Leptospirosis

Signs and Symptoms	• May be asymptomatic, may be biphasic. Severe muscle aches (calves and lumbar region) and conjunctival suffusion are specific findings but less common. • Acute phase: fever begins abruptly, chills, headaches, myalgia, vomiting, nausea, diarrhea, abdominal pain, jaundice, or rash. • Convalescent phase (~10%): More severe, with possible kidney or liver failure, meningitis, respiratory distress, bleeding. 5-15% case fatality if severe.	
Incubation	5-14 days (range 2-30 days)	
Case classification	**Clinical criteria**: One or more of the following: fever, headache, chills, myalgia, vomiting, nausea, diarrhea, abdominal pain, conjunctival suffusion, renal insufficiency, jaundice, respiratory insufficiency, meningitis, or rash.	
	Confirmed: Meets confirmatory laboratory evidence.	**Probable:** A clinically compatible case meeting presumptive laboratory evidence OR a clinically compatible case meeting epi linkage criteria.
Differential diagnosis	Mononucleosis, influenza, hepatitis B and C, meningitis, brucellosis, tularemia, dengue, TBRF, Colorado tick fever, plague, rickettsiosis, ehrlichiosis, and Q fever.	
Treatment	Antibiotic therapy, generally doxycycline or penicillin. Could become more severe if untreated, eventually requiring intravenous antibiotics.	
Duration	Acute: 5-7 days. Convalescent: 4-30 days, beginning 3-4 days after acute phase.	
Exposure	Broken skin or mucous exposure to urine or other body fluids from infected animals or contact with contaminated water, soil, or food. Direct person-to-person transmission is rare.	
Laboratory testing	Local Health Jurisdiction (LHJ) and Communicable Disease Epidemiology (CDE) arrange testing for individual cases and environmental testing for suspected outbreaks. • Washington State Public Health Laboratories can facilitate testing at CDC • **Best specimens**: 2 mL of acute serum (≤ 7 days) paired with 2 mL of convalescent serum (2-4 weeks); PCR can be performed on blood, serum, CSF, or urine. • *Leptospira* spp. should be grown in semi-solid EMJH. *Specimen shipping (Section 4):* • Keep blood, serum, CSF, or urine specimens **cold,** tissue frozen, other specimens room temperature; include two identifies on specimen and form, ship according to PHL requirements: https://doh.wa.gov/public-health-provider-resources/public-health-laboratories/lab-test-menu	
Public health actions **URGENT**	Immediately report to CDE any cases with likely exposure in a public setting. • Identify persons who may have been exposed to the same source as the patient and report and investigate anyone meeting the probable case definition. • Animal infections are reportable to the Washington State Dept. of Agriculture. *Infection Control:* standard precautions.	

Leptospirosis

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To better understand the epidemiology of leptospirosis in Washington State.
2. To identify sources of infection (e.g., animals or contaminated water) and educate people about how to reduce their risk of infection.

B. Legal Reporting Requirements

1. **Health care providers and health care facilities**: notifiable to **local health jurisdiction** within 24 hours.
2. **Laboratories**: notifiable to **local health jurisdiction** within 24 hours; submission on request – isolate or if no isolate specimen associated with positive result, within 2 business days.
3. **Veterinarians:** animal cases notifiable to Washington State Department of Agriculture. https://app.leg.wa.gov/WAC/default.aspx?cite=16-70
4. **Local health jurisdictions**: notifiable to the Washington State Department of Health (DOH) Office of Communicable Disease Epidemiology (CDE) within 7 days of case investigation completion or summary information required within 21 days.

C. Local Health Jurisdiction Investigation Responsibilities

1. Facilitate the transport of specimens to Washington State Public Health Laboratories for confirmatory testing when necessary.
2. Report all *confirmed* and *probable* cases (see below) to CDE using the leptospirosis case report form https://www.doh.wa.gov/Portals/1/Documents/5100/210-057-ReportForm-Lepto.pdf and enter data in the Washington Disease Reporting System (WDRS).
3. Leptospirosis in an animal is reportable to the Washington State Department of Agriculture. An animal case report form is available at: https://agr.wa.gov/departments/animals-livestock-and-pets/animal-health/reportable-diseases.

2. THE DISEASE AND ITS EPIDEMIOLOGY

Background

Leptospirosis occurs worldwide; except polar climates. It is an occupational hazard for people who work outdoors or with animals, such as farmers, sewer workers, dairy farmers, veterinarians, landscapers, rice and sugarcane field workers, military personnel, or others. It is a recreational hazard for gardeners or participants of sports involving water or mud, particularly in temperate or tropical climates; infections have occurred from swimming, wading, rafting, and adventure racing, among other activities. Outbreaks can occur after heavy rainfall or flooding in endemic areas. Outbreaks of leptospirosis have been identified in the United States after flooding in Hawaii and in Puerto Rico following

hurricanes. In temperate climates, peak incidence is during the summer, when leptospires survive longer in the environment.

A. Etiologic Agent

The infection is caused by spiral-shaped bacteria (spirochete) of the genus *Leptospira*. The spirochetes can be associated with animal hosts or be free-living; they are spread through the urine or other body fluids of infected animals and persist well in water, soil, and mud. Multiple pathogenic species exist, including *Leptospira interrogans*, and are subdivided into pathogenic serovars based on antigenic properties. More than 300 serovars have been identified within these species. Common pathogenic serovars in the United States in the *L. interrogans* species are *pomona*, *icterohaemorrhagiae, canicola,* and *autumnalis*. Although incidence in the United States is relatively low (100-150 cases per year), leptospirosis is widespread worldwide.

B. Description of Illness

Clinical course is highly variable, ranging from asymptomatic to self-limited febrile illness to severe disease. Symptoms include fever, headache, chills, vomiting, nausea, abdominal pain, diarrhea, cough, jaundice, anemia, or rash. Severe muscle aches (calves and lumbar region) and conjunctival suffusion are specific findings but are seen less commonly. Severe manifestations include kidney failure, jaundice, respiratory distress or failure, liver failure, and meningitis. Clinical illness lasts a few days to 3 weeks or longer and generally has two phases: the acute or leptospiremic phase (5–7 days), followed by the convalescent or immune-mediated phase with severe symptoms (4–30 days). Phases may be separated by 3–4 days; some patients only present in the second phase. If untreated, recovery may take several months. Overall case fatality is 1-5%, and 5-15% among cases with severe disease.

C. Leptospirosis in Washington State

DOH receives 0 to 5 reports of leptospirosis per year. Some of the cases are related to recreational water exposure in other countries, but most cases report exposure to soil or water in western Washington. About 50% of cases in the U.S. occur in Puerto Rico. Leptospirosis is regularly diagnosed in dogs in Washington, though canine to human transmission is rare.

D. Reservoirs

Rats are universal reservoirs for this spirochetal zoonosis, although farm animals and livestock, including cattle, pigs, horses, and dogs, and many wild animals, carry the bacteria. Some become sick while others have no symptoms. Common clinical signs in dogs include fever, vomiting, diarrhea, refusal to eat, and weakness, and may be more severe in younger animals. Leptospires are shed in urine of infected animals and may survive in water or moist soil for weeks to months. In carrier animals with chronic renal infections, leptospiruria can persist for life.

E. Modes of Transmission

Leptospirosis is transmitted by exposure of skin (especially if abraded) or mucous membranes (e.g., eyes, mouth or nose) to urine or other body fluids from infected animals, or, more commonly, by contact with water or soil contaminated with the urine of

infected animals. These water or soil exposures typically occur during recreational (e.g., swimming, wading, camping, rafting) or occupational activities, but have also been associated with floods. Infection can also occur by swallowing contaminated water or food. Person-to-person transmission is rare.

F. Incubation Period

The incubation period is typically 7 days (range: 2–30 days).

G. Period of Communicability

Direct transmission from person to person is rare. Leptospires may be excreted in the urine, usually for 1 month, but leptospiruria has been observed in humans for months, even years, after the acute illness.

H. Treatment

Leptospirosis should be treated with appropriate antibiotic therapy, generally doxycycline or penicillin, given early in the course of disease. Note: Jarisch-Herxheimer reactions may occur with antibiotic treatment.

3. CASE DEFINITIONS

A. Clinical Criteria

An illness characterized by one or more of the following: fever, headache, chills, myalgia, vomiting, nausea, diarrhea, abdominal pain, conjunctival suffusion, renal insufficiency, jaundice, respiratory insufficiency, meningitis, or rash. Symptoms may be biphasic.

B. Laboratory Criteria

Confirmatory:

- 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 (P1 clade) or intermediate (P2 clade) *Leptospira* DNA (e.g., by PCR) from a clinical specimen.

Presumptive:

- *Leptospira* agglutination titer of ≥200 but <800 by 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 serum specimen.

C. Epidemiologic Linkage Criteria

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

D. Case Definition (2025)

Probable:

- Meets clinical criteria AND meets presumptive laboratory evidence, OR
- Meets clinical criteria AND meets epidemiologic linkage criteria.

Confirmed: meets confirmatory laboratory evidence.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Diagnosis

Diagnostic testing should be requested for patients in whom there is a high index of suspicion for leptospirosis, based either on signs and symptoms, or on occupational, recreational, or vocational exposure to animals or environments contaminated with animal urine.

1. Serologic tests: The diagnosis of leptospirosis is most commonly demonstrated by ELISA or MAT. Antibodies develop during the second week of illness. An acute serum specimen should be collected when the diagnosis is suspected (≥7 days after onset) and the convalescent serum should be collected at least 10-14 days after the acute specimen.
2. Culture: Requires special media. Leptospires can be isolated from whole blood (within 7 days of onset), cerebrospinal fluid (CSF) during the acute illness (4-10 days from onset), and from urine (after the 7th day and only if inoculated into special media within 2 hours of voiding). Clinical or autopsy specimens (e.g., punch biopsy of kidney) should be submitted fresh or frozen.
3. PCR: *Leptospira* species molecular detection from blood or urine. Blood specimens should be collected in EDTA or Sodium Citrate tubes; blood specimens in heparin are not acceptable. Specimens should be submitted frozen.
4. Immunofluorescence (IF) and immunohistochemistry (IHC) techniques are used for detection of leptospires in clinical and autopsy specimens (e.g., kidney, liver). Tissue should be formalin fixed or paraffin embedded.

B. Services Available at the Washington State Public Health Laboratories (PHL)

Testing for leptospirosis is not performed at PHL but specimens will be forwarded to the Centers for Disease Control and Prevention (CDC) for testing. Contact the Office of Communicable Disease Epidemiology (206 418-5500 or 877-539-4344) to arrange for testing, especially for cultures in order to request special media.

Note that the PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date.

C. Specimen Collection

Collect 2 mL of serum, preferably an acute specimen (≤ 7 days after symptom onset) and a convalescent specimen (≥14 days after symptom onset) sent as a pair. Whole blood specimens for PCR should be collected in tubes containing any anticoagulant EXCEPT for heparin. Ship according to PHL requirements: https://doh.wa.gov/public-health-provider-resources/public-health-laboratories/lab-test-menu.

5. ROUTINE CASE INVESTIGATION

Interview the case and others who might provide pertinent information.

A. Evaluate the Diagnosis

Review the clinical presentation and laboratory results. Because leptospirosis rarely occurs in Washington, specimens should be collected for confirmatory testing at CDC if confirmatory testing has not already been performed. If possible, arrange for diagnostic specimens to be shipped to the Public Health Laboratories. Ensure that appropriate specimens are collected at the appropriate times (see Section 4 above).

B. Manage the Case

No follow up needed. Hospitalized patients should be cared for using standard precautions.

C. Identify Potential Sources of Infection

Ask the case about contact with animals, particularly if known to be infected, and exposure to water, mud, or soil e.g., recreational water exposures, drinking untreated water, occupational hazards, etc.

D. Identify Contacts / Other Potentially Exposed Persons

Identify persons who may have exposed to the same source as the patient. If any are ill, inform them of possible exposure, in order to facilitate proper diagnosis and therapy. Anyone meeting the probable case definition (i.e., clinically compatible illness sharing a common exposure with the case) should be reported and investigated in the same manner as the case.

E. Management of Contacts / Others Exposed

The infection is not routinely spread person-to-person.

Persons exposed to the same source as the case should be educated about symptoms of leptospirosis to facilitate prompt diagnosis and treatment if they become ill. Doxycycline may be effective in preventing leptospirosis in adults exposed in high-risk areas. In Washington, prophylaxis would rarely be warranted and is not routinely recommended. Exposed persons who are pregnant or immunocompromised should be referred to their healthcare provider to discuss whether PEP is clinically recommended.

F. Environmental Evaluation/Management

If a site of exposure is determined, (e.g., contaminated lake) consider posting signs in the area to warn others of the risk and prevent further illness. Report recreational water associated cases to the local environmental health division.

6. MANAGING SPECIAL SITUATIONS

A. Leptospirosis in an Animal

Animal infections are reportable to the Washington State Department of Agriculture (WAC 16-70). WSDA reports positive laboratory findings to DOH, which notifies the LHJ of animal residence. The primary mode of transmission of leptospirosis from pets to humans is through direct or indirect contact with contaminated tissues, organs, or urine. People in contact with the infected animal (owners, clinicians, kennel workers, etc.) should be provided the following information. Template letters for owners of infected dogs and veterinarians are available from the ZD External Sharepoint or by emailing zd@doh.wa.gov:

- Avoid unprotected contact with urine, blood or tissues from the infected animal until it has completed treatment.
- Wash your hands after handling your pet or anything that might have your pet's excrement on it. If you are cleaning surfaces that may be contaminated, use an antibacterial cleaning solution or 1 part bleach to 10 parts water.
- Make sure your infected pet takes all of its medicine and follow up with your veterinarian.
- Maintain symptom watch for 30 days after last exposure, and tell your healthcare provider about exposure if symptoms consistent with leptospirosis occur.

CDC does not have standard post-exposure prophylaxis recommendations for exposed, asymptomatic individuals. However, pregnant or immunocompromised exposed individuals should discuss PEP with their healthcare provider to decide whether PEP should be administered.

B. Outbreaks

Determine if the case is associated with or potentially associated with an outbreak.

If an outbreak is suspected, notify the Office of Communicable Disease Epidemiology immediately: 1-877-539-4344.

7. ROUTINE PREVENTION

A. Immunization Recommendations

No licensed vaccine for people exists in the United States.

B. Prevention Recommendations:

Prevention involves avoiding contact with potentially infected animals and contaminated water and soil.

1. If drinking water is being collected from a source potentially contaminated by flood water or exposed to urine from infected animals, treat by boiling or appropriate chemical methods before drinking.

2. Do not swim wade, bathe, submerse your head in, or swallow flood or fresh water that might be contaminated with animal urine.
3. Persons with occupational or recreational exposure to potentially infected animals, water or soil should wear protective clothing, boots, and gloves.
4. Do not feed wildlife or attract wildlife to homes or yards.
5. Prevent rodent infestation by keeping food, water, and trash in closed containers, and trapping any rodents that you see. Rodent-proof homes and out-buildings. Avoid eating food to which rodents may have had access.
6. Vaccinate pets against leptospirosis. The vaccine for pets does not provide 100% protection, because the vaccine does not provide immunity against all strains of *Leptospira*. It is important to get your pet vaccinated even if it gets leptospirosis because it can still get infected with a different *Leptospira* strain.
7. Dispose of animal carcasses properly.
8. Drain potentially contaminated waters and soil when possible.

For additional information, see: https://www.cdc.gov/leptospirosis/prevention/index.html

ACKNOWLEDGEMENTS

This document is a revision of the Washington State Guidelines for Notifiable Condition Reporting and Surveillance published in 2002 which were originally based on the Control of Communicable Diseases Manual (CCDM), 17th Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format and select content of this document.

https://wwwnc.cdc.gov/eid/article/10/3/03-0431_article

UPDATES

May 2008: Severe symptoms were added to section 2B.

July 2008: Updated to include information regarding the reporting and management of leptospirosis in animals.

January 2011: The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision. The disease epidemiology and laboratory testing guidance were updated (Sections 2 and 4).

January 2013: The case classifications and case-defining laboratory and clinical criteria in Section 3 were updated to reflect the new 2013 CSTE case definition. The outline format was revised to combine Routine Case Investigation and Controlling Further Spread into a single Section 5.

October 2015: reviewed, updated links

December 2017: Front page added. Reviewed, updated Specimen Collection guidelines, expanded disease details.

December 2019: Updated section 6A, routine review.

December 2022: For 2023 WAC revision combined provider and facility reporting requirement, updated laboratory submission (Section 1B)

December 2023: For 2024 WAC revision updated laboratory submission.

June 2024: CDC links updated

December 2024: Revised to CSTE 2025 case definition; general updates