Kansas
Department of Health and Environment
Division of Health

Leptospirosis Investigation Guideline

Contents

Revision History:

Date	Replaced	Comments
11/2018	-	Released

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:

- 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.

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, leptospires are present in the blood (septicemia) for approximately the first 4–6 days of illness. Leptospires 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)	• Screen tests. Results should be confirmed by additional method.
PCR (Polymerase chain reaction) *At CDC and some commercial labs*	• 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) *Available at CDC*	• 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 *Available at CDC*	• 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 under the data's associated [tab] in the case morbidity report (CMR) 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. 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:

- Hurricanes, Floods, and Leptospirosis
- Leptospirosis Fact Sheet
- Adventure Racing and Leptospirosis
- Leptospirosis Fact Sheet for Clinicians
- 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.

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 and 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. 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: wwwn.cdc.gov/nndss/

D. Kansas Regulations/Statutes Related to Infectious Disease: www.kdheks.gov/epi/regulations.htm

E. Additional Information (CDC): https://www.cdc.gov/leptospirosis/index.html

Leptospirosis Case Report Form

Visit www.cdc.gov/leptospirosis for a fillable PDF version of this Case Report

Form Approved
OMB 0920-0728
Exp. 1/31/2019

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-A30, 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: _____ Clinician's Name: _____

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

City: _____ Reporting State: _____

Demographics

State of Residence _____ Zip Code _____ County of Usual Residence _____

Sex ☐ Male ☐ Female ☐ Unknown

Pregnant ☐ Yes ☐ No ☐ Unknown

Birth Date _____ Age _____ ☐ days ☐ months ☐ years

Race
☐ Alaska Native or American Indian ☐ Black/African American ☐ White
☐ Asian ☐ Native Hawaiian or Other Pacific Islander ☐ Not Specified

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 ☐ Conjunctival suffusion ☐ Jaundice ☐ Pulmonary complications ☐ Gastrointestinal involvement
☐ Myalgia ☐ Thrombocytopenia ☐ Hepatitis ☐ Cardiac involvement ☐ Rash (petechial or maculopapular)
☐ Headache ☐ Aseptic meningitis ☐ Hemorrhage ☐ Renal insufficiency/failure

☐ 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 ☐ Other, specify: _____

Clinical Outcome: ☐ Still hospitalized ☐ Died ☐ Discharged ☐ Other

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

Laboratory Results

Culture	Specimen Type ☐ Blood ☐ CSF ☐ Other _____ ☐ Urine ☐ Tissue ☐ Unknown	Collection date _____	Result ☐ Positive ☐ Unknown ☐ Negative
PCR	Specimen Type ☐ Blood ☐ CSF ☐ Unknown ☐ Urine ☐ Other _____	Collection date _____	Result ☐ Positive ☐ Unknown ☐ Negative
PCR	Specimen Type ☐ Blood ☐ CSF ☐ Unknown ☐ Urine ☐ Other _____	Collection date _____	Result ☐ Positive ☐ Unknown ☐ Negative
MAT	Acute Collection Date _____ Highest Titer _____	Convalescent (≥ 2 weeks later) Collection Date _____ Highest Titer _____	☐ 4-fold rise in titer ☐ Single titer ≥ 800
Other test	☐ ELISA ☐ Immunohistochemistry (IHC) ☐ Lateral flow test ☐ Other (Specify): _____		Result ☐ Positive ☐ Negative ☐ Unknown ☐ Inconclusive
If ELISA, choose type	☐ IgG ☐ IgM ☐ IgG & IgM ☐ ImmunoDot (IgM) ☐ Not Applicable		Titer* _____ *If applicable*

Leptospira serovar^ _____ ^*identified by PFGE, MLST, or other molecular typing method*

Leptospirosis Case Report Form

Visit www.cdc.gov/leptospirosis for a fillable PDF version of this Case Report

Form Approved
OMB 0920-0728
Exp. 1/31/2019

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

Contact with animals *(select all that apply)*

☐ Farm livestock ☐ Wildlife ☐ Rodents ☐ Dogs ☐ Other ☐ No known contact ☐ Unknown

Specify animal: _____

Where did animal contact(s) occur *(eg, at home)*? _____

Contact with water *(select all that apply)*

☐ Standing fresh water *(eg, lake, pond)* ☐ River/stream ☐ Wet soil ☐ Flood water, run-off ☐ Sewage

☐ Other ☐ No known contact ☐ Unknown Specify water: _____

Where did water contact(s) occur *(specify location)*? _____

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

☐ Occupational

☐ Farmer (Land) ☐ Farmer (Animals) ☐ Fish worker ☐ Unknown ☐ Other

If Other, Specify: _____

☐ Avocational

☐ Gardening ☐ Pet Ownership ☐ Unknown ☐ Other

If Other, Specify: _____

☐ Recreational

☐ Swimming ☐ Boating ☐ Outdoor competition ☐ Camping/hiking ☐ Hunting ☐ Unknown ☐ Other

If Other, Specify: _____

☐ Other *(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, 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

Did the patient have similar exposures as a contact diagnosed with leptospirosis in the 30 day period? ☐ Yes ☐ No ☐ Unknown

Has the patient ever had 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

Investigator Name: _____ Phone Number: _____

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 in acute phase serum specimen, but without confirmatory laboratory evidence of *Leptospira* infection.