



INFECTION PREVENTION IN LONG TERM CARE

Legionellosis

Massachusetts Department of Public Health

DISEASE OVERVIEW

Legionellosis is a respiratory infection caused by *Legionella* bacteria. There are at least 60 different species of *Legionella*; most are considered pathogenic, but most disease is caused by *Legionella pneumophila*, particularly serogroup 1.

Legionellosis has two distinct forms: Legionnaires' disease, a common form of severe pneumonia, and Pontiac fever, a milder, self-limited illness that presents without pneumonia.

Legionnaires' disease was named after an outbreak that occurred among people attending a convention of the American Legion in Philadelphia in 1976. Legionellosis has a worldwide distribution. An estimated 5,000 people develop Legionnaires' disease in the U.S. each year. Most of these are single, isolated cases that are not associated with an outbreak. Outbreaks usually occur in the summer and fall, though cases can occur year-round. Serologic surveys have shown a prevalence of antibodies to *L. pneumophila* serogroup 1 at a titer of $\geq 1:128$ in 1–20% of the population, consistent with past infection. Illness affects older persons most severely, especially those who smoke cigarettes or have chronic lung disease. Other risk factors include immunosuppressive therapy and immunosuppressive diseases such as HIV/AIDS and diabetes. *Legionella* is estimated to be responsible for 0.5–5% of cases of community-acquired pneumonia.

Risk Factors: Risk factors for developing Legionnaires disease include:

- Renal or hepatic failure;
- Diabetes;
- Chronic lung disease;
- Systemic malignancy;
- Smoking (current or historical);
- Immune system disorders; and
- Age ≥ 65 years.

Symptoms: The symptoms of Legionnaires' disease are those of pneumonia and pneumonia due to legionellosis cannot be distinguished by x-ray from that due to many other causes. Initial symptoms may include fever, anorexia, myalgia, malaise, and headache. These symptoms are followed by fever (up to 102 – 105⁰ F), chills, and a non-productive cough. Other symptoms may include abdominal pain and diarrhea. The overall case-fatality rate of Legionnaires' disease is 5–30%. Pontiac fever is not usually associated with pneumonia or death, and cases usually recover in 2–5 days without treatment.

Note: Infection with *Legionella* is not valid grounds for denial of admission to a long term care facility (LTCF).

Vectors and Reservoirs: Water is the major natural reservoir for *legionellae* species, which are commonly found in the natural environment. These organisms have been identified in water systems, such as hot and cold tap water, in showers, whirlpool spas, cooling towers, and evaporative condensers of large air-conditioning systems. Outbreaks of legionellosis have been linked to these sources, as well as to decorative fountains, humidifiers, respiratory therapy devices and misters (such as those found in the produce section of grocery stores). The bacteria are most likely to reproduce in high numbers in warm, stagnant water. In this environment, they live as intracellular parasites of free-living amoebae.

Diagnosis and Testing: Legionnaires' disease usually cannot be distinguished from other forms of pneumonia by x-ray and requires specific tests to confirm the diagnosis. The preferred diagnostic tests for Legionnaires' disease are culture of lower respiratory secretions and the *Legionella* urinary antigen assay. Serological assays can be nonspecific and are not recommended in most situations. The urinary antigen assay detects *Legionella pneumophila* serogroup 1, the most common cause of Legionnaires' disease; isolation of *Legionella* by culture is important for detection of other serogroups and species for public health investigation.

Transmission: Legionellosis is transmitted via aerosolized water containing the bacteria. Less commonly, *Legionella* can be transmitted via aspiration of drinking water. ***Legionellosis is not transmitted from person to person.*** There is no evidence to suggest transmission of *Legionella* from auto air-conditioners or household window air-conditioning units, which do not use water as their coolant.

Incubation Period: The incubation period for Legionnaires' disease ranges from 2 - 10 days, but is most commonly 5–6 days. The incubation period for Pontiac fever ranges from 24-72 hours.

Treatment: Antibiotics are used to treat Legionnaires' disease and their use should be addressed by the patient's physician. Patients with Pontiac fever usually recover without antibiotic treatment.

DIAGNOSTIC CRITERIA AND REPORTING RESPONSIBILITIES

Cases of legionellosis (using the diagnostic criteria listed below) and potential outbreaks in LTCFs are reportable to the local board of health (LBOH) and/or to the MDPH Bureau of Infectious Disease and Laboratory Sciences (BIDLS) Division of Epidemiology and Immunization at (617) 983-6800. Potential outbreaks or suspect or confirmed healthcare associated cases should also be reported to the Bureau of Healthcare Safety and Quality at (617) 753-8150 during normal business hours and (617) 363-0755 after normal business hours. The Division of Epidemiology and Immunization can provide advice and assistance with control measures.

Reporting Criteria and Laboratory Testing

The following diagnostic test results will define either a suspect or confirmed case of legionellosis and should be reported:

- Isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, blood, or other normally sterile fluid.
- Detection of *L. pneumophila* serogroup 1 antigen in urine.
- 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.
- Four-fold or greater rise in antibody titer to specific species or serogroups of *Legionella*, including *L. pneumophila* serogroup 1.
- Detection of *Legionella* species by a validated nucleic acid assay.

The Massachusetts State Public Health Laboratory (MA SPHL) can perform cultures for *Legionella* species on clinical specimens other than serum or urine. For more information, call the MA SPHL Microbiology Laboratory at (617) 983-6607.

INFECTION CONTROL AND PREVENTION

Implementation of, and adherence to, environmental infection control practices are key to preventing the transmission of infectious diseases in all healthcare facilities. LTCFs should have a written infection prevention and control plan for legionellosis that includes infection prevention precautions; diagnostic testing and laboratory criteria for diagnosis, case definitions, surveillance for additional cases, environmental investigation, and staff education and communication.

Standard Precautions should be used consistently and at all times, by all staff, in LTCFs. General infection control measures, including Standard Precautions for healthcare providers can be found at: <http://www.mass.gov/eohhs/docs/dph/cdc/infection-control/general-measures.pdf>.

Legionnaires' disease is not transmitted person to person, therefore residents with Legionnaires' disease can be cared for using Standard Precautions, with an emphasis on strict adherence to hand hygiene and appropriate glove use.

Hand Hygiene: Handwashing is the single most effective measure to prevent the spread of all infections. Strict adherence to hand hygiene protocols must be maintained. Hand hygiene should be performed:

- After touching blood, body fluids, secretions, excretions, and contaminated items.
- Immediately after gloves are removed, between resident contacts, and when otherwise indicated to avoid transfer of microorganisms to other residents or environments.

- When hands are visibly soiled with blood or other body fluids.

Both staff and visitors should wash their hands with soap and water after resident care, and prior to leaving the room of a resident. Hands should be dried with a dry, disposable paper towel, and faucets should be turned off using a paper towel. **The use of a waterless, alcohol-based hand antiseptic is as effective as soap and water for residents with legionellosis, is not harmful to hands, and may improve compliance.** However, these products are not a substitute for handwashing in the event of visible contamination.

Gloves: Don gloves upon entry into the room or cubicle. Gloves (clean non-sterile gloves are adequate) should be worn when providing care that involves substantial personal contact (e.g. changing clothes, toileting, bathing) or contact with items that may be contaminated with bodily fluids. If, during the course of resident care, gloves become soiled with potentially infectious material (e.g. urine, stool), they should be changed before further contact with clean surfaces, the resident, or other staff. Remove the gloves after caring for the resident and wash hands with soap and water or use an alcohol based hand sanitizer before leaving the room. Gloves alone do not guarantee prevention of transmission. Never wash gloves for the purpose of reuse.

Surveillance and Environmental Prevention Measures

Response to a Single Case of Legionellosis in a Resident:

If a resident is diagnosed with legionellosis and has not been confined to the facility for 10 days prior to the onset of illness, investigation efforts should include the documentation of the movement and activities of the resident while they were not at the facility and enhanced surveillance efforts to identify additional cases. If no additional suspect or confirmed cases are identified in the facility after a retrospective review, no additional actions need to be taken other than to continue a heightened awareness for future cases. If additional cases are identified, refer to the Response to Healthcare-Associated Legionellosis.

Response to Healthcare-Associated Legionellosis:

A laboratory-confirmed case of legionellosis that occurs in a resident who has resided in a LTCF continuously for ≥ 10 days before the onset of illness is considered a case of healthcare-associated legionellosis. When a case of healthcare-associated legionellosis occurs in a LTCF, in addition to enhanced surveillance for additional cases, immediate remediation is recommended.

The Division of Epidemiology and Immunization does not have the capacity or expertise to assist with environmental investigations; it is recommended that the facility hire or work with an environmental consultant. MDPH can provide names of environmental professionals that other facilities have used when environmental testing was recommended. Members of the Environmental Legionellosis Isolation Evaluation (ELITE) Program that have met proficiency standards for isolation of legionella species can

be found on the CDC website for environmental testing services:

<http://www.cdc.gov/legionella/elite.html>

CDC also has resources on their website to assist facilities in these investigations.

<http://www.cdc.gov/legionella/specimen-collect-mgmt/index.html>

<http://www.cdc.gov/legionella/downloads/toolkit.pdf>

Staff Education: Educate physicians and patient care staff to heighten their suspicion for cases of Legionnaires' disease and to use appropriate methods for its diagnosis. Educate all staff about measures to prevent and control HAI legionellosis.

Communication: Establish procedures for identifying at-risk residents and staff who currently reside or who are no longer at the facility. Ensure a proactive employee health service approach to legionellosis including providing information to all staff. Maintain an open and cooperative attitude between management and staff.

Communication with other Facilities

It is essential that LTCFs, hospitals and other healthcare organizations (e.g. home health care and VNAs) work together to control the spread of all infections. Effective communication will ensure that the *Legionellosis* status of residents is known so that appropriate precautions are implemented in all healthcare settings. Identification of infection should be noted in the resident's medical record, and notification should be given prior to transfer/travel to another facility. Examples of transfer forms can be found here: https://www.cdc.gov/HAI/prevent/prevention_tools.html.

Information about reportable diseases to the Massachusetts Department of Public Health can be found here: <http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/rdiq/reporting-diseases-and-surveillance-information.html>.

REFERENCES and RESOURCES

Center for Disease Control and Prevention. Legionella.

<http://www.cdc.gov/legionella/index.html>

Centers for Disease Control and Prevention. *Guidelines for environmental infection control in health-care facilities*. MMWR 2002;51 (RR16);1-45. Also available on line at:

http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf

Centers for Disease Control and Prevention. Investigation Tools for Clusters and Outbreaks of Disease.

<http://www.cdc.gov/legionella/health-depts/inv-tools-cluster/index.html>

Centers for Disease Control and Prevention and American Water Works Association.

Emergency water supply planning guide for hospitals and health care facilities. Atlanta: U.S. Department of Health and Human Services; 2012.
<http://www.cdc.gov/healthywater/pdf/emergency/emergency-water-supply-planning-guide.pdf>

Centers for Disease Control and Prevention. *Legionellosis --- United States, 2000--2009*. MMWR 2011; 60:1083-1086

Infectious Diseases Society of America/American Thoracic Society Consensus Guidelines on the Management of Community-Acquired Pneumonia in Adults. *Clin Infect Dis*. 2007; 44 (Supplement 2): S27-S72.

Quinn C, Demirjian A, Lucas C, et al. Legionnaires' disease outbreak at a long-term care facility caused by a cooling tower using an automated disinfection system—Ohio, 2013. *J Environ Health*. 2015; 78:8–13. <http://www.cdc.gov/nceh/ehs/docs/jeh/2015/legion-ohio-2015>.

[Seenivasan MH](#), [Yu VL](#), Muder RR. Legionnaires' disease in long-term care facilities: overview and proposed solutions. *J Am Geriatr Soc*. 2005; 53:875-80.

Smith PW, Bennett G, Bradley S, Drinka P, Lautenbach E, Marx J, Mody L, Nicolle L, Stevenson K, SHEA, et al. SHEA/APIC Guideline: Infection Prevention and Control in the Long-Term Care Facility: Infection Control and Hospital Epidemiology. 2008; 29:785-814.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3319407/>

Y.E. Lin, V.L. Yu. Legionnaires' Disease in Nursing Homes and Long Term Care Facilities: An Emerging Catastrophe. *Jour Nursing Home Res* 2015;1:28-32.
Published online July 7, 2015, <http://dx.doi.org/10.14283/jnhrs.2015.6>