address and phone number,
  - attending physician (locally and out-of-province) and
  - positive laboratory report (faxed).

## Etiology

*Legionella* are gram-negative bacilli. The bacteria survive for months in tap or distilled water but are susceptible to many disinfectants, moist heat, and dry heat. There are at least 35 species of *Legionella*, but *Legionella pneumophila* serogroups 1, 4, and 6 are responsible for more than 90% of clinical disease.

## Clinical Presentation

Legionellosis is an acute bacterial disease with two currently recognized, distinct clinical and epidemiological manifestations: Legionnaires' disease and Pontiac fever.

Clinical symptoms of *Legionella* infection occur two to ten days after exposure. Legionnaires' disease is characterized by anorexia, malaise, headache, and myalgias. Within a day, there is usually a rapidly rising fever associated with chills. Temperatures commonly reach 39° C to 40.5° C. A non-productive cough, abdominal pain, and diarrhea are common, as is leukocytosis. The clinical condition may progress to multi-system failure with confusion, depression, disorientation, increasing respiratory distress, and disseminated legionellosis. Prolonged convalescence and significant case fatality rates (as high as 39%) can occur, especially in persons with immunosuppression or chronic medical conditions. A chest X-ray is usually consistent with pneumonia.

The initial symptoms of Pontiac fever are as above, but without pneumonia or progression to multi-system involvement. Rapid recovery without sequelae is the rule. This syndrome may represent a reaction to inhaled antigen, rather than bacterial invasion. Pontiac fever is not associated with pneumonia or death. It is a self-limited disease. Individuals recover spontaneously in 2-5 days. Pontiac fever has only been recognized during outbreaks.

## Diagnosis (1, 2)

The diagnosis of legionellosis can be made by isolation of the organism from respiratory secretions or from a normally sterile site, seroconversion, a fourfold increase in antibody levels ( $\geq 1:128$ ), or positive urinary antigen (for *L. pneumophila*). Urinary antigen testing is the most rapid and sensitive test but only detects infection with *L. pneumophila*. Samples may not show test positivity for up to five days after the start of symptoms. Testing may need to be repeated if the specimen is taken early in the illness. Serology testing to demonstrate recent infection requires two samples taken 3-6 weeks apart to show a fourfold rise in titre.

Legionnaires disease cannot be distinguished clinically or radiographically from pneumonia caused by other agents. A single elevated antibody titre does not confirm a case of Legionnaires disease because IFA titres greater than or equal to 1:256 are found in 1-6% of healthy adults.

## Epidemiology

### Reservoir

The organism is ubiquitous in nature, particularly in aquatic environments. Outbreaks and sporadic cases have been linked to air conditioning cooling towers, evaporative condensers, humidifiers (including household humidifiers), whirlpool spas, respiratory therapy devices, decorative fountains, and potable water systems.

### Transmission (3)

*Legionella* are opportunistic pathogens with widespread distribution in the environment but cause a very low rate of infection in the general population. It is most commonly associated with water-droplet transmission from cooling towers. *Legionella* are transmitted directly from the environment to humans with the most common source thought to be aerosolization of water containing *L.*

*pneumophila*. The organism can survive for years in water at 2-8° C and is resistant to usual levels of chlorination. Person-to-person transmission has not been documented.

#### **Incubation Period (4)**

The incubation period for Legionnaire's disease is 2-10 days, most often 5-6 days. Pontiac fever has a much shorter incubation period with a range of 5-66 hours, most often 24-48 hours.

#### **Period of Communicability**

Person-to-person transmission of legionellosis had not been documented.

#### **Host Susceptibility (3)**

Illness occurs most frequently with increasing age (most cases are at least 50 years of age), especially in persons who smoke and in those with diabetes mellitus, chronic lung disease, those that require intubation, renal diseases or malignancy, and in the immunocompromised especially solid organ transplant recipients. The disease is rare in those under 10 years of age, however, nosocomial infection in neonates has been reported. Several outbreaks have occurred among hospitalized patients. Unrecognized infections are common.

#### **Occurrence**

##### **General**

The earliest documented case of legionellosis occurred in 1947 and the first documented outbreak in Minnesota in 1957. The *Legionella* bacterium was first identified in 1976 when 34 members of the American Legion died following a conference in Philadelphia.

Cases have been reported in Canada, the US, Europe, Australia, Africa and South America. Cases are more common in summer and autumn. Most cases are sporadic, however, when outbreaks occur it is most often with low attack rates (0.1–5%) in the population at risk. In the US, there are 8,000 to 18,000 admissions to hospital related to Legionnaire's disease. Pontiac fever attack rate is 95%. Legionellosis, where prevalent, causes 2–15% of all community-acquired pneumonia. The case fatality rate ranges from 3–5%.

##### **Canada (5)**

Cases have been reported in Canada since 1986. They have occurred most commonly in the summer and autumn. In general, the majority of reported cases of Legionnaires' disease are sporadic. The reported rate from 1989 to 1999 has been approximately 0.34/100 000.

In 2005, an outbreak of Legionnaire's disease in a Toronto nursing home was responsible for 20 deaths among 127 infected residents and workers.

##### **Alberta (5,6)**

Since 1998 there have been 25 cases of legionellosis reported in Alberta. The reported sources of infection are unknown (21), travel (two), school (one) and home (one). One case was fatal. From 1989 to 1999, the most common age group reported with legionellosis was individuals 40 to 59 years followed closely by those over 60 years of age.

#### **Key Investigation (7)**

- Determine history of relevant exposure, particularly to air conditioners, humidifiers and aerosolized water, i.e., hot tubs, fountains, plant mistings.
- Assess for underlying medical conditions.

- Investigate to determine the possible source of exposure. This may include exposure in the community or nosocomial.
  - A definite case of nosocomial Legionnaires' disease is defined as laboratory-confirmed legionellosis that occurs in a person who has been hospitalized continuously for greater than or equal to 10 days before the onset of illness.(1)
  - A possible case of nosocomial Legionnaires' disease is defined as a laboratory-confirmed infection that occurs 2-9 days after hospital admission.(1)
- See ANNEX A for investigation in hospital inpatients/LTCF residents and/or outbreak situations.
- Public health and facility infection control should work collaboratively in investigation of nosocomial acquired legionellosis.
- Obtain a detailed travel history including names of hotels, resorts, etc. during the two weeks prior to onset.

## Control

### Management of a Case

- Routine practices.
- Supportive treatment. Some individuals may require oxygen and/or fluid replacement.

### Treatment of a Case

- Azithromycin is the preferred treatment.
- If illness progresses, rifampin can be added.
- Levofloxacin may be used as an alternative agent.
- Consultation with an infectious diseases physician is recommended.
- Cases with Pontiac fever generally recover spontaneously in two to five days without treatment.

### Management of Contacts

- Legionellosis is not passed person-to-person.
- Symptomatic and asymptomatic contacts should be investigated if a common source is suspected.

### Preventive Measures (1,3,5,7-10)

- Preventive measures for Legionellosis are general measures for health care facilities and commercial facilities e.g., grocery stores, hotels.
- A balance between growth of biofilm and the risk of scalding needs to be taken into consideration.
- Clean taps and shower heads frequently to remove built-up scale and sediment.
- Outlets (e.g., taps, shower heads) in areas of low flow should be cleaned frequently, and water distribution in such areas should be flushed frequently.
- Clean spas and hot tubs frequently and consider using tubs that do not have recirculation systems to minimize biofilm accumulation.
- Use vapor humidifiers or steam vaporizers rather than humidifiers that give rise to the formation of aerosols from non-sterile water, as in, ultrasonic humidifiers. Consider using sterile water. Caution should be used with steam vaporizers as there is a risk of scalding.
- Tap water should not be used for respiratory therapy devices. Use sterile water in the tank and for rinsing any type of equipment used for respiratory tract treatment.

- Maintain water-heater temperature in facilities to a minimum of 51° C and ensure that all hot-water temperature remains above 50° C at all distribution points. Cold water temperature should be < 20° C at distribution points.
- Maintenance, testing and disinfection of water-cooling towers according to the manufacturer's recommendation.
- Home humidifiers and spas must be maintained following the manufacturer's recommendations for maintenance and disinfection.
- Active surveillance for *Legionella* infection, especially among hospital patients at highest risk of acquiring nosocomial infection (i.e., transplant, immunocompromised or patients with certain chronic underlying health conditions) can also be considered an important tool for minimizing risk of disease because it allows for prompt remedial actions and rapid treatment.
- Routine surveillance of environmental sources is not recommended because of the high prevalence of the organism in water, the multiplicity of potential sources, likely recolonization of environmental sources, and the frequency of environmental bacteria in the absence of clinical disease.

Superseded

## ANNEX A

### Investigation in Hospital Patients, Long Term Care Facility (LTCF) Residents, and Outbreak Situations (8)

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The following guidelines may be considered for investigation in hospital patients, LTCF residents, and outbreak situations.

- Infection control should take additional steps if one inpatient (or resident in a long term care facility) develops a definite or possible case or when two or more patients develop lab confirmed Legionnaires' disease within six months of each other after having visited the same outpatient unit the 2–10 day period prior to onset of illness.
- Epidemiologic investigation including retrospective review of microbiologic, serologic and postmortem data to identify previous cases and intensify prospective surveillance for additional cases.
- Conduct an environmental investigation (in collaboration with appropriate health care facility personnel) to determine source(s). Water samples and swabs of point of use devices or system surfaces which may contain biofilms should be collected and cultured for *Legionella spp.*
- If an environmental source is identified, it should immediately be removed or decontaminated if possible
- If potable water is found to be the environmental source, the following steps should be completed until *Legionella* is no longer detected by culture:
  - water system should be decontaminated,
  - immunosuppressed patients should be restricted from taking showers and washing hair under taps, water free of *Legionella* should be used for sponge baths of human stem cell transplant (HSCT) recipients,
  - water free of *Legionella* should be provided for tooth brushing, drinking and flushing nasogastric tubes for immunosuppressed patients and
  - aerators should be removed from faucets.
- If an environmental source is not identified, surveillance for new cases should be continued for at least two months after the initiation of surveillance.
- Depending on the number of cases and scope of the outbreak, Infection Control should decide on either deferring decontamination pending identification of the source, or proceeding with decontamination of the hospital water system, with specific attention to those areas involved in the outbreak.

For more detail refer to CDC. *Guidelines for Environmental Infection Control Health-Care Facilities*. MMWR 2003;52:RR10. <http://www.cdc.gov/MMWR/preview/mmwrhtml/rr5210a1.htm>

## References

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