



# California Department of Public Health

## Healthcare-Associated Legionnaires' Disease

### Investigation Quicksheet



#### Legionnaires' Disease (LD)

- Legionnaires' disease (LD), a pneumonia caused by *Legionella* species bacteria, is often severe, requiring hospitalization. LD risk factors include age  $\geq 50$  years, smoking, chronic lung disease, immune system disorders, systemic malignancy, and other chronic diseases such as diabetes, renal failure or hepatic failure.
- Transmission occurs through inhalation or aspiration of water contaminated with *Legionella*. Incubation period is 2-14 days prior to symptom onset. 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, particularly within microbial biofilms on plumbing surfaces.
- 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.
- The Centers for Disease Control and Prevention (CDC) recommend and the Centers for Medicare & Medicaid Services (CMS) require all hospitals and skilled nursing facilities to develop and implement a Water Management Program to reduce the growth and spread of *Legionella* and other opportunistic pathogens in premise plumbing.

#### Laboratory Testing Considerations

- Optimal testing for LD includes culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and *Legionella* urinary antigen test (UAT), concurrently if possible.

- Alternatively, testing for *Legionella* may be performed with a validated nucleic acid amplification test on lower respiratory secretions and UAT. If UAT or nucleic acid test is positive, lower respiratory secretions should be cultured for *Legionella* using selective media.
- The UAT is a sensitive assay for *Legionella pneumophila* serogroup 1 (Lp1), the most common cause of LD. However, it does not reliably detect Lp serogroups 2-14 or other *Legionella* species.
- Antigen from a previous *Legionella* infection can be excreted in urine for months. This may lead to a positive UAT without current signs and symptoms of pneumonia, or with pneumonia from another etiology.

#### Legionnaires' Disease Case Classification

Local health departments (LHD) should review patients' clinical, radiographic and microbiologic information, infectious disease consultation (if available) and clinician diagnosis. Classify reported cases of LD using the 2019 Council of State and Territorial Epidemiologists' case (CSTE) classifications:<sup>1</sup>

- **Confirmed:** pneumonia, diagnosed clinically and/or radiographically in addition to at least one of the confirmatory laboratory criteria: positive test for Lp 1 antigen in urine, *Legionella* culture of respiratory secretions or other sterile site, detection of *Legionella* in a lower respiratory specimen or sterile site by validated nucleic acid amplification test, or seroconversion to Lp 1 using validated reagents.

#### [1CSTE Classifications](https://www.cste.org/resource/resmgr/2019ps/final/19-ID-04_Legionellosis_final.pdf)

[https://www.cste.org/resource/resmgr/2019ps/final/19-ID-04\\_Legionellosis\\_final.pdf](https://www.cste.org/resource/resmgr/2019ps/final/19-ID-04_Legionellosis_final.pdf)

- **Suspect:** pneumonia, diagnosed clinically and/or radiographically in addition to at least one of the supportive laboratory criteria (specified stains, serologies for non-Lp1 or other *Legionella spp.*).
- **Probable:** pneumonia, diagnosed clinically and/or radiographically with an epidemiologic link to a setting with a confirmed source of *Legionella*, or to a setting with a suspected source of *Legionella* that is associated with at least one confirmed case.

Clinical symptoms of pneumonia include acute lower respiratory tract illness with fever and/or cough. Refer to the CSTE class classification for additional guidance.

### Healthcare-Associated Legionnaires' Disease (HA-LD) Definitions

Approximately 85% of Legionnaires' disease cases have illness onset within 10 days of exposure; for healthcare-associated case surveillance purposes, the goal is to capture the most likely exposure source.

CSTE and CDC developed surveillance case definitions for presumptive and possible HA-LD to guide LHD investigations. CDPH further classifies possible cases as possible (overnight) or possible (other).

- **Presumptive HA-LD:** A case with  $\geq 10$  days of continuous stay at one or more healthcare facilities (i.e., hospital or SNF) during the 14 days before onset of symptoms.
- **Possible HA-LD (overnight):** A case that spent a portion of the 14 days before date of symptom onset overnight in one or more healthcare facilities, but does not meet the criteria for presumptive HA-LD.
- **Possible HA-LD (other):** A case that spent a portion of the 14 days before date of symptom onset in one or more healthcare facilities but does not meet the criteria for presumptive or possible HA-LD (overnight).

Healthcare facilities include hospitals, SNF, and medical or dental clinics. Assisted living and residential care are not considered healthcare facilities. Cases working at a healthcare facility, and/or visiting a health care facility would be classified as Possible HA-LD (other).

### Investigating HA- 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 laboratory test must be accompanied by clinical 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 14 days 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 name(s) and addresses of facilities. If a patient's outpatient healthcare exposure history is unclear or the patient cannot recall the name of a facility, mark unknown on the case report form for outpatient exposure.
4. Identify the healthcare facilities at which the patient had an overnight stay during the 14 days prior to symptom onset. Note that the symptom onset date is considered "day 0."
5. Determine whether the patient meets the surveillance criteria for "presumptive" or "possible (overnight)" HA-LD.
6. LHD should notify the CDPH Healthcare-Associated Infections (HAI) Program as soon as possible of a LD case identified as "presumptive" healthcare-associated. Licensed healthcare

facilities must report a “presumptive” case of healthcare-associated LD as an “unusual occurrence” to their local CDPH Licensing & Certification district office.<sup>2</sup>

**Recommend Healthcare Facility Surveillance:**

When a facility has one confirmed case of “presumptive”, two or more cases of “possible (overnight)” HA-LD (within 12 months), the facility should perform active retrospective and prospective case surveillance for 12 months by:

1. Reviewing microbiologic, serologic, and postmortem records to identify any previous HA-LD cases in the past 12 months.
2. Identifying patients with recent unexplained cases of healthcare-associated pneumonia, and testing those patients for *Legionella* where possible.
3. 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 a culture of lower respiratory secretions in addition UAT and nucleic acid test. Prospective surveillance should continue for 12 months after the most recent case is identified.
4. 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.

Review a copy of the facility Legionella Water Management Program and results of water quality parameters. The CDC and CSTE has guidance on developing a water management plan.

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

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When a facility has two or more cases of “possible (other)” HA-LD identified within 12 months, consult with the HAI Program to determine whether the facility should implement active case surveillance.

**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 the patient occupied during the incubation period. Because the UAT can be positive for *Legionella* for prolonged periods, it may be difficult to confidently conclude that a positive result is associated with exposure at a specific facility.
- When available epidemiologic evidence is not strong enough to warrant a full investigation, consider conducting or recommending that healthcare facility staff perform an environmental assessment<sup>3</sup> to determine if conditions for *Legionella* growth exist in the building water system(s) where the case(s) may have been exposed. The HAI Program is available for consultation.

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

≥1 case of “presumptive” healthcare-associated LD is identified or ≥2 cases of “possible (overnight)” HA-LD are identified (within 12 months of each other) AND a LHD assessment finds that there is a high probability that exposure to *Legionella* occurred at a specific facility.

Perform a full investigation following a *single* case of “possible (overnight)” HA-LD on a bone marrow or solid-organ transplant unit.

<sup>3</sup> [CDC Legionella Environmental Assessment Form](https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf)

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Consider a full investigation for a single case of “possible(overnight)” HA-LD depending on the level of risk and duration of stay in a facility, for example, a case in a patient on an oncology ward for 8 days during the incubation period. If a presumptive case is associated with overnight stays at more than one facility a full investigation might not be warranted.

A full investigation includes:

- Retrospective and prospective surveillance
- Evaluation of potential environmental exposures
- An environmental assessment<sup>4</sup>
- Consideration for restricting water exposures
- Environmental sampling, with cultures performed by a CDC ELITE laboratory<sup>5</sup>
- Comparison of clinical and environmental isolates if available
- Remediation of environmental source(s) if identified (typically performed by an experienced environmental consultant contracted by the facility<sup>6</sup>).
- Revision of existing water management programs or developing new ones

Full investigations are recommended as a best practice to reduce the risk of ongoing *Legionella* transmission to other patients or residents. Environmental assessment and sampling may be performed by LHD (all or in part) and/or by an experienced environmental consultant contracted by the facility. The CDC provides instructions on collecting environmental samples. Ensure the facility conducts representative sampling using the recommended sample volume (1 liter for bulk water samples).

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

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

*Implement Immediate Control Measures (Water Restriction):*

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).
2. Exclude use of sink in case patient room(s) pending cultures, but handwashing with tap water may continue as usual elsewhere in the facility.
3. Avoid ice from ice machine(s) until ice machine culture results are available.
4. 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.
5. 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.
6. 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.

<sup>6</sup> Remediation is not further addressed in this Quicksheet. The HAI Program is available to consult on remediation plans as needed.

7. Use of tap water for dish washing in SNF may continue as usual.

Note that water restrictions may lead to areas of stagnation. Periodic flushing may be necessary to prevent *Legionella* growth while cultures are pending.

*Additional Considerations for Investigations in Long-Term Care/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., 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 pneumonia due to *Legionella* as well as other respiratory pathogens.
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 pneumonia while continuously residing in the facility (10 days prior to symptom onset) 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 urinary 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 assessment to identify 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 Legionellosis information](https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Legionellosis%28Legionella%29.aspx) (https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Legionellosis%28Legionella%29.aspx)
- [CDC Legionella website](http://www.cdc.gov/legionella/index.html) (http://www.cdc.gov/legionella/index.html)
- [CDC Legionnaires' disease](http://www.cdc.gov/legionella/health-depts/index.html). Information for health departments including healthcare investigations: (http://www.cdc.gov/legionella/health-depts/index.html)
- [CDC Legionella Prevention with Water Management Programs](https://www.cdc.gov/legionella/wmp/index.html) (https://www.cdc.gov/legionella/wmp/index.html)
- [CMS Requirements to Reduce Legionella Risk](https://www.cdc.gov/legionella/wmp/healthcare-facilities/federal-requirement.html) Information for healthcare facilities. (https://www.cdc.gov/legionella/wmp/healthcare-facilities/federal-requirement.html)
- [CSTE Resource: Water Management Program Template](https://www.cste.org/page/Legionnaires) (https://www.cste.org/page/Legionnaires)