Leptospirosis

Disease Category: Zoonotic

Timeframe to follow-up: Within one working day

Signs and Symptoms (1)	Fever, headache, chills, body or muscle aches, vomiting or nausea, jaundice, red eyes, stomach pain, diarrhea, rash
Incubation	Usually 5-14 days; range 2-30 days
Case Classification	Laboratory criteria *Presumptive Laboratory Evidence:* • *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. *Confirmatory Laboratory Evidence:* • 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.
	Case classification Probable • Meets clinical criteria AND meets presumptive laboratory evidence, OR • Meets clinical criteria AND meets epidemiologic linkage criteria. Confirmed • Meets confirmatory laboratory evidence.
Differential Diagnosis (2)	Brucellosis, Dengue, Chikungunya, Enteroviral infections, Hantavirus, Hepatitis A, Malaria, Meningitis, Q Fever, Rickettsial infection, Viral Hemorrhagic fevers, measles, Rubella

Treatment	Antimicrobial therapy should be initiated as soon as possible; doxycycline or penicillin is typically recommended. Intravenous antibiotics may be required for severe infections.
Duration	Symptoms usually persist for a few days to 3 weeks, depending on the severity of the infection.
Exposure	• Contact of mucosal surfaces or skin abrasions with urine-contaminated environmental sources (soil and water) or direct contact with infected animals or their tissues, urine, or other body fluids. • Occupational exposure including abattoir and sewer workers, miners, veterinarians, farmers and military personnel. • Recreational exposure with adventure travel, sporting events (triathlons, wading, swimming, or boating) in contaminated water, particularly during flooding, heavy rainfall, or natural disasters (hurricanes and monsoons).
Laboratory Testing	Nevada State Public Health Laboratory (NSPHL) does not test for *Leptospira* but can assist in forwarding on to the CDC. Coordinate efforts with OSE, LHA's, and NSPHL.
Control of Contacts	Disease does not have person-to-person contact and does not require any control measures of contacts
Key areas of focus during investigation	Animal exposure (rat/mouse, dog, cow, horse, domestic pig, goat or sheep); contact with fresh water or mud; contact with sewage; travel to tropical or sub-tropic areas.
Public Health Actions	Reports of leptospirosis cases must be made to the Local Health Authority during the regular business hours of the health authority on the first working day following the identification of the case. Local Health Authority to notify Office of State Epidemiology (dpbhepi@health.nv.gov) or call 775-684-5911/775-400-0333 (after hours) if outbreak suspected. For individual confirmed or probable cases: • Confirm diagnosis, if possible • Identify potential exposures • Prepare a case report and submit to the Chief Medical Officer (through OSE) within 7 days after completing the case investigation • Identify potential outbreaks from common sources • Some animals, especially rodents and livestock, can become chronic carriers of leptospirosis, posing ongoing risks for disease transmission to humans and other animals • Individuals working in agriculture, sewage, and animal handling are at higher risk and should employ protective measures such as waterproof clothing and proper vaccination where available

	• To the best of the local health authority's ability, each step of the investigation should be completed within one working day or in alignment with NAC 441A.
Key Partner Agencies	• Environmental Health • Nevada Department of Agriculture • Nevada Department of Wildlife • Nevada State Public Health Laboratory

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LEPTOSPIROSIS

I. DISEASE REPORTING

A. Legal Reporting Requirements

A report to the health authority may be made by telephone; telecopy (in the form prescribed by the health authority); or any form of electronic communication identified by the health authority, following the specified format and procedure. (3)

1. Health Care Providers and Health Care Facilities

Health providers and facilities must notify the health authority where provider is located within the first working day after identifying the case. (3) (4) (5)

2. *Laboratories*

Laboratories must notify the health authority within the first working day after identifying the case. (3) If the lab is located outside of Nevada, notify the Nevada Chief Medical Officer through the Office of State Epidemiology (OSE) within the same timeframe. (3) (6)

3. Local Health Authority (LHA)

LHA's must notify the Office of State Epidemiology (OSE) within 7 days after completing the case investigation. (7)

II. THE DISEASE AND ITS EPIDEMIOLOGY

A. Background

Leptospirosis is an infection caused by the bacterium *Leptospira,* which spreads through the urine of infected livestock, pets, rodents, marine mammals, and wild animals. If the urine from an infected animal contaminates water or soil, the bacteria can persist for several weeks to months. (8) While thought to be the most widespread zoonotic disease in the world, in the United States the incidence is relatively low. (2) It occurs most frequently in tropical and subtropical climates, with cases increasing after hurricanes or flooding when individuals may come into contact with contaminated water. (8)

The mortality rate for leptospirosis can vary significantly based on the severity of the disease, the health status of the patient, and the timeliness and adequacy of treatment received. Generally, the case-fatality rates are as follows:

Mild cases: Often do not result in mortality as they may present mild symptoms that can be easily managed with appropriate antibiotics.

Severe cases: The mortality rate can range from 5% to 20% among hospitalized patients. In instances where patients develop severe complications such as pulmonary hemorrhage, multiorgan failure, or refractory shock, the mortality rate can exceed 50%, particularly if not promptly and effectively treated. (9)

B. Etiologic Agent

Infection is caused by spiral-shaped bacteria (spirochete) of the genus *Leptospira* called leptospires. They spread in the urine and body fluids of infected animals.

C. Description of Illness (2) (9)

Leptospirosis can cause a wide range of non-specific symptoms easily confused with other diseases, and some people who are infected will have no symptoms at all. There are two phases in the illness.

Acute, or bacteremic, phase (first 7-14 days of the illness): abrupt onset of high fever, headache, aches in the calves and lower back, nausea, vomiting, and diarrhea in 50% of cases, and nonproductive cough in 25 to 35% of cases

Second phase, or immune phase (1-2 weeks later) but often does not result in symptoms. For those who develop symptoms, this phase is characterized by prolonged fever and aseptic meningitis

Distinction between phases is not always apparent, and sometimes patients may just experience a monophasic illness. In approximately 5-10% of symptomatic cases, a rapidly progressive multisystem illness is referred to as Weil's disease or icteric leptospirosis can occur, associated with mortality rates of 5 to 15%. This is typically accompanied by fever, jaundice, and renal failure.

D. Disease Burden in Nevada

Leptospirosis is not common in Nevada.

See the Nevada Office of State Epidemiology Communicable Disease Dashboard for Nevada specific data on leptospirosis. (Zoonotic section).

E. Reservoirs

Leptospirosis has a wide range of mammalian hosts including rodents, wildlife, domestic dogs, and livestock. These animals are natural carriers and can harbor the bacteria without showing symptoms. Infected animals excrete the bacteria through urine which can contaminate water and soil. (9)

F. Modes of Transmission

Infection typically occurs through direct or indirect contact with the urine of infected animals or a contaminated environment, particularly water. It can enter the body through broken skin, mucous membranes, or ingestion. (9)

G. Incubation Period

Typically, 5–14 days, with a range from 2 to 30 days. (9)

H. Period of Communicability

Humans are generally considered dead-end hosts for leptospirosis, meaning they do not typically transmit the disease to others. However, the bacteria can be present in human urine; the risk of human-to-human transmission, while extremely rare, might theoretically

occur through exposure to contaminated urine. Nevertheless, this is not commonly documented or considered a significant route of transmission. (9)

I. Testing

Collect whole blood and serum samples during the acute phase (first week) for culture and PCR testing, and serum +/- urine samples during the convalescent phase. If leptospirosis is suspected, coordinate with Office of State Epidemiology (OSE) and the Nevada State Public Health Laboratory (NSPHL).

Table 1: Leptospirosis Testing (10)

Supportive Diagnostic Tests	
IgM- based commercial assays: ELISA IgM ImmunoDOT Lateral flow tests	IgM assays are screening tests and results should be confirmed.
Confirmatory Diagnostic Test	
Microscopic agglutination test (MAT) confirmed serologic testing, available at CDC	• Acute and convalescent serum samples collected 7-14 days apart is ideal. • If only one serum sample can be sent for testing, a sample collected after the first 7-10 days of illness is preferred.
Polymerase Chain Reaction (PCR) available at CDC and some commercial labs	Recommended samples: whole blood collected in the first week of illness (first 4 days), urine (collected at least 1 week after symptom onset), cerebrospinal fluid from a patient with signs of meningitis, fresh, frozen kidney and/or liver (if available from deceased patient) kidney is preferred.
Pathology (immunohistochemistry) available at CDC	Formalin-fixed tissues: from kidney (preferred), liver, lung, heart, or spleen

J. Treatment

Early treatment can reduce severity and duration of disease. If there is a high clinical suspicion of leptospirosis it is advised to start antibiotic treatment as soon as possible without waiting for laboratory results. (8) For patients with mild symptoms, doxycycline is the drug of choice if not contraindicated. Intravenous antibiotic treatment may be needed for severe cases.

Provide most current treatment guidelines from Red Book to the healthcare provider or refer case to physician for proper treatment for leptospirosis.

III. EPIDEMIOLOGIC CASE INVESTIGATION

The public health authority should begin investigating the case of leptospirosis, step by step, within one working day of notification or in alignment with NAC 441A.

A. Step 1: Review relevant information about the disease.

1. Review scientific information in Control of Communicable Diseases Manual, most recent edition.

2. Review leptospirosis most recent case definition (2025 CDC).

B. Step 2: Begin investigating the case.

1. Contact Reporting Source and/or Reported Case

Upon receiving an initial case report, review lab test results and available clinical details and epidemiologic factors. Please make three attempts to contact the case (text and phone calls) on separate days, at different times of the day (morning, afternoon, late afternoon). Document all attempts to contact a reporting source and/or reported case, preferably in the "Encounters" tab of EpiTrax. Please use case report forms (CRF) to gather accurate information about the case. Focus on the key data elements listed above. Filling out an electronic version of the CRF in EpiTrax (called a Confidential Morbidity Report (CMR) in EpiTrax) is preferred. If used, the completed PDF version should be attached to the CMR in EpiTrax. The CRF should be completed within 7 days of completing the investigation of the case. (7)

C. Step 3: Identify potential sources of infection

The investigation focuses on exposures in the 3 weeks before onset. Ask about any risk factors for infection such as contact with animals, especially if known to be infected, and exposure to water, mud, or soil through recreational water exposure, drinking untreated water, and occupational hazards.

D. Step 4: Initiate control measures for case and/or for contacts (see Section IV – Section VI below).

E. Step 5: Provide Education and Prevention messaging to the case and/or contacts (see Section IX below).

IV. CONTROL OF CASE

Disease does not require any specific control measures of cases. Please provide education and prevention measures. If case is in a medical facility, blood and body fluid precautions are advised for potential exposure to urine. Pregnant women- Careful monitoring and antibiotic treatment. Penicillin can prevent transmission to fetus.

V. CONTROL OF CONTACTS

Disease does not have person-to-person contact and does not require any control measures of contacts. Please provide education and prevention measures.

VI. CONTROL OF CARRIERS

A carrier state has not been documented for leptospirosis and thus no carrier-specific control measures are needed.

VII. MANAGEMENT OF SPECIAL SITUATIONS/OUTBREAK CONTROL

Coordinate with senior epidemiology staff to determine if an outbreak is occurring. If so, notify Nevada Environmental Health, local health authorities, or infection control, as appropriate.

VIII. PREVENTION

- Don't swim or wade in water that may be contaminated with animal urine, especially after hurricanes, floods, or heavy rainfall.
- Avoid contact with animals that may be infected.
- Cover any cuts or scratches with waterproof bandages.
- Wear waterproof protective clothing (i.e., shoes or boots) near floodwater, or other water or soil that may be contaminated.
- Research any body of water for possible leptospirosis infection if planning on participating in recreational activities (swimming, boating, fishing).
- Wash hands frequently.
- Provide protective clothing and equipment to workers that come into contact with animals or contaminated water or soil.
- Vaccinate animals against leptospirosis, and isolate sick animals. (10)

The Nevada OSE website also provides information about leptospirosis, as does the One Health website.

IX. REFERENCES

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X. ACKNOWLEDGEMENTS

This document was developed based on the content and format of the disease investigation guidelines of several state and local health jurisdictions:

- Oregon Health Authority Investigative Guidelines
- Washington State Department of Health Reporting and Surveillance Guidelines
- Washoe County Health District Epidemiology and Communicable Disease Program Investigation of Communicable Disease Manual

The Nevada Office of State Epidemiology would like to acknowledge the work of these great partners.

XI. UPDATE LOG

12/02/2025

Ihsan Azzam, Ph.D., M.D.
Chief Medical Officer

Chief Medical Officer Approval Date