

LEGIONELLOSIS

(Legionnaires' Disease, Pontiac Fever)

REPORTING INFORMATION

- **Class B:** Report by the close of the next business day after the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism: The Ohio Disease Reporting System (ODRS) should be used to report lab findings to the Ohio Department of Health (ODH). For healthcare providers without access to ODRS, you may use the Ohio Confidential Reportable Disease Form (HEA 3334, rev. 1/09 <http://www.odh.ohio.gov/pdf/forms/hea3334.pdf>)
- The Centers for Disease Control and Prevention (CDC) [Legionellosis Case Report form](#) (revised 1/2014) should be completed. The fields are incorporated in the ODRS record. It is not necessary to send the form to ODH. In addition to reporting through ODRS, local health departments should call the Ohio Department of Health (ODH) Outbreak Response and Bioterrorism Investigation Team (ORBIT) at 614-995-5599 during regular business hours to report suspected travel-associated cases of Legionellosis.
- Key fields for ODRS reporting include: import status (whether the infection was travel-associated or Ohio-acquired), date of illness onset, and all the fields in the Epidemiology module. Please try to determine if the patient had pneumonia (see Clinical, Diagnosis in ODRS).

AGENT

Legionella spp. are gram-negative bacilli. Thirteen species have been implicated in causing human disease. The most common species causing infection is *Legionella pneumophila* serogroup 1.

CASE DEFINITION

Clinical Case Definition

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.

Laboratory Criteria for Diagnosis

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) *or*
- By seroconversion: Fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigen and validated reagents *or*
- 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 *or*
- By detection of *Legionella* species by a validated nucleic acid assay.

Confirmed:

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

Case Classification

Suspect: A clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.

- Travel-associated: 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.

Confirmed: A clinically compatible case that meets at least one of the confirmatory laboratory criteria.

- Travel-associated: 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.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

Comment

The previously used category of "probable case," which was based on a single IFA titer, lacks specificity for surveillance and is no longer used.

SIGNS AND SYMPTOMS

There are two distinct clinical manifestations associated with *Legionella* infections.

Legionnaires' Disease

Initially characterized by anorexia, malaise, myalgia and headache. Within a day, there is usually a rapidly rising fever associated with chills. Temperatures commonly reach 39-40° C (102-105° F). A nonproductive cough is common. Abdominal pain and diarrhea occur in many patients. Chest x-ray may show patchy areas of consolidation, which can progress to bilateral involvement and ultimately to respiratory failure. Immunocompromised hosts are generally at higher risk for acquiring Legionnaires' disease.

Pontiac Fever

Characterized by anorexia, malaise, myalgia and headache. Mild respiratory symptoms are usually present. Symptoms usually resolve in a few days with no further sequelae.

DIAGNOSIS

Legionnaires' disease is most commonly diagnosed with the urine antigen test. It can also be diagnosed by culture of a respiratory specimen (e.g. BAL), direct immunofluorescent test of a respiratory specimen, or a 4-fold rise in antibody titer. Antibody titers in single serum specimens reflect exposure that may or may not relate to current disease. Cases with single antibody titers as the only positive lab finding do not meet the current CDC case definition for Legionnaires' disease.

EPIDEMIOLOGY

Source

The reservoir for *Legionellae* is water. The bacteria are ubiquitous in fresh water sources. They grow well in warm water, such as hot tubs, cooling towers, hot water tanks, plumbing systems and air conditioning systems in large buildings. They do not seem to be associated with car or window air conditioners.

Occurrence

Sporadic cases and outbreaks are more common in the summer and autumn. Immunocompromised hosts have a higher risk for acquisition of Legionnaires' disease than the general population. Those at highest risk for Legionellosis include: persons >50 years of age, smokers, those with chronic lung disease, and those who are immunocompromised either as a result of underlying disease (e.g. diabetes, cancer) or immunosuppressive therapy (e.g. chemotherapy, corticosteroid therapy).

Mode of Transmission

The airborne route appears to be the mode of transmission, most commonly by inhalation of aerosolized contaminated water.

Period of Communicability

Person-to-person transmission has not been documented.

Incubation Period

Legionnaires' disease: range 2-10 days, most often 5-6 days.

Pontiac Fever: range 5-72 hours, most often 24-48 hours.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

Reported cases should be investigated. For the 10 days prior to onset, try to determine the activities of the case. Of special interest are cases with exposure during the 10 days prior to onset to healthcare settings (e.g. hospitals, clinics, nursing homes), cases who have traveled away from home, cases who work in industrial or manufacturing settings, and situations in which there is more than one case exposed to the same residence, health care site, work site or other location.

Many cases are sporadic and isolated. However, if you find any of the following situations, please contact the ODH Outbreak Response and Bioterrorism Investigation Team (ORBIT) at 614-995-5599 as soon as possible:

- A case is identified who has been a **hospital inpatient or resident of a long-term care facility** during the 10 days prior to onset of Legionnaires' Disease;
- A case is identified who has been **exposed to spraying or misting water at their job** during the 10 days prior to onset of Legionnaires' disease. This may be in a manufacturing or industrial setting.
- A case is identified who has been away from home (that is, **traveling**) either in-state, out-of-state, or outside the U.S. in the 10 days prior to onset.
- **Two or more cases** who have been exposed to the same hospital, nursing home, clinic, job site, or had any other **shared exposure** (e.g. gym, hotel) or who work at the same location, as this may represent an outbreak.

Treatment

For Legionnaires' disease, recommended treatment is a respiratory fluoroquinolone (e.g. levofloxacin) or a newer macrolide (e.g. azithromycin). Penicillin, cephalosporins, and aminoglycosides are ineffective. Pontiac Fever does not require antimicrobial treatment.

Isolation

There is no indication that person-to-person transmission occurs; therefore, there is no need to isolate cases.

Prevention and Control

Domestic or institutional water systems: Water should be stored at >60° C (140° F) and distributed at >50° C (122° F). If an outbreak investigation should implicate the water system (either by positive culture or epidemiologic implication), the system may be superheated (>160° F) and all outlets flushed using hot water for at least 10 minutes. Tap water should not be used in respiratory therapy devices or the rinsing or preparation of patient care equipment which require high-level disinfection.

Cooling towers: Regular inspection should focus on the presence of slime, sludge, scale and other deposits. The cooling tower should be drained, washed out, hyperchlorinated and then thoroughly flushed out. Manufacturer recommendations for routine operation, cleaning and maintenance should be strictly followed.

Water-operated humidifiers in industrial air handling facilities have not yet been associated with Legionellosis; however, they should be kept scrupulously clean.

Room humidifiers have been associated with legionellosis. Their use should be limited as much as possible. If a room humidifier must be used, only equipment which does not produce aerosols and which allows easy and thorough cleaning should be used. These should not be used in health care institutions. Steam humidifiers should be used in high-risk areas of health care institutions.

See the CDC website for additional information: <http://www.cdc.gov/legionella/index.html>

The American Society of Heating, Refrigerating, and Air Conditioning Engineers has developed Guideline 12-2000 "Minimizing the Risk of Legionellosis Associated with Building Water Systems". This document is available at www.ashrae.org, as well as at www.baltimoreaircoil.com.

What is legionellosis?

Legionellosis is an infection caused by the bacterium *Legionella pneumophila*. The disease has two distinct forms: Legionnaires' disease, the more severe form of infection which includes pneumonia and Pontiac Fever, a milder illness. Legionnaires' disease acquired its name in 1976 when an outbreak of pneumonia occurred among persons attending a convention of the American Legion in Philadelphia. Later, the bacterium causing the illness was named *Legionella*.

How common is legionellosis in the United States?

An estimated 8,000 to 18,000 persons get Legionnaires' disease in the United States each year. An additional unknown number are infected with the *Legionella* bacterium and have mild symptoms or no illness at all. Outbreaks of Legionnaires' disease have received the most media attention; however, most often the disease occurs as single, isolated cases not associated with any recognized outbreak. Outbreaks are usually recognized in the summer and early fall, but cases may occur year-round. Approximately 5%-15% of known cases of Legionnaires' disease have been fatal.

In Ohio, between 2009-2015, the median number of reported cases was 390 (range 230-572).

What are the symptoms of legionellosis?

Patients with Legionnaires' disease usually have fever, chills and cough, which may be dry or may produce sputum. Some patients also have muscle aches, headache, tiredness, loss of appetite and occasionally, diarrhea. Laboratory tests may show decreased function of the kidneys. Chest x-rays often show pneumonia. It is difficult to distinguish Legionnaires' disease from other types of pneumonia by symptoms alone; other tests are required for diagnosis. Persons with Pontiac Fever experience fever and muscle aches and do not have pneumonia. They generally recover in 2-5 days without treatment. The time between exposure and onset of illness for Legionnaires' disease is 2-10 days; for Pontiac Fever, it is shorter, generally a few hours to 2 days.

How is legionellosis diagnosed?

The diagnosis of legionellosis requires special tests not routinely performed on persons with fever or pneumonia. Therefore, a physician must consider the possibility of legionellosis in order to obtain appropriate tests. Several types of tests are available. The most useful are detecting the bacteria in sputum, finding *Legionella* antigens in a urine sample and comparing antibody levels to *Legionella* in two blood samples obtained 3-6 weeks apart.

Who gets legionellosis?

People of any age can develop Legionnaires' disease, but the illness most often affects middle-aged and older persons, particularly those who smoke cigarettes or have chronic lung disease. Also at increased risk are persons whose immune system is suppressed by diseases such as cancer, kidney failure requiring dialysis, diabetes, or AIDS. Persons who take drugs that suppress the immune system are also at higher risk. Pontiac fever most commonly occurs in persons who are otherwise healthy.

What is the treatment for legionellosis?

Levofloxacin and azithromycin are among the drugs usually recommended for the treatment of Legionnaires' disease. Pontiac fever requires no specific treatment.

How is legionellosis spread?

Outbreaks of legionellosis have occurred after persons have inhaled aerosols that come from a water source (e.g. air conditioning cooling towers, whirlpool spas, showers) contaminated with *Legionella* bacteria. Persons may be exposed to these aerosols in homes, workplaces, hospitals or public places. Infection cannot be acquired from another person with legionellosis, and there is no evidence of persons becoming infected from auto air conditioners or household window air-conditioning units.

Where is the *Legionella* bacterium found?

Legionella organisms can be found in many types of water systems; however, the bacteria reproduce to high numbers in warm, stagnant water (95-115°F), such as that found in certain plumbing systems and hot water tanks, cooling towers and evaporative condensers of large air-conditioning systems and whirlpool spas. Cases of legionellosis have been identified throughout the United States and in several other countries. The disease likely occurs worldwide.

What is being done to prevent legionellosis?

Improved design and maintenance of cooling towers and plumbing systems to limit the growth and aerosolization of *Legionella* organisms are the foundations of legionellosis prevention. During outbreaks, CDC and health department investigators seek to identify the source of disease transmission and recommend appropriate prevention and control measures, such as decontamination of the water source. Current research will likely identify additional prevention strategies.

See the CDC website for additional information: <http://www.cdc.gov/legionella/index.html>