

# Legionellosis

## 1. DISEASE REPORTING

### A. Purpose of Reporting and Surveillance

1. To identify sources of transmission (e.g., contaminated water source) and prevent further transmission from such a source.
2. To identify outbreaks and educate potentially exposed persons about signs and symptoms of disease, thereby facilitating early diagnosis and treatment.

### B. Legal Reporting Requirements

1. Health care providers: notifiable to local health jurisdiction within 24 hours
2. Health care facilities: notifiable to local health jurisdiction within 24 hours
3. Laboratories: *Legionella* species notifiable to local health jurisdiction within 24 hours; submission of *Legionella* isolates required (2 business days)
4. Local health jurisdictions: notifiable to the Washington State Department of Health (DOH) Office of Communicable Disease Epidemiology (CDE) within 7 days of case investigation completion or summary information required within 21 days

### C. Local Health Jurisdiction Investigation Responsibilities

1. Begin follow-up investigation within one working day.
2. Ensure that laboratories forward the first isolate from each patient to the Public Health Laboratories for molecular studies in the event a subsequent cluster is detected.
3. Report all *confirmed* and *suspect* cases (see definition below) to CDE. Complete the legionellosis report form (available at <http://www.doh.wa.gov/Portals/1/Documents/5100/210-034-ReportForm-Legion.pdf>) and enter the data into the Public Health Issues Management System (PHIMS).
4. For all *confirmed* and *suspect* cases, also complete the CDC Legionellosis Case Report form (available at <http://www.cdc.gov/legionella/downloads/case-report-form.pdf>). Fax the completed CDC Legionellosis Case Report form to DOH CDE at 206-418-5515.

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

*Legionella* are Gram-negative bacilli. Approximately 20 different species can infect humans but most recognized infections (~80%) are due to *L. pneumophila* serogroup 1. Other species known to cause disease include *L. micdadei*, *L. bozemanii*, and *L. longbeachae*. Legionellae thrive in warm, aquatic environments and can survive for extended periods in tap water. They do not colonize the human respiratory tract.

## B. Description of Illness

Legionellosis was first recognized following a 1976 outbreak of pneumonia involving American Legion convention delegates, so was named by the press “Legionnaires’ disease”. Illness is usually associated with two clinically and epidemiologically distinct syndromes: Legionnaires’ disease, a potentially fatal form of pneumonia, and Pontiac fever, a self-limited “flu-like” illness without pneumonia. Persons with Legionnaires’ disease may present early in the illness with nonspecific symptoms including fever, malaise, myalgia, anorexia, and headache. Cough may be only slightly productive, and chest pain, occasionally pleuritic, can be prominent. Gastrointestinal symptoms, especially diarrhea, occur in 20–40% percent of cases. Chest x-rays almost always show pneumonia. Case fatality rate is up to 30%. Pontiac fever is a milder, self-limited illness. Persons at increased risk for legionellosis include persons over 50 years of age and those with certain medical conditions such as COPD, diabetes, and immunosuppression.

## C. Legionellosis in Washington

During recent years, 15–45 cases have been reported annually, usually at least one fatal.

## D. Reservoirs

Water is the primary reservoir. *Legionella* can survive for extended periods in tap water. A variety of natural and man-made aqueous sources have been implicated in outbreaks, including warm, stagnant water such as that found in, or aerosolized from sources such as: plumbing systems, hot water tanks, shower heads and faucets, cooling towers, evaporative condensers of large air-conditioning systems, whirlpool spas, respiratory therapy equipment, ultrasonic misters, humidifiers, grocery vegetable misting machine, and decorative fountains including water walls. Attack rates are low for Legionnaires’.

Potting soil has been associated with *L. longbeachae* infections, a serogroup uncommon in the United States.

## E. Modes of Transmission

Legionellosis is generally acquired by inhalation of contaminated aerosols, but can also be acquired through microaspiration of contaminated water. City-wide outbreaks have occurred in Milwaukee (MMWR 2014;62(03);63 and Quebec City. In addition, legionellosis may also be transmitted through contaminated soil (MMWR 2000;49(34):777–9). Person-to-person transmission has not been documented.

## F. Incubation Period

For Legionnaires’ disease, 2–10 days (average 5–6 days); for Pontiac fever, 5–66 hours (average 24–48 hours).

## G. Period of Communicability

Person to person transmission has not been documented.

## H. Treatment

Legionnaires’ disease should be treated promptly with appropriate antibiotics. Delay in treatment is associated with increased mortality rates. Pontiac fever requires no specific treatment.

### 3. CASE DEFINITIONS

#### A. Clinical Criteria for Diagnosis

Legionellosis is associated with two clinically and epidemiologically distinct illnesses: Legionnaires' disease, which is characterized by fever, myalgia, cough, and clinical or radiographic pneumonia; and Pontiac fever, a milder illness without pneumonia.

#### B. Laboratory Criteria for Diagnosis

1. *Suspect*:

- By seroconversion: fourfold or greater rise in antibody titer to specific species or serogroups of *Legionella* other than *L. pneumophila* serogroup 1 (e.g., *L. micdadei*, *L. pneumophila* serogroup 6).
- By seroconversion: fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents.
- By the detection of specific *Legionella* antigen or staining of the organism in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody (DFA) staining, immunohistochemistry (IHC), or other similar method, using validated reagents.
- By detection of *Legionella* species by a validated nucleic acid assay.

2. *Confirmed*:

- By culture: isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid.
- By detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents.
- By seroconversion: fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents.

#### C. Case Definition (2005)

- *Suspect*: a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.
- *Confirmed*: a clinically compatible case that meets at least one of the confirmatory laboratory criteria.

### 4. DIAGNOSIS AND LABORATORY SERVICES

#### A. Laboratory Diagnosis

Urinary antigen assay **and** culture of respiratory secretions on selective media are together the preferred diagnostic tests for confirming Legionnaires' disease.

- Urine antigen tests: Rapid immunoassays are available commercially to detect *Legionella* antigens in urine. The test has good sensitivity (70–80%) for detecting *Legionella pneumophila* serogroup 1 antigen (80% of cases) but poor sensitivity (5%) for detecting other *L. pneumophila* serogroups and other species.

- Culture: *Legionella* bacteria can be isolated from lower respiratory tract secretions, lung tissue, and pleural fluid by using special media. The sensitivity of culture is highly variable depending on the severity of illness and the experience of the laboratorian performing the test. The advantage of culture is that it will detect all species and allow for comparison with environmental samples, if available.
- Serologic tests: Demonstrating a four-fold rise in antibodies to *L. pneumophila* serogroup 1 can confirm the diagnosis but is more useful for epidemiologic investigations than for clinical use. An acute serum specimen should be collected when the diagnosis is suspected (during the acute phase of illness) and the convalescent serum specimen should be collected at 4, 6 and 12 weeks after onset.

### **B. Services Available at the Washington State Public Health Laboratories (PHL)**

PHL performs culture on respiratory specimens if unable to test commercially, and speciation and pulsed-field gel electrophoresis (PFGE) on isolates.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

### **C. Specimen Collection**

Isolates should be submitted to PHL on media that support their growth. In the event of an outbreak, contact Office of Communicable Disease Epidemiology for assistance in determining which additional specimens should be collected for laboratory study.

Specimens shipped to PHL should include a completed DOH Microbiology form (<http://www.doh.wa.gov/Portals/1/Documents/5230/302-013-Micro.pdf>).

## **5. ROUTINE CASE INVESTIGATION**

Interview the case and others who may be able to provide pertinent information. As most cases of legionellosis present as sporadic disease, routine case investigation is limited to collecting information on demographics, the basis of diagnosis, risk factors for disease, and potential sources of infection.

### **A. Evaluate the Diagnosis**

Using the case report form, itemize signs and symptoms and obtain copies of laboratory reports that support the diagnosis. Urinary antigen assay **and** culture for the organism are together the preferred diagnostic tests for confirming Legionnaires' disease. If *Legionella* is isolated from the patient, ensure that the laboratory sends the isolate to the Public Health Laboratories for molecular studies in the event a subsequent cluster is detected.

### **B. Manage the Case**

Hospitalized patients should be cared for using standard precautions.

### **C. Identify Potential Sources of Infection**

Ask about potential exposures in the 2–10 days prior to onset including:

- Time spent in a hospital as an inpatient, outpatient or employee;

- Exposure to aerosolized water (e.g., fountain, whirlpool spa, hot tub, humidifier, evaporative condenser, nebulizer, grocery store misting machine);
- Travel;
- Spending as least one night away from the home; and
- Exposure to soil.

Investigate all travel-associated cases and nosocomial cases, particularly persons hospitalized during the entire exposure period (See Managing Special Situations).

#### **D. Identify Other Potentially Exposed Persons**

Promptly report travel-associated and nosocomial cases to Office of Communicable Disease Epidemiology. Person-to-person transmission has not yet been demonstrated.

#### **E. Manage Other Potentially Exposed Persons**

Increased surveillance may be appropriate for others exposed to the same source.

#### **F. Environmental Evaluation**

An environmental investigation is generally only performed in the course of an outbreak investigation (See Managing Special Situations).

## **6. MANAGING SPECIAL SITUATIONS**

### **A. Nosocomial Case**

A definite nosocomial case is defined as a patient hospitalized continuously for  $\geq 10$  days before onset of *Legionella* infection. A possible nosocomial case is defined as a patient hospitalized at any point 2–9 days before onset of *Legionella* infection.

If a definite or possible nosocomial case is identified, the Centers for Disease Control and Prevention recommend the following:\*

- If 1 inpatient or  $\geq 2$  outpatients definitive or possible case(s) within 6 months report exposure to a transplant unit, the facility should perform an extensive epidemiologic and environmental investigation to identify and decontaminate the source.
- If 1 definite or  $\geq 2$  possible nosocomial case(s) within 6 months report exposure to a facility without severely immunocompromised patients, the facility should perform a retrospective review and intensive prospective surveillance to identify additional cases. The facility should consider an environmental investigation to identify and decontaminate the source after 1 definite nosocomial case.

\*CDC. Guidelines for preventing healthcare-associated pneumonia, 2003. MMWR 2004;53:1–36. (<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm>)

If 1 possible nosocomial case is identified with exposure to a facility without severely immunocompromised patients, Office of Communicable Disease Epidemiology recommends notifying the facility about the possible case so that the facility can increase awareness for identifying additional cases.

## B. Travel-Associated Case

A travel-associated case is defined as a case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the ten days before onset of illness.

- Report travel-associated cases promptly to Office of Communicable Disease Epidemiology, particularly cases with potential exposures involving out-of-state lodging or cruise ship travel. These situations will be reported to the CDC.
- Obtain lodging or cruise ship information including facility name, address, room number, and dates spent at the facility, and if a spa was present even if not used.
- Ask about others in the travel group who may be ill.
- Recommend testing suspected pneumonia cases for legionellosis including culture.

## C. Outbreaks

If a cluster of legionellosis is suspected, confirmation and investigation are warranted, as morbidity may be significant and mortality high (up to 30%), and reservoirs may be found and eliminated. Outbreaks in healthcare settings are particularly important but challenging to investigate. Contact Office of Communicable Disease Epidemiology to discuss possible outbreaks. Such investigations may involve complex questionnaires and detailed environmental evaluations. For additional resources regarding assessing and testing water systems for *Legionella* see: <http://www.cdc.gov/legionella/index.html>

## 7. ROUTINE PREVENTION

**A. Immunization Recommendations:** None

### B. Prevention Recommendations

Consult available resources for environmental recommendations:  
<http://www.cdc.gov/legionella/index.html>

## ACKNOWLEDGEMENTS

This document is a revision of the Washington State Guidelines for Notifiable Condition Reporting and Surveillance published in 2002 which were originally based on the Control of Communicable Diseases Manual (CCDM), 17<sup>th</sup> Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format and select content of this document.

## UPDATES

April 2010: The guideline was reviewed. Changes were made to Section 7A.

January 2011: The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.

June 2012: The guideline was reviewed. No significant changes were made.

June 2014: The guideline was reviewed. No significant changes were made.

November 2014: A change was made to Section 1C: Local Health Jurisdiction Investigation Responsibilities, directing LHJs to complete the CDC Legionellosis Case Report form for all confirmed and suspect cases and fax the completed CDC form to DOH CDE.