



Legionellosis

Investigation Guideline

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Revision History:

Date	Replaced	Comments
01/2020	05/2018	New case definition for 2020. Investigations now cover a 14-day exposure period (increased from 10 days) and asks about more possible exposures. Updated Epidemiology, Disease Overview, Notification, Case Investigation, and Outbreak sections.
05/2018	07/2013	Updated Notification sections and Isolation, Work and Daycare Restrictions sections with updated regulations.
05/2014	05/2013	Edited notification section in association to travel/hotel related notifications.
05/2013	09/2009	Added notification section. Removed references to KS-EDSS (02/2012).

Legionellosis

Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 2020)

Clinical Description for Public Health Surveillance:

Legionellosis is associated with three clinically and epidemiologically distinct illnesses: Legionnaires' disease, Pontiac fever, or extrapulmonary legionellosis.

- **Legionnaires' disease (LD):** LD presents as pneumonia, diagnosed clinically and/or radiographically. Evidence of clinically compatible disease can be determined several ways:
 - a) a clinical or radiographic diagnosis of pneumonia in the medical record OR
 - b) if "pneumonia" is not recorded explicitly, a description of clinical symptoms that are consistent with a diagnosis of pneumonia
 - o Clinical symptoms of pneumonia may vary but must include acute onset of lower respiratory illness with fever and/or cough. Additional symptoms could include myalgia, shortness of breath, headache, malaise, chest discomfort, confusion, nausea, diarrhea, or abdominal pain.
- **Pontiac fever (PF):** PF is a milder illness. While symptoms of PF could appear similar to those described for LD, there are distinguishing clinical features. PF does not present as pneumonia. It is less severe than LD, rarely requiring hospitalization. PF is self-limited, meaning it resolves without antibiotic treatment.
 - o Clinical symptoms may vary but must include acute symptom onset of one or more of the following: fever, chills, myalgia, malaise, headaches, fatigue, nausea and/or vomiting.
- **Extrapulmonary legionellosis (XPL):** *Legionella* can cause disease at sites outside the lungs (for example, associated with endocarditis, wound infection, joint infection, graft infection). A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site and diagnostic testing indicates evidence of *Legionella* at that site.

Laboratory Criteria for Case Classification:

Confirmatory laboratory evidence:

- Isolation of any *Legionella* organism from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site
- Detection of any *Legionella* species from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site by a validated nucleic acid amplification test
- Detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents
- Fourfold or greater rise in specific serum antibody titer to *Legionella pneumophila* serogroup 1 using validated reagents

Supportive laboratory evidence:

- 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)
- Fourfold or greater rise in antibody titer to multiple species of *Legionella* using pooled antigens.
- Detection of specific *Legionella* antigen or staining of the organism in lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site associated with clinical disease by direct fluorescent antibody (DFA) staining, immunohistochemistry (IHC), or other similar method, using validated reagents

Epidemiologic Linkage for Case Classification:

- 1) Epidemiologic link to a setting with a confirmed source of *Legionella* (e.g., positive environmental sampling result associated with a cruise ship, public accommodation, cooling tower, etc.), OR
- 2) Epidemiologic link to a setting with a suspected source of *Legionella* that is associated with at least one confirmed case.

Case Classification:

Confirmed Legionnaires' disease (LD): A clinically compatible case of LD with confirmatory laboratory evidence for *Legionella*.

Probable Legionnaires' disease (LD): A clinically compatible case with an epidemiologic link during the 14 days before onset of symptoms.

Suspect Legionnaires' disease (LD): A clinically compatible case of LD with supportive laboratory evidence for *Legionella*.

Confirmed Pontiac fever (PF): A clinically compatible case of PF with confirmatory laboratory evidence for *Legionella*.

Probable Pontiac fever (PF): A clinically compatible case with an epidemiologic link during the 3 days before onset of symptoms.

Suspect Pontiac fever (PF): A clinically compatible case of PF with supportive laboratory evidence for *Legionella*.

Confirmed Extrapulmonary legionellosis (XPL): A clinically compatible case of XPL with confirmatory laboratory evidence of *Legionella* at an extrapulmonary site.

Suspect Extrapulmonary legionellosis (XPL): A clinically compatible case of XPL with supportive laboratory evidence of *Legionella* at an extrapulmonary site.

LABORATORY ANALYSIS

Isolates are not required to be sent to the State Public Health Laboratory (KHEL); but they are equipped to confirm isolates of *Legionella* spp. Specimens for *Legionella* testing will be forwarded to the CDC only after prior clearance by the CDC Respiratory Diseases Branch.

- When sending isolates to the state laboratory:
 - Contact the laboratory at 785-620-1620.
 - Use IDS (infectious disease shipper) for shipping.
- When sending serology, urine, or pathologic specimens for testing at the CDC:
 - Contact KDHE Epidemiology services for approval at 1-877-427-7317.
 - An epidemiologist will request the information needed to verify an outbreak related case or if other special circumstances exist in which the CDC would need to assist. The epidemiologist will contact the Respiratory Disease Branch within the CDC Division of Bacterial Disease at 404-639-2215.
 - After approval, specimen collection and delivery instructions will be given.

Note: For serology, paired serum specimens taken at least 14 days apart are required. A single antibody titer at any level is not diagnostic for legionellosis.

- For additional information, call (785) 296-1620.

EPIDEMIOLOGY

Legionellosis has a worldwide distribution. In the United States an estimated 8,000 - 18,000 cases occur annually; most are isolated and are not associated with outbreaks. Outbreaks usually occur in the summer and fall, although cases may occur year-round. Serologic surveys show a prevalence of antibodies to *L. pneumophila* serogroup 1 in up to 20% of the population. Risk factors include increased age (i.e., >50 years), cigarette smoking, chronic lung disease and immunosuppressive therapy. *Legionella* accounts for 0.5- 5% of community-acquired pneumonias each year.

In the United States, the rate of reported cases of Legionnaires' disease has grown by nearly five and a half times since 2000. It is unclear whether this increase represents artifact (due to increased awareness and testing), increased susceptibility of the population, increased *Legionella* in the environment, or some combination of factors.

DISEASE OVERVIEW

A. Agent:

Legionellosis is an illness caused by *Legionella* species. There are many serogroups, but serogroup 1 is the most frequently linked with serious illness.

B. Clinical Description:

Legionellosis is primarily associated with two distinct illnesses:

- Legionnaire's disease characterized by fever, myalgia, cough, and pneumonia.
 - Legionnaires' disease has a case-fatality rate of 5-30%.
- Pontiac fever is a milder form of illness without pneumonia. The most common symptoms are anorexia, myalgia, malaise and headache. This is followed by fever, chills and a non-productive cough. Other symptoms include abdominal pain and diarrhea.
 - Pontiac fever cases usually recover in 2-5 days without treatment.

Extrapulmonary legionellosis (XPL) is less common, but *Legionella* can cause disease at sites outside the lungs. A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site and diagnostic testing indicates evidence of *Legionella* at that site.

C. Reservoirs:

Legionella is commonly found in aquatic environments. The organism can survive in water between 68- 176° F and is resistant to typical levels of chlorination. Outbreaks and sporadic cases have been linked to air conditioning cooling towers, evaporative condensers, humidifiers, whirlpool spas, respiratory therapy devices, decorative fountains and potable water systems.

D. Mode(s) of Transmission:

People can get Legionnaires' disease or Pontiac fever when they breathe in small droplets of water in the air that contain the bacteria. Less commonly, people can get sick by aspiration of drinking water containing *Legionella*. This happens when water accidentally goes into the lungs while drinking. People at increased risk of aspiration include those with swallowing difficulties. In general, people do not spread Legionnaires' disease and Pontiac fever to other people. However, this may be possible under rare circumstances.

E. Incubation Period:

Most commonly 2 to 10 days from the time of exposure to symptom onset, with an average of 5 to 6 days. For surveillance purposes, public health officials collect exposure histories for the 14 days before date of symptom onset.

F. Period of Communicability:

None.

G. Susceptibility and Resistance:

Those most susceptible to disease are of increased age (i.e., >50) and a history of cigarette smoking, chronic lung disease and/or a history of immunosuppressive therapy or disease. There is evidence of lifetime immunity to specific strains.

H. Treatment:

Legionella-directed antibiotics include macrolides and respiratory fluoroquinolones — see the most recent [IDSA-ATS guidelines for treatment of community-acquired pneumonia](#) and the most recent [IDSA-ATS guidelines for treatment of hospital-acquired pneumonia](#) for more information. While it is preferred to obtain diagnostic testing before antibiotic administration, antibiotic treatment should not be delayed to facilitate this process. Antibiotics should not be prescribed for Pontiac fever, as it is a self-limited illness and patients usually recover within one week.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Suspected cases of legionellosis shall be reported within 24 hours, except if the reporting period ends on a weekend or state-approved holiday, the report shall be made by 5:00 p.m. on the next business day after the 24-hour period:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
Phone: 1-877-427-7317 Fax: 1-877-427-7318**

Further responsibilities of state and local health departments to the CDC:

As a nationally notifiable condition, pertussis cases require a ROUTINELY NOTIFIABLE report to the Center of Disease Control and Prevention (CDC).

1. Local public health jurisdiction will report information as requested in the Kansas electronic surveillance system, as soon as possible, ensuring that the electronic form is completed within 5 days of receiving a notification of a report.
 - For cases who may have been infected in a **lodging facility** (inside or outside of Kansas) or a **healthcare facility** (especially those who worked or resided at the healthcare facility for their entire exposure period), the Local public health jurisdiction will **notify KDHE-BEPHI by phone** at 1-877-427-7317.
2. ROUTINE reporting requires KDHE-BEPHI to file an electronic report for cases within the next reporting cycle to CDC.
3. KDHE-BEPHI will also perform the following notifications:

Lodging-associated notifications:

- After receiving a notification that a Kansas lodging facility may be associated to a legionellosis case, KDHE-BEPHI will notify the lodging facility's management by mail of the potential problem with their building water system.
- If a lodging facility outside of Kansas is potentially associated with a legionellosis case, KDHE-BEPHI will notify the CDC by emailing travellegionella@cdc.gov. The CDC will then notify the appropriate state health department.

Healthcare-associated notifications:

- All medical facilities that are associated to a potential nosocomial case of legionellosis will be contacted by KDHE-BEPHI.

Kansas City Metro-associated notifications:

- If a Kansas case reports significant exposures on the Missouri side of the Kansas City Metro area (place of work is in Missouri, etc.), KDHE-BEPHI will notify the Northwest District of the Missouri Department of Health and Senior Services.

INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all confirmed, probable and suspected cases to the KDHE-BEPHI.
 - Start the [Case Investigation](#) within 3 days of receiving a notification
 - Complete the case investigation within 5 days of receiving notification.
- 2) Contact medical provider to collect additional information and confirm diagnosis using the current case definition.
 - Collect all information requested in [Step 1](#)) of case investigation.
 - Ensure that the patient is aware of his/her diagnosis.
- 3) Complete the [case investigation](#) to identify potential source of infection.
- 4) Only if a particular source is considered highly likely to be the cause of illness (i.e. multiple cases associated with a common source, or a case who was hospitalized during their entire exposure period) will a more detailed [contact investigation](#) or an environmental assessment be conducted in cooperation with KDHE-BEPHI.
- 5) For suspected travel or healthcare associated cases, contact the KDHE immediately at 1-877-427-7317 to report suspicions.
- 6) [Record](#) data, collected during the investigation, in the KS EpiTrax system under the data's associated [\[tab\]](#) in the case morbidity report (CMR). Identify whether the source of infection is major public health concern,
- 7) As appropriate, use notification letter(s) and the disease [fact sheet](#) .

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

- 1) Contact the medical provider who reported or ordered testing of the case.
 - Obtain information from the provider or medical chart about the diagnosis.
 - If patient hospitalized, obtain medical records.
 - Collect case's demographic data and contact information (birth date, county, sex, race/ethnicity, occupation, address, phone number(s))
 - Note the symptoms and onset date, especially: fever (record the maximum temperature measured); myalgia, cough, or pneumonia
 - Examine the laboratory testing that was done.
 - Record hospitalizations or healthcare visits (including those 14 days prior onset): include location and dates
 - Record outcomes: survived or date of death
 - Note pre-existing conditions: alcoholism; smoking; diabetes; any chronic disease; immunodeficiency; organ transplant; malignancy

- 2) Interview the case or proxy to determine source and risk factors:
 - Focus on incubation period 14 days prior to illness onset.
 - Ask about all possible exposures listed in the interview form.
 - When recording any travel or overnight stays somewhere other than the patient's usual residence, collect as many details as possible
 - If the stay was at a hotel, collect all lodging information. If they cannot recall or retrieve their room number, ask what floor they stayed on. If they report using a whirlpool, ask if it was in their room or in swimming pool area.
- 3) Consider if a case is healthcare-associated Legionnaires' disease (HA-LD):
 - **Presumptive healthcare-associated Legionnaires' disease:** A case with 10 or more days of continuous stay at a healthcare facility (including acute care facilities, long term acute care facilities, skilled nursing facilities, and clinics) during the 14 days before onset of symptoms.
 - **Possible healthcare-associated Legionnaires' disease:** 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 HA-LD.
 - Notify KDHE (877-427-7317) of presumptive HA-LD
- 4) For cases that have exposures to in-state or out-of-state lodging facilities, whirlpools in gyms, or other suspicious exposures that are in public or semi-public areas in the 14 days before illness onset:
 - Notify KDHE (877-427-7317)
 - KDHE will notify the CDC regarding exposures to out-of-state lodging facilities.
 - KDHE may notify facility management by mail of the potential problem with their building water system.
 - When epi-linked cases are identified, the CDC and KDHE will assist the local investigator in investigating the cases and possible exposure locations.
- 5) Investigate epi-links among cases (clusters, household, co-workers, etc).
 - Highly suspected sources should be investigated.
 - For suspected [outbreaks](#) refer to Managing Special Situations section.

Contact Investigation

Contacts are at risk if they are exposed to the same source.

A detailed contact and environmental investigation will only be completed if a source is considered highly likely to be the cause of illness.

The CDC and its web resources will be used to guide the investigation. Refer to www.cdc.gov/legionella/index.html for more information.

Isolation, Work and Daycare Restrictions

None.

Case Management

None.

Contact Management

None; unless required as part of an active investigation with state and/or CDC.

Environmental

The following measures are recommended:

- Water management programs should be considered to reduce *Legionella* growth and spread in buildings. Toolkits are available to assist:
<https://www.cdc.gov/legionella/maintenance/wmp-toolkit.html>
- Cooling towers should undergo regular maintenance and should be drained when not in use. Appropriate biocides should be used to limit the growth of slime-forming organisms.
- If it is necessary to attempt to eliminate *L. pneumophila* from a cooling tower or potable water system the most effective methods are heating to 140° F, and/or hyperchlorination.
- Tap water should not be used for respiratory therapy devices. Devices should be maintained and cleaned as per the manufacturer's instructions to prevent growth of *Legionella*.
- Where clinical cases are linked to a likely environmental source, an environmental assessment and sampling may be considered. Consult with KDHE at 1-877-427-7317.

Refer to www.cdc.gov/legionella/index.html for more information.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

- Outbreak definition:
 - A single case who was a hospital inpatient for 10 or more days of their 14-day exposure period, or a resident of a long-term care facility who had few exposures outside of the facility should be investigated as a potential outbreak.
 - In outbreaks, cases are clustered in time and place among groups that share a common exposure. Most cases are sporadic, and a complete environmental investigation is not necessary.
- Notify KDHE immediately, 877-427-7317.
- Active case finding will be an important part of any investigation.
- Recommendations will be made based on the CDC guidance.
 - Refer to www.cdc.gov/legionella/index.html for more information.

DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Accept the case assigned to the LHD and record the date the LHD investigation was started on the [\[Administrative\]](#) tab.
- B. Organize and collect data.
 - The [Legionellosis Investigation Form](#) can assist with data collection.
 - Investigators can collect and enter all required information directly into EpiTrax [\[Investigation\]](#), [\[Clinical\]](#), [\[Demographics\]](#), [\[Contact\]](#) tabs without using the paper forms.
 - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.
- C. Report data collected during the investigation via EpiTrax.
 - Verify that all data requested in [Step 1](#)) has been recorded on an appropriate EpiTrax [\[tab\]](#), or that actions are completed for a case lost to follow-up as outlined below.
 - Some data that cannot be reported on an EpiTrax [\[tab\]](#) may need to be recorded in [\[Notes\]](#) or scanned and attached to the record.
 - Paper report forms do not need to be sent to KDHE after the information is recorded in EpiTrax. The forms should be handled as directed by local administrative practices.
- D. If a case is lost to follow-up, after the appropriate attempts:
 - Indicate 'lost to follow-up' on the [\[Administration\]](#) tab with the number of attempts to contact the case recorded.
 - Record at least the information that was collected from the medical records.
 - Record a reason for 'lost to follow-up' in [\[Notes\]](#).
- E. After the requirements listed under [Case Investigation](#) have been completed, record the "Date LHD investigation completed" field located on the [\[Administrative\]](#) tab.
 - Record the date even if the local investigator's [Case](#) or [Contact Management](#) for the contact is not "Complete".
- F. Once the entire investigation is completed, the LHD investigator will click the "Complete" button on the [\[Administrative\]](#) tab. This will trigger an alert to the LHD Administrator, so they can review the case before sending to the state.
 - The LHD Administrator will then "Approve" or "Reject" the CMR.
 - Once a case is "Approved" by the LHD Administrator, BEPHI staff will review the case to ensure completion before closing the case.

Review the [EpiTrax User Guide, Case Routing](#) for further guidance.

ADDITIONAL INFORMATION / REFERENCES

- A. Treatment / Differential Diagnosis:** American Academy of Pediatrics. Red Book: Report of the Committee on Infectious Disease, 29th Edition. Illinois, Academy of Pediatrics, 2014.
- B. Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, Washington, DC, American Public Health Association, 2010.
- C. Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: wwwn.cdc.gov/nndss/
- D. Additional Information (CDC):** www.cdc.gov/health/default.htm
- Legionellosis Resource Site: www.cdc.gov/legionella/index.html

ATTACHMENTS

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