



Leptospirosis Investigation Guideline

Contents

CASE DEFINITION (CDC 2013)	1
LABORATORY ANALYSIS	2
EPIDEMIOLOGY	3
DISEASE OVERVIEW	3
NOTIFICATION TO PUBLIC HEALTH	4
INVESTIGATOR RESPONSIBILITIES	4
STANDARD CASE INVESTIGATION	5
MANAGING SPECIAL SITUATIONS	6
A. Reported Incidence Is Higher than Usual/Outbreak Suspected:	6
B. Positive Leptospirosis Laboratory Results in Pets	6
DATA MANAGEMENT	6
ADDITIONAL INFORMATION	7
CDC Case Report Form	8

Revision History:

Date	Replaced	Comments
11/2018	-	Released
07/2021	11/2018	Correction Laboratory Criteria for Case Classification. Added section on Positive Laboratory Results in Pets. Fixed broken links. Added new CDC Case Report Form (vs. Jan 2021)

Leptosporiosis

Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 2013)

Clinical Description for Public Health Surveillance:

- An illness characterized by fever, headache, and myalgia, and less frequently by conjunctival suffusion, meningitis, rash, jaundice, or renal insufficiency. Symptoms may be biphasic.
- Clinical presentation includes history of fever within the past two weeks and at least two of the following clinical findings: myalgia, headache, jaundice, conjunctival suffusion without purulent discharge, or rash (i.e. maculopapular or petechial); OR at least one of the following clinical findings:
 - Aseptic meningitis
 - GI symptoms (e.g., abdominal pain, nausea, vomiting, diarrhea)
 - Pulmonary complications (e.g., cough, breathlessness, hemoptysis)
 - Cardiac arrhythmias, ECG abnormalities
 - Renal insufficiency (e.g., anuria, oliguria)
 - Hemorrhage (e.g., intestinal, pulmonary, hematuria, hematemesis)
 - Jaundice with acute renal failure.

Laboratory Criteria for Case Classification:

Supportive:

- Leptospira agglutination titer of ≥ 200 but < 800 by Microscopic Agglutination Test (MAT) in one or more serum specimens, or
- Demonstration of anti-Leptospira antibodies in a clinical specimen by indirect immunofluorescence, or
- Demonstration of Leptospira in a clinical specimen by darkfield microscopy, or
- Detection of IgM antibodies against Leptospira in an acute phase serum specimen.

Confirmed:

- Isolation of Leptospira from a clinical specimen, or
- Fourfold or greater increase in Leptospira agglutination titer between acute- and convalescent-phase serum specimens studied at the same laboratory, or
- Demonstration of Leptospira in tissue by direct immunofluorescence, or
- Leptospira agglutination titer of ≥ 800 by Microscopic Agglutination Test (MAT) in one or more serum specimens, or
- Detection of pathogenic Leptospira DNA (PCR) from a clinical specimen.

Epidemiologic Linkage

Involvement in an exposure event (e.g., adventure race, triathlon, flooding) with associated laboratory-confirmed cases.

Case Classification:

Probable: A clinically-compatible case with at least one of the following:

- Involvement in an exposure event (e.g., adventure race, triathlon, flooding) with known associated cases, or
- Presumptive laboratory findings, but without confirmatory laboratory evidence of *Leptospira* infection.

Confirmed: A case with confirmatory laboratory results, as listed above.

LABORATORY ANALYSIS

- Antibodies for leptospirosis develop between 3-10 days after symptom onset. A negative serologic test results from samples collected in the first week of illness do not rule out disease, and serologic testing should be repeated on a convalescent sample collected 7-14 days after the first.
- In the acute phase of illness, leptospire are present in the blood (septicemia) for approximately the first 4–6 days of illness. Leptospire may be shed intermittently in the urine after approximately the first week of illness onset. A negative PCR test does not rule out leptospirosis.
- It is best to submit as many specimen types as possible. Recommended:
 - Acute illness (first week): whole blood and serum
 - Convalescent illness (after first week): serum +/- urine.

Serologic Test	Diagnostic Value
IgM-based commercial assays (ELISA, ImmunoDOT, Lateral Flow)	<ul style="list-style-type: none"> • Screen tests. Results should be confirmed by additional method.
PCR (Polymerase chain reaction) <i>At CDC and some commercial labs</i>	<ul style="list-style-type: none"> • Confirmatory on whole blood and urine collected in first week of illness onset. CSF for persons with meningitis or fresh frozen kidney (preferred) or liver from autopsies.
MAT (Microscopic agglutination test) <i>Available at CDC</i>	<ul style="list-style-type: none"> • Confirmatory on acute and convalescent serum samples collected 7-14 days apart or a single serum sample collected 7-10 days after illness onset.
Pathology <i>Available at CDC</i>	<ul style="list-style-type: none"> • Confirmatory on formalin-fixed tissues (kidney preferred).

Unless authorized to send directly to CDC, all specimens should be sent through the Kansas Health and Environment Laboratory (KHEL). Contact KDHE at 1-877-427-7317 for specimen approval. Contact KHEL at 785-296-1653 or 785-296-1645 for specific specimen collection and shipping questions.

Additional information on shipping specimens to CDC:

- Questions regarding leptospirosis diagnostic testing, contact CDC-INFO at 800-232-4636.
- Information on sample submission, including the sample submission form (DASH Form 50.34) and shipping instructions can be found at: https://www.cdc.gov/ncezid/dhcpp/bacterial_special/zoonoses_lab.html

EPIDEMIOLOGY

Leptospirosis occurs worldwide, it is more common in tropical or sub-tropical climates. It is estimated that more than 1 million cases occur worldwide annually, including almost 60,000 deaths. In the United States, approximately 100–150 leptospirosis cases are reported annually. Puerto Rico reports the most leptospirosis cases, followed by Hawaii. Outbreaks of leptospirosis tend to occur after heavy rainfall or flooding in endemic areas, especially areas with poor housing and sanitation conditions.

DISEASE OVERVIEW (Source: CDC, [Information for Healthcare Workers](#))

A. Agent:

Spirochete bacteria in the genus *Leptospira*. There are 10 pathogenic species, and more than 250 pathogenic serovars.

B. Clinical Description:

Symptoms include fever, headache, myalgia (typically of the calves and lower back), conjunctival suffusion, nausea, vomiting, diarrhea, abdominal pain, cough, and sometimes a skin rash. Severe symptoms include jaundice, renal failure, hemorrhage (especially pulmonary), aseptic meningitis, cardiac arrhythmias, pulmonary insufficiency, and hemodynamic collapse. Combined renal and liver failure associated with leptospirosis is referred to as Weil's disease. In severe illness 5-15% case fatality rate. Infection in pregnancy can cause fetal death or abortion.

C. Reservoirs:

Spread by the urine of infected animals (rodents, dogs, livestock, pigs, horses, wildlife). The bacteria can survive for weeks to months in urine-contaminated water and soil.

D. Mode(s) of Transmission:

Contact of mucous membranes, conjunctiva, and skin cuts or abrasions with the urine or reproductive fluids of infected animals or with urine contaminated water or wet soil. Also, ingestion of food or water contaminated by urine.

E. Incubation Period:

2 to 30 days after exposure. (Usually, 5-14 days.)

F. Period of Communicability:

Rare person-to-person potentially through sexual intercourse and breastfeeding. Excreted in urine for one month after acute illness; has been found extended to 11 months after acute illness. (CCDM, 2014)

G. Susceptibility and Resistance:

Infection results in immunity to the specific serovar, but not all serovars.

H. Treatment:

Early treatment may decrease the severity and duration of disease. Doxycycline is drug of choice for mild symptoms with azithromycin, ampicillin, or amoxicillin as alternatives. For severe illness, IV penicillin is the drug of choice with ceftriaxone equally effective.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Suspected cases of leptospirosis 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 local health jurisdiction
2. Laboratories: report to KDHE - BEPHI
3. Local health jurisdiction: report to KDHE - BEPHI

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Response (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, leptospirosis cases require a ROUTINELY NOTIFIABLE report to the Center of Disease Control and Prevention (CDC).

1. ROUTINE reporting requires KDHE-BEPHI to file an electronic report for within the next reporting cycle. KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested in the Kansas electronic surveillance system, as soon as possible.

INVESTIGATOR RESPONSIBILITIES

- 1) [Report](#) all confirmed, probable and suspect cases to the KDHE.
- 2) The goal of the [case investigation](#) is to collect epidemiological data as required by current surveillance objectives.
 - Contact the medical provider to collect information needed confirm diagnosis using the current case definition.
 - The [CDC Leptospirosis Case Report Form](#) will help in the confirmation of the case and with the organization and the collection of essential data
 - Collect all information requested in the case investigation.
 - Most data can be collected from the medical provider, and the patient may not need to be contacted.
- 3) Routine contact investigation is not needed for cases of leptospirosis.
- 4) [Record](#) data, collected during the investigation, in the KS EpiTrax system or by attaching scanned records.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

- 1) Contact the medical provider who ordered testing of the case and obtain the following information. (This includes medical records for hospitalized patients.)
 - Use the [CDC Leptospirosis Case Report Form](#) to identify any symptoms of histoplasmosis, record onset date and symptoms experienced.
 - Examine the laboratory testing that was done to ensure all testing that could confirm the case has been reported. Obtain, scan, and attach copies of any lab reports that may still be needed to the EpiTrax record.
 - Collect case's demographic data and contact information (birth date, county, sex, race/ethnicity, occupation, address, phone number(s))
 - For females, record pregnancy status.
 - Record hospitalizations: location, admission and discharge dates
 - Was the patient exposed to potentially contaminated water or animals?
 - Record outcomes: recovery, or date of death
- 2) Interview the case, proxy, or use medical record to determine source and risks.
 - Occupation or activities that may have resulted in exposure to contaminated water, soil or infected animals.
 - Travel outside of the current county within the 30 days prior to onset.

Contact Investigation

Usually none required. For contacts to animal cases, refer to Positive Leptospirosis Laboratory Results in Pets section. Provide education as needed.

Isolation, Work and Daycare Restrictions

None required for humans.

Case Management

Follow-up if case had not yet recovered. Report any changes in case.

Contact Management

Usually none required. Provide education as needed.

Environmental Measures

Reduce risk by not swimming or wading in water that might be contaminated with animal urine or eliminating contact with potentially infected animals. Protective clothing or footwear should be worn by those exposed to contaminated water or soil because of their job or recreational activities.

Education

Resources are available at <https://www.cdc.gov/leptospirosis/resources/index.html> including fact sheets on:

- [Leptospirosis Fact Sheet](#)
- [Leptospirosis Fact Sheet for Clinicians](#)
- [Adventure Racing and Leptospirosis](#)
- [Hurricanes, Floods, and Leptospirosis](#)
- [Prevention in Pets](#)

MANAGING SPECIAL SITUATIONS

A. Reported Incidence Is Higher than Usual/Outbreak Suspected:

- If you suspect an outbreak, consult with the epidemiologist on call at KDHE by calling the reporting hotline at 1-877-427-7318.

B. Positive Leptospirosis Laboratory Results in Pets

- If the health department is notified by a laboratory report of leptospirosis in a domestic animal or pet.
 - Verify the owner is aware of the test results,
 - Educate the owner on leptospirosis, the potential for zoonotic transmission, and steps to take to help prevent transmission.

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 [CDC Leptospirosis Case Report Form](#) is provided to assist the investigator but can be attached to the record in EpiTrax.
- Investigators can also collect and enter all required information directly into EpiTrax **[Clinical]**, **[Demographics]**, **[Epidemiological]**, and **[Notes]** 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 [CDC Leptospirosis Case Report Form](#) 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. Once the investigation is completed, the LHD investigator will click the "Complete" button. 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. Case Definitions:** wwwn.cdc.gov/nndss/
- B. Kansas Regulations/Statutes Related to Infectious Disease:**
www.kdheks.gov/epi/regulations.htm
- C. Additional Information (CDC):** <https://www.cdc.gov/leptospirosis/index.html>



Leptospirosis Case Report Form

Form Approved
OMB 0920-0728
Exp. 04/30/2023

Redact Patient's Name and Address prior to sending a copy of the form to CDC.

Send completed form by fax to (404) 929-1590, encrypted email to bspb@cdc.gov, secure FTP, or to CDC / Bacterial Special Pathogens Branch, 1600 Clifton Road NE, MS H24-12 Atlanta, GA 30329-4027. Call (404) 639-1711 or email bspb@cdc.gov with questions about a case, lab testing, or form submission.

Patient's Name: _____ Date First Submitted: _____ Investigators's Name: _____

Address: _____ State Case ID: _____ Investigators's Phone: _____

City: _____ Reporting State/Territory: _____

Demographics

State/Territory of Residence	Zip Code	County/Municipality	Sex			Pregnant		Birth Date	Age	days months years
			Male	Female	Unknown	Yes	No			
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Race (select all that apply):
 Alaska Native or American Indian Black/African American White
 Asian Native Hawaiian or Other Pacific Islander Unknown

Ethnicity
 Hispanic or Latino Not Hispanic or Latino Unknown

Clinical Presentation

Was the patient symptomatic? Yes No Unknown If yes, Date of Onset _____

Select all clinical manifestations the patient experienced:

Fever	Vomiting/nausea	Skin rash (petechial or maculopapular)	Pulmonary hemorrhage
Headache	Conjunctival suffusion	Cardiac arrhythmia/ECG abnormalities	Other pulmonary complications (e.g.cough, dyspnea)
Myalgia	Jaundice	Acute renal insufficiency or failure	Other hemorrhage (e.g. blood in vomit, stool, or urine; petechiae/ecchymosis)
Calf Pain	Thrombocytopenia	Acutely elevated liver enzymes/liver insufficiency or failure	
Diarrhea	Aseptic meningitis		

Other, specify: _____

Outcome

Was the patient hospitalized? Yes No Unknown If yes, date admitted _____ Number of days hospitalized _____

Was antimicrobial treatment given for this infection? Yes No Unknown If yes, date started _____

Which drugs (select all that apply)? Doxycycline Penicillin Ceftriaxone Ampicillin Amoxicillin Other, specify: _____

Clinical Outcome: Still hospitalized Died Discharged/Recovered Other, specify: _____

Date of Discharge _____ Date of Death _____ Illness Duration (days) _____

Laboratory Results

PCR 1	Specimen Type				Collection date	Result		
	Blood	CSF	Urine	Other _____		Positive	Negative	Indeterminate
PCR 2	Specimen Type				Collection date	Result		
	Blood	CSF	Urine	Other _____		Positive	Negative	Indeterminate
MAT	Acute serum			Convalescent serum (≥ 2 weeks later)			Met MAT case criteria (check all that apply) 4-fold rise in titer Single titer ≥ 800 Single titer 200–400	
	Collection Date _____			Collection Date _____				
	Highest Titer _____			Highest Titer _____				
Culture	Specimen Type				Collection date	Result		
	Blood	Urine	Tissue _____	Other _____		Positive	Negative	
<i>Leptospira</i> serovar^ _____					^identified by PFGE, MLST, or other molecular typing method of culture isolate			
Other test	ELISA	Immunohistochemistry (IHC)	Lateral flow test	Result				
	Other (Specify): _____				Positive	Negative	Borderline	Indeterminate
If ELISA, choose type:		IgG	IgM	IgG & IgM	ImmunoDot (IgM)	Not Applicable	Titer* _____ *If applicable	

Public reporting burden of this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Information Collection Review Office, 1600 Clifton Road NE, MS D-74, Atlanta, Georgia 30329-4027; ATTN: PRA (0920-0728).

Leptospirosis Case Report Form

Exposures in 30 days prior to illness onset, specify if the patient had:

Contact with animals <i>(select all that apply)</i>	Rodents Dogs Cows Sheep/goats Pigs Horses No known contact Unknown
	Wildlife, specify: _____
	Other, specify: _____
	Where did animal contact(s) occur <i>(specify location)</i> ? _____
Contact with fresh water <i>(select all that apply)</i>	Standing water <i>(e.g. lake, pond)</i> Running water <i>(e.g. river, stream)</i> Wet soil/mud Flood water, rainwater run-off Sewage
	No known contact Unknown Other, specify: _____
	Body of water name <i>(if applicable)</i> : _____
	Where did water contact(s) occur <i>(specify location)</i> ? _____

If the patient had contact with animals or water, select the type(s) of contact:

Occupational <i>(select all that apply)</i>	Farmer (crops) Farmer (animals) Fisherman Veterinary services Pet care (e.g. boarding, grooming)
	Landscaping/Yardcare Slaughterhouse Worker Military/First Responder Sanitation Worker Sewer Worker
Other, Specify: _____	
Recreational/ Avocational <i>(select all that apply)</i>	Swimming Boating Outdoor competition Camping/hiking Hunting Fishing
	Gardening Pet ownership
	Other, Specify: _____
Unknown type of contact	
Other type of contact, specify: _____	

In the 30 days prior to illness onset:

Did the patient stay in housing with evidence of rodents? Yes No Unknown

Did the patient stay in a rural area? Yes No Unknown

Did the patient travel outside of county/municipality, state, or country? Yes No Unknown Travel destination(s): _____

Was there heavy rainfall near the patient's place of residence, work site, activities, or travel? Yes No Unknown

Was there flooding near the patient's place of residence, work site, activities, or travel? Yes No Unknown

If the patient knows anyone recently diagnosed with leptospirosis, did they have similar exposures in the past 30 days? Yes No Unknown N/A

Has the patient ever previously been diagnosed with leptospirosis? Yes No Unknown

Is this patient part of an outbreak? Yes No Unknown If yes, describe outbreak: _____

Classify case based on the CSTE/CDC case definition (see criteria below)

Confirmed Probable

Comments

Confirmed: Isolation of *Leptospira* from a clinical specimen, OR fourfold or greater increase in *Leptospira* agglutination titer between acute- and convalescent-phase serum specimens studied at the same laboratory, OR demonstration of *Leptospira* in tissue by direct immunofluorescence, OR *Leptospira* agglutination titer of ≥ 800 by Microscopic Agglutination Test (MAT) in one or more serum specimens, OR detection of pathogenic *Leptospira* DNA (e.g., by PCR) from a clinical specimen.

Probable: A clinically compatible case with involvement in an exposure event (e.g., adventure race, triathlon, flooding) with known associated cases, OR *Leptospira* agglutination titer of ≥ 200 but < 800 by Microscopic Agglutination Test (MAT) in one or more serum specimens, OR demonstration of anti-*Leptospira* antibodies in a clinical specimen by indirect immunofluorescence, OR demonstration of *Leptospira* in a clinical specimen by darkfield microscopy, OR detection of IgM antibodies against *Leptospira* in an acute phase serum specimen, but without confirmatory laboratory evidence of *Leptospira* infection.