

Legionellosis Investigation Guideline

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Legionellosis

Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 2005)

Clinical Description for Public Health Surveillance:

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 Case Classification:

Confirmatory lab results:

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

Suspect (presumptive) lab results:

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

Case Classification:

- **Confirmed:** a clinically compatible case that meets at least one of the confirmatory laboratory criteria.
- **Suspect:** a clinically compatible case that meets at least one of the presumptive (suspect) laboratory criteria.
- **Travel-associated:** a suspect or confirmed 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.

LABORATORY ANALYSIS

Specimens or isolates are not required to be sent to the State Public Health Laboratory (KHEL); but they are equipped to confirm isolates of *Legionella spp.* All other 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 the Epidemiology services for approval at 1-877-427-7317.
 - An epidemiologist will request information needed to acquire approval for testing at the CDC (outbreak related or other special circumstance in which the CDC would assist with investigation); the epidemiologist will then contact the Respiratory Disease Branch within the CDC Division of Bacterial Disease at 404-639-2215.
 - After approval, instructions for specimen collection and delivery will be obtained.
- **Note:** For serology, paired serum specimens taken at least 14 days apart are required. A single antibody titer at any level is not diagnostic to Legionellosis.

For additional information concerning collection or sample transport, call (785) 296-1620 or refer to guidance at http://www.kdheks.gov/labs/lab_ref_guide.htm

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), cigarette smoking, chronic lung disease and immunosuppressive therapy. *Legionella* accounts for 0.5- 5% of community-acquired pneumonias each year.

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 associated with two clinically and epidemiologically distinct illnesses:

- Legionnaire's disease is characterized by fever, myalgia, cough, and pneumonia.
- Pontiac fever is a milder form of illness without pneumonia. The most common symptoms both illnesses are anorexia, myalgia, malaise and

headache. This is followed by fever, chills and a non-productive cough. Other symptoms may include abdominal pain and diarrhea.

Legionnaires' disease is associated with pneumonia with a case-fatality rate of 5-30%. Pontiac fever is not associated with pneumonia and cases usually recover in 2-5 days without treatment.

C. Reservoirs:

Legionella is commonly found in aquatic environments. 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:

Legionellosis is transmitted via aerosols inhaled from a contaminated water source or through aspiration. The organism can survive in water between 68-176° F and is resistant to typical levels of chlorination. It is not transmissible person-to-person.

E. Incubation Period:

- Legionnaire disease: 2-10 days; average 5-6 days.
- Pontiac fever: 5 hours to 3 days; average 1-2 days.

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:

Erythromycin is the preferred treatment. If illness progresses, Rifampin may be added. Alternative antimicrobials such as Azithromycin and Levofloxacin may also be used.

INVESTIGATOR RESPONSIBILITIES

- 1) Use current [case definition](#), to confirm diagnosis with the medical provider.
- 2) Conduct [case investigation](#) to collect information on potential sources of infection. (Note: a single case of Legionellosis does not require a comprehensive investigation.)
- 3) Only if a particular source is considered highly likely to be the cause of illness (i.e. additional cases associated with a common source or a single nosocomial case in hospitalized patient), conduct a more detailed [contact investigation](#) and investigate possible environmental measures to control and prevent the spread of disease.
- 4) For suspected travel associated cases, contact the KDHE immediately at 1-877-427-7317 to report suspicions.
- 5) Complete and report all information requested on the [General Investigation Form](#) and [Legionellosis Supplemental Form](#).
- 6) Report all cases to the KDHE using established methods.

- 7) As appropriate, use the notification letter(s) and the disease fact sheet to notify the case, contacts and other individuals or groups.

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.
 - If patient hospitalized, obtain medical records, including admission notes, progress notes, lab report(s), and discharge summary.
 - Note the symptoms and onset date, especially: fever (note maximum temperature); myalgia, cough, or pneumonia
 - Examine the laboratory testing that was done.
 - Collect case's demographic data and contact information (birth date, county, sex, race/ethnicity, occupation, address, phone number(s))
 - Record hospitalizations for Legionellosis: location, 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 to determine source and risk factors:
 - Focus on incubation period 2 weeks prior to illness onset.
 - Record any travel or overnight stay somewhere other than usual residence; note city and lodging information.
 - Record any dental work, note name of dental office.
 - Record any hospital visits; note name of hospital.
 - Record any work in a hospital; note name of hospital.
- 3) Consider if a case is hospital related (nosocomial):
 - Not nosocomial: no hospital visit (in and out-patient) 10 days prior to onset.
 - Possibly nosocomial: hospitalized 2-9 days before onset of infection.
 - Definitely nosocomial: hospitalized continuously for ≥ 10 days before onset.
 - Notify KDHE (877-427-7317) of any suspicion of nosocomial association.
- 4) For cases that have any travel or overnight stay 10 days before illness onset:
 - Notify KDHE (877-427-7317) of any travel association within 7 days of initial report of local health department receiving a report of Legionellosis.
 - KDHE will notify the CDC within 7 days after receiving a notification.
 - When epi-linked cases are identified, the CDC and state will assist the local investigator in investigating the cases and 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 only at risk if they are exposed to the same source.

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

groups of people or in hospital settings. The CDC and its web resources will be used to guide the investigation. Refer to <http://www.cdc.gov/legionella/index.htm> for more information.

It should be noted that routine surveillance of environmental sources is not recommended because of the high prevalence of the organism in the environment, the number of potential sources and the frequency of environmental bacteria in the absence of clinical disease.

The following measures are recommended:

- 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.
- Where clinical cases are linked to a likely environmental source, sampling may be considered. Consult with KDHE at 877-427-7317.
- 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.

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.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

- 1) Outbreak definition:
 - A single documented nosocomial case in a hospital or other care facility should be investigated as a potential outbreak until a source has been identified and decontaminated or until possible additional cases have been ruled out.
 - In outbreaks, cases are clustered in time and place among groups that share a common air space. Most cases are sporadic and a complete environmental investigation is not necessary.
- 2) Notify KDHE immediately, 877-427-7317.
- 3) Active case finding will be an important part of any investigation.
- 4) Recommendations will be made based on the CDC guidance.
- 5) Refer to <http://www.cdc.gov/legionella/index.htm> for more information.

DATA MANAGEMENT AND REPORTING TO THE KDHE

- A. Organize, collect and report data with the [General Investigation Form\(s\)](#) and [Legionellosis Supplemental Form](#).
- B. Report data electronically via KS-EDSS or by fax, include:
 - At a minimum, data collected during the investigation that helps to confirm or classify a case. (For epi-linked cases, please include the KS-EDSS investigation ID of the related case.)
 - All information collected on the General Investigation and supplemental form(s).

ADDITIONAL INFORMATION / REFERENCES

- A. **Treatment / Differential Diagnosis:** American Academy of Pediatrics. 2006 Red Book: Report of the Committee on Infectious Disease, 27th Edition. Illinois, Academy of Pediatrics, 2006.
- B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, 18th Edition. Washington, DC, American Public Health Association, 2004.
- C. **Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: www.cdc.gov/ncphi/diss/nndss/casedef/case_definitions.htm
- D. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm
- E. **Additional Information (CDC):** www.cdc.gov/health/default.htm
 - Legionellosis Resource Site: <http://www.cdc.gov/legionella/index.htm>

General Investigation Form(s)

Kansas Disease Investigation Guidelines

General Investigation Form

Investigation Information		
Case Type: <input type="checkbox"/> Human Case <input type="checkbox"/> Non-human Case	Disease Name: _____	
Classification: <input type="checkbox"/> Suspect <input type="checkbox"/> Probable <input type="checkbox"/> Confirmed	KS-EDSS Investigation ID: _____	
Outbreak: <input type="checkbox"/> Yes <input type="checkbox"/> No	Outbreak Name: _____	Outbreak #: _____
Onset Date: _____	Diagnosis Date: _____	Report Date: _____
Assigned to (Investigator): _____	Patient Died: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
Patient Information		
Name Type: <input type="checkbox"/> Default/Common <input type="checkbox"/> Legal <input type="checkbox"/> Maiden <input type="checkbox"/> Nickname		
Last: _____	First: _____	Middle: _____
Street: _____	City/State: _____	Zip: _____
Evening Phone #: _____	Daytime Phone #: _____	
Sex: <input type="checkbox"/> Failure to Report <input type="checkbox"/> Female <input type="checkbox"/> Male <input type="checkbox"/> Other <input type="checkbox"/> Transexual <input type="checkbox"/> Unknown		
Race: <input type="checkbox"/> American Indian or Alaska Native <input type="checkbox"/> Asian <input type="checkbox"/> Black or African American <input type="checkbox"/> Native Hawaiian or Other Pacific Islander <input type="checkbox"/> White <input type="checkbox"/> Unknown		
Hispanic / Latino Ethnicity: <input type="checkbox"/> Yes <input type="checkbox"/> No		
Date of Birth: _____	Age: _____	Age Unit: <input type="checkbox"/> Days <input type="checkbox"/> Weeks <input type="checkbox"/> Months <input type="checkbox"/> Years
Parent Information (if under 18)		
Last: _____	First: _____	Middle: _____
Street: _____	City/State: _____	Zip: _____
Evening Phone #: _____	Daytime Phone #: _____	
Work / Occupation or School / Grade		
Worksites / School: _____		
Occupations / Grade: _____		
Travel History		
1st	Destination: _____	Depart Date: _____ Return Date: _____
2nd	Destination: _____	Depart Date: _____ Return Date: _____
3rd	Destination: _____	Depart Date: _____ Return Date: _____
4th	Destination: _____	Depart Date: _____ Return Date: _____

Supplemental Laboratory Report Form

Lab Reports

Laboratory Name: _____

Lab Report Date: _____

Ordering Provider Name: _____

Phone: _____

Facility: _____

Specimen Accession Number: _____

Specimen Collection Date: _____

Organism Name: _____

Organism Species: _____

Organism Serogroup: _____

Organism Serotype: _____

PFGE Results

Pattern 1 KS: _____

Other State: _____

CDC: _____

Pattern 2 KS: _____

Other State: _____

CDC: _____

Pattern 3 KS: _____

Other State: _____

CDC: _____

Additional Results Information

Reported Test Name:

Coded Result:

Text Result:

Numeric Result:

Comments:

Supplemental Contact Form

Contacts

Last: _____ **First:** _____ **Middle:** _____

Street: _____ **City/State:** _____ **Zip:** _____

Evening Phone #: _____ **Daytime Phone #:** _____ **E-mail:** _____

Sex: Failure to Report Female Male Other Transexual Unknown

Race: American Indian or Alaska Native Asian Black or African American Native Hawaiian or Other Pacific Islander White Unknown

Hispanic / Latino Ethnicity: Yes No

Date of Birth: _____ **Age:** _____ **Age Unit:** Days Weeks Months Years

Worksites / School: _____

Occupations / Grade: _____

Exposure Information

Contact Type: Household Sexual Other: _____ **Partner / Cluster Code:** _____

Date of First Exposure: _____ **Date of Last Exposure:** _____ **Frequency:** _____

Nature of Exposure: _____ **Comments:** _____

Testing and Treatment Information

Clinic Code: _____ **Examination Date:** _____

Examination Test: _____ **Examination Result:** _____

Prophylaxis/empiric treatment date: _____ **Drug / Dosage:** _____

Provider (Name / Facility): _____

Disposition and Diagnosis Information

Initiation Date: _____ **Disposition Date:** _____ **Disposition:** _____

Diagnosis: _____ **Referral Type:** Patient Provider **Post-test Counseled :** Yes No

Currently Assigned To: _____ **Follow-up Date:** _____

Risk Factors

Pregnant: Yes No **If Yes, # of Weeks:** _____

Risk factors for complications in contact: None Pregnant Woman HIV Seropositive Unimmunized Index case is a super-spreader

Child younger than 5 Age > 65 Otherwise immunosuppressed (s/p transplant, high dose steroids, etc)

Legionellosis Supplemental Form

Kansas Department of Health

Epidemiologic Case History

* indicates required fields

Case Type* <i>Human Case Non Human Case</i>	Classification* <i>Confirmed Not a Case Probable Suspect Deleted Unknown</i>
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Supplemental Form Status <i>Not Done Form Complete Form in Progress Form Approved Form Sent to CDC</i>
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Report Date* <small>mm/dd/yyyy</small>
--

Patient Demographic Information

* indicates required fields

Last Name*	First Name*	Middle Name	Name Type*	Age
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Age Unit <i>Days Weeks Months Years</i>	Date of Birth <small>mm/dd/yyyy</small>
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Race* <small>(Check all that apply)</small>			
<i>American Indian or Alaska Native</i>	<i>Asian</i>	<i>Black or African American</i>	
<i>Native Hawaiian or Other Pacific Islander</i>	<i>White</i>	<i>Unknown</i>	

Ethnicity* <i>Hispanic or Latino Not Hispanic or Latino Unknown</i>

Sex* <i>Failure to Report Female Male Other Transexual Unknown</i>

Street Address

City	County	State	Zip
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Evening Phone <small>###-###-####</small>	Daytime Phone <small>###-###-####</small>
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Occupation

Person Providing Report

Name of Reporting Facility*

LEGIONELLOSIS CASE REPORT

Possible sources of exposure:

IN THE TWO WEEKS BEFORE ONSET, DID PATIENT:

Travel or stay overnight somewhere other than usual residence?

Yes No Unknown

Lodging

Did the patient have dental work?

Yes No Unknown

If yes, name of the dental office:

Did the patient visit a hospital as an outpatient?

Yes No Unknown

If yes, name of the hospital:

Did the patient work in a hospital?

Yes No Unknown

If yes, name of the hospital:

This case was hospital related (nosocomial)

*Not nosocomial: No inpatient or outpatient hospital visits
in the 10 days prior to onset of symptoms*

*Definitely nosocomial: Patient hospitalized continuously for
10 or more days before onset of legionella infection*

*Possibly nosocomial: Patient hospitalized 2 - 9 days before
onset of legionella infection*

Unknown

Other _____

Public Health Fact Sheet

Legionellosis Disease

What is Legionellosis?

Legionellosis is an illness caused by the *Legionella* bacteria. The more severe form is known as Legionnaires' disease, identified in an outbreak of pneumonia among persons attending an American Legion convention in Philadelphia in 1976. The less severe form of legionellosis is Pontiac Fever.

What are the symptoms?

Symptoms usually begin 2 to 14 days after being exposed to the bacteria. Legionnaire's Disease symptoms include: muscle aches, headache, tiredness and dry cough followed by high fever, chills and sometimes diarrhea. Temperatures may reach 102-105°F and chest x-rays often show pneumonia. Pontiac Fever symptoms include: fever, headache, weakness and muscle aches. Pontiac Fever symptoms do not result in pneumonia and usually resolve in 2-5 days without treatment.

How is Legionellosis spread?

Breathing in the Legionella bacteria, usually carried by a mist, spreads Legionellosis. It is not spread from person-to-person.

Who gets Legionellosis?

Anyone can get Legionellosis. Legionnaires' disease is more common among the elderly and those with impaired immune systems or underlying diseases. People who smoke cigarettes or drink heavily are also at increased risk.

How is disease Legionellosis treated?

Antibiotics are effective in treating the disease.

How can you prevent Legionellosis?

Measures can be taken to reduce the likelihood of exposure. For example, large air conditioning systems with cooling towers and evaporative condensers should be operated and maintained according to manufacturers' recommendations. Because Legionella bacteria are found throughout the environment, testing potential sources is not recommended when individual cases occur.

Where can you get more information?

- Your Local Health Department
- Kansas Department of Health and Environment, Epidemiologic Services Section at (877) 427-7317
- <http://www.cdc.gov/health/default.htm>
- Your doctor, nurse, or local health center

This fact sheet is for information only and is not intended for self-diagnosis or as a substitute for consultation. If you have any questions about the disease described above or think that you may have an infection, consult with your healthcare provider. This fact sheet is based on the Centers for Disease Control and Prevention's topic fact sheets.