California Department of Public Health

Healthcare-Associated Legionnaires' Disease Investigation Quicksheet

Legionnaires' Disease (LD)

- Legionnaires' disease (LD) is pneumonia caused by *Legionella* species bacteria. LD is often severe, requiring hospitalization. Patient risk factors include renal or hepatic failure, diabetes, smoking, systemic malignancy, immune system disorders, and age greater than 50 years.
- Transmission occurs through inhalation or aspiration of water contaminated with *Legionella*. The incubation period is 2-10 days. Standard precautions should be used when caring for hospitalized patients with LD.
- *Legionella* are found naturally in fresh water, are chlorine tolerant, and proliferate in warm, stagnant water systems.
- Hospitals and other healthcare facilities often have large, complex water systems, making them potentially high risk settings for transmission of *Legionella* to vulnerable patients or residents. Centers for Disease Control and Prevention (CDC) recommend all healthcare facilities have a water management program to control *Legionella*.

Laboratory Testing Considerations

- Optimal testing for *Legionella* requires both a urine antigen test AND culture of lower respiratory tract specimens using selective media.
- The urine antigen test is a sensitive assay for *Legionella pneumophila* serogroup 1, the most common cause of LD. However, it does not reliably detect other serogroups, such as *Legionella pneumophila* serogroups 2-14 or other *Legionella* species.
- Antigen from a previous *Legionella* infection can be excreted in urine for months after convalescence and antibiotic treatment. This may lead to positive urine antigen tests despite no clinical signs and symptoms of pneumonia.

Legionnaires' Disease Case Classification

Local health departments (LHD) should review patients' clinical, radiographic and microbiologic information and classify reported cases of LD using the Council of State and Territorial Epidemiologists' case (CSTE) classifications:[1]

- **Suspected**: a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria (nucleic acid assay, specified stains, etc.).
- **Confirmed**: a clinically compatible case that meets at least one of the confirmatory laboratory criteria: positive test for *Legionella pneumophila* serogroup 1 antigen in urine, *Legionella* culture of respiratory secretions or other sterile site, or seroconversion in specific antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents.

Review chest radiology findings and/or a provider diagnosis to assign the appropriate LD classification.

Healthcare-Associated LD Definitions

A patient meets the CDC surveillance definition for healthcare-associated LD if he/she had an overnight stay in a hospital or long-term healthcare facility (i.e., skilled nursing or other healthcare facility, not including assisted living or other residential care facility) during the incubation period. Definitions are further classified as:

- **Definite**: a patient that was hospitalized or a resident in one or more healthcare facilities during the entire 2 to 10 day incubation period prior to the onset of symptoms.
- **Possible**: a patient that was hospitalized or a resident in one or more healthcare facilities for a portion of the 2 to 10 day incubation period prior to onset of symptoms.

[1] CSTE Classifications (https://www.cdc.gov/legionella/health-depts/inv-tools-single/cste-position-statement.html)

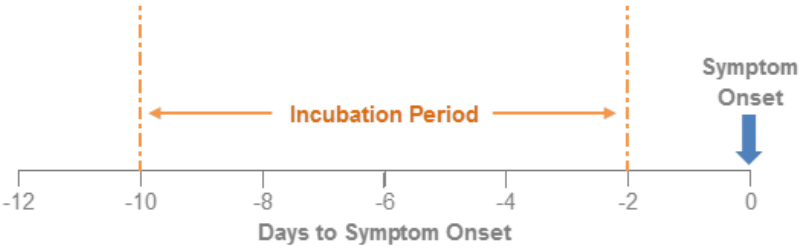

Figure: Legionnaires' disease incubation period

Investigating Potential Healthcare-Associated LD Cases

When investigating a case of LD that might be healthcare-associated, LHD should:

Collect and Review Case Information:

1. Verify that the reported case meets the CSTE surveillance LD case definition. A positive urine antigen test or a diagnosis must be accompanied by evidence of pneumonia to meet LD criteria.
2. Establish the pneumonia symptom onset date. A best estimate of this date based on patient history is acceptable. A close review of medical records (including previous chest x-rays) might be necessary depending on a patient's underlying illnesses and ability to communicate.
3. Document all recent healthcare exposures during the two weeks prior to the onset of symptoms, including hospitalizations, visits to healthcare facilities, and residence at a skilled nursing or other long-term care facility. Record addresses of facilities where the patient had overnight stays.
4. Identify the healthcare facilities at which the patient was an inpatient or resident during the 2-10 day incubation period. Note that the symptom onset date is considered "day 0."
5. Determine whether the patient meets the surveillance criteria for "definite" or "possible" healthcare-associated LD. **LHD should notify the CDPH HAI Program as soon as possible of a LD case identified as "definite" healthcare-associated. Licensed healthcare facilities must report the occurrence of a "definite" case of healthcare-associated LD to their local CDPH Licensing & Certification district office.**[2]

Recommend Healthcare Facility Surveillance:

When a facility has one confirmed case of "definite" or two or more cases of "possible" healthcare-associated LD (within 6 months), LHD should recommend the facility perform case surveillance by:

1. Reviewing microbiologic, serologic, and postmortem records to identify any previous healthcare-associated LD cases in the past 6 months. Case finding might also include identifying patients with recent unexplained cases of healthcare-associated pneumonia, and testing those patients for *Legionella* where possible.
2. Identifying all patients with healthcare-associated pneumonia prospectively, including hospital inpatients or residents in a healthcare facility for two or more calendar days prior to onset of symptoms. Patients should be tested for *Legionella* by ordering both a culture of lower respiratory secretions and urine antigen test. Prospective surveillance should continue for at least two months after the first case was identified.
3. If transferring a patient with acute respiratory symptoms to another healthcare facility for further evaluation, the transferring facility should alert the medical staff at the receiving facility to suspect and test for LD if the patient is diagnosed with pneumonia.

LHD should verify whether a facility has a water management program to control Legionella. Visit CDC's website for guidance on developing a water

[2] CDPH Licensing & Certification (https://www.cdph.ca.gov/Programs/CHCQ/LCP/Pages/DistrictOffices.aspx)

management control plan.[3] If the healthcare facility has a *Legionella* water management program, LHD should request a copy to review.

Retrospective and prospective surveillance should also be considered for a facility with one case of "possible" healthcare-associated LD.

Full Investigations

The decision to pursue a full investigation should be made on a case-by-case basis, taking into consideration any exposures that might have occurred outside of the facility. A patient might have a complex medical history with recent respiratory illness and may have been exposed elsewhere. Urinary antigen can be positive for *Legionella* for prolonged periods, thereby making it difficult to confidently conclude that a positive result is associated with exposure at a particular facility. Full investigations are recommended as a best practice to reduce the risk of ongoing *Legionella* transmission to other patients/residents. The HAI Program is available for consultation.

Perform a Full Investigation at a Facility for the Source of Legionella when:

≥1 case of "definite" healthcare-associated LD is identified or ≥2 cases of "possible" healthcare-associated LD are identified (within 6 months of each other) AND a LHD assessment finds that there is a high probability that exposure to *Legionella* occurred at the identified facility/facilities.

We recommend LHD also consider a full investigation for a single case of "possible" healthcare-associated LD depending on the level of patient risk, such as patients on oncology wards. A full investigation should always be performed following a single case of "possible" healthcare-associated LD on a bone marrow or solid-organ transplant unit.

A full investigation includes:

- Evaluation of potential environmental exposures
- An environmental assessment[4]
- Environmental sampling, with cultures performed by a CDC ELITE laboratory[5]
- Comparison of clinical and environmental isolates if available
- Decontamination of environmental source(s) if identified
- Revision of existing water management programs or developing new ones

The full investigation may be performed by LHD (all or in part) and/or by an experienced environmental consultant contracted by the facility.

Implement Control Measures:

Control measures may be necessary based on the findings of the facility assessment and consideration of risk factors. If environmental samples are obtained, control measures should be implemented and continued until water culture results are available. Positive culture results will require remediation, and control measures should remain in place until remediation is completed.

1. Avoid tap water for drinking by patients/residents; substitute with bottled water or water collected from a faucet with a point-of-use filter (0.2 micron). Handwashing with tap water may continue as usual.
2. Avoid ice from ice machine(s) until ice machine culture results are available. Ice machines may be preemptively cleaned and disinfected

[3] CDC Water Management Program (https://www.cdc.gov/legionella/water-system-maintenance.html)

[4] CDC Environmental Assessment Form (https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf)

[5] CDC ELITE Laboratories (https://wwwn.cdc.gov/elite/public/memberlist.aspx)

according to manufacturer recommendations if ice service is needed after samples are collected.
3. Avoid using showers in the area of concern; patients/residents may receive sponge baths with tap water. Point-of-use filters may be installed on the shower(s) to allow for temporary use pending water sampling results.
4. Use sterile water for filling reservoirs of respiratory devices and rinsing respiratory equipment. Alternatively, nebulizer devices can be rinsed with filtered (0.2 micron) water or with tap water followed by an isopropyl alcohol rinse and thorough drying.
5. Shut down water sources, such as whirlpool spa, decorative fountain, etc., that have the potential to transmit *Legionella* to case patients based on an environmental risk assessment.
6. Use of tap water for dish washing may continue as usual.

Additional Considerations for Investigations in Long-Term Care Facilities and Skilled Nursing Facilities

1. Review cases with the Director of Nursing to evaluate if other water exposures may have occurred outside the facility during the incubation period (e.g., received respiratory therapy at an outside facility).
2. Recommend that all new cases of lower respiratory tract infection (LRTI) at the facility be assessed by a medical provider for the possibility of LD or other infectious disease.
3. Review medical records and logs to identify patients with respiratory symptoms during the two months prior to identification of the index case. Test residents for *Legionella* who developed LRTI while continuously residing in the facility (10 days prior to their symptom onset date) and do not have alternative diagnoses.
4. Remind facility staff that all laboratory-confirmed cases of LD should be reported to local public health, whether community-onset or healthcare-associated.
5. Recommend staff alert the hospital to suspect and test for *Legionella* by urine antigen and lower respiratory tract culture when a resident transferred for evaluation of acute respiratory symptoms is diagnosed with pneumonia.
6. Recommend infection prevention staff conduct weekly reviews to assess the number of new LRTI events. Any unusual increase in LRTI events should be reported to local public health and the CDPH Licensing and Certification district office.

Additional Resources

- CDPH information about legionellosis: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Legionellosis(Legionnaires'_Disease_PontiacFever).aspx#
- CDC *Legionella* website: http://www.cdc.gov/legionella/index.html
- CDC information on Legionnaires' disease for health departments: http://www.cdc.gov/legionella/health-depts/index.html
- CDC tools for investigation of *Legionella* outbreaks and clusters: http://www.cdc.gov/legionella/health-depts/inv-tools-cluster/index.html
- CDC toolkit on developing a water management program to control the growth of *Legionella*: http://www.cdc.gov/legionella/maintenance/wmp-toolkit.html