

PUBLIC HEALTH REFERENCE SHEET

Leptospirosis



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| Name | <i>Leptospira interrogans</i> (Weil's disease) |
| Reservoir & Transmission | Wild and domestic animals (rats, cattle, swine, raccoons, dog, cats) Skin or mucous membrane contact with contaminated substance; Consuming water or food contaminated with urine of infected animals; Inhalation of droplet aerosols of contaminated fluids |
| Incubation Period | Usually 5–14 days with a range of 2–30 days |
| Common Symptoms | Myalgia, headache, jaundice conjunctival suffusion without purulent discharge, rash, aseptic meningitis, GI symptoms, pulmonary complications, cardiac arrhythmias, renal insufficiency, hemorrhage, acute renal failure |
| Gold Standard Diagnostic Test | Microscopic agglutination test (MAT) |
| Risk Groups | Children and adults where infection is endemic in animal reservoirs; Agricultural workers, fish workers, miners, veterinarians, dairy workers, sewer workers |
| Geographic Significance | Worldwide, particularly tropical and subtropical regions |

What is leptospirosis?

Leptospirosis, also known as Weil's disease, is caused by *Leptospira* species, which is an obligate aerobic, gram-negative spirochete bacterium that affects humans and animals.

What is the occurrence of leptospirosis?

Regions with the highest estimated morbidity and mortality include parts of sub-Saharan Africa, parts of Latin America, the Caribbean, South and Southeast Asia, and Oceania. The estimated worldwide annual incidence of leptospirosis is >1 million cases, most commonly in adult males, and resulting in approximately 59,000 deaths. Outbreaks can occur after heavy rainfall or flooding in endemic areas, especially in urban areas where housing conditions and sanitation are poor and rodent infestation is common. Outbreaks of leptospirosis have occurred after flooding in Florida, Hawaii, Puerto Rico, and the U.S. Virgin Islands.

How is leptospirosis transmitted?

Leptospira are spread through the urine of infected animals, which can get into water or soil and survive for weeks to months. Rodents are an important reservoir for *Leptospira*, but most mammals (e.g., dogs, horses, cattle, and swine) and many wildlife species (e.g., raccoons, opossums, buffaloes, sheep, and goats) can be infected and shed the bacteria in their urine. Infected animals, even if asymptomatic, may continue to excrete the bacteria into the environment, continuously or occasionally, for a few months or up to several years. Humans can be infected by direct contact with urine or reproductive fluids from infected animals, through contact with urine-contaminated freshwater sources or wet soil, or by consuming contaminated food or water. Infection rarely occurs through animal bites or human-to-human contact. *Leptospira* can enter the body through skin or mucous membranes (eyes, nose, or mouth), especially if the skin is broken from a cut or scratch or macerated from prolonged water exposure. Outbreaks of Leptospirosis are usually caused by exposure to contaminated water, such as floodwaters. Person-to-person transmission is rare.

Who is at risk for leptospirosis?

Leptospirosis most often affects humanitarian aid workers at sites of hurricanes or floods; military personnel during training and operations in endemic areas; adventure tourists; outdoor

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athletes; or anyone exposed to floodwater, contaminated freshwater (rivers and streams), soil, or mud. Individuals are at risk when working directly with animals in endemic areas, especially when exposed to their body fluids, and visiting or residing in areas with rodent infestation. Activities that increase risk of leptospirosis include drinking from potentially contaminated water sources, including floodwater, streams, rivers, or unsafe tap water; bathing or wading in floodwater or contaminated fresh water, especially with an open wound or scratch; prolonged exposure to contaminated water; and eating food that has been exposed to contaminated water or potentially urinated on by rodents.

What are the signs and symptoms of leptospirosis?

In humans, most infections are asymptomatic. Clinical illness can present as a self-limiting acute febrile illness, estimated to occur in ~90% of clinical infections, or as a severe, potentially fatal illness with multiorgan dysfunction in 5%–10% of patients. Leptospirosis can cause a wide range of symptoms, including high fever, headache, chills, muscle aches, nausea, vomiting, cough, jaundice, red eyes, abdominal pain, diarrhea, and rash. The time between a person's exposure to a contaminated source and becoming sick is 2 days to 4 weeks. The illness lasts from a few days to 3 weeks or longer. Without treatment, recovery may take several months.

What are potential complications of leptospirosis?

In patients who progress to severe disease, the illness can be biphasic, with a temporary decrease in fever between phases. Though distinction between phases might not be apparent, the acute, or bacteremic, phase occurs during the first 7–14 days of illness; this phase is characterized by the abrupt onset of high fever; myalgias (calves and lumbar region); headache (retroorbital and frontal); chills; conjunctival suffusion, characteristic of leptospirosis but not occurring in all cases; nausea; vomiting; diarrhea; abdominal pain; cough; and rarely, a skin rash. A second, or immune, phase occurs days to 1–2 weeks later in conjunction with the development of the antibody response and presence of leptospire in the urine. If clinically apparent, the immune phase is characterized by prolonged fever with both focal and systemic manifestations that do not respond to antibiotics. Clinical findings can include cardiac arrhythmias, hemodynamic collapse, hemorrhage, jaundice, liver failure, aseptic meningitis, pulmonary insufficiency, and renal failure. The classically described syndrome, Weil's disease, consists of renal and liver failure. Leptospirosis can lead to meningitis, respiratory distress, and death. Severe pulmonary hemorrhagic syndrome is a rare but severe form of leptospirosis that can have a case-fatality ratio of >50%. Poor prognostic indicators include older age, development of altered mental status, respiratory insufficiency, or oliguria.

How is Leptospirosis diagnosed?

Antibodies for leptospirosis develop between 3 and 10 days after symptom onset, thus any serologic test must be interpreted accordingly. Negative serologic test results from samples collected in the first week of illness do not rule out disease. Serologic testing should be repeated on a convalescent sample collected 7–14 days after the first. Due to the transience of leptospire in body fluids, a negative PCR test does not rule out leptospirosis. The following recommended specimens are based on collection timing: Acute illness (first week): whole blood and serum; convalescent illness (after first week): serum +/- urine. Confirmatory diagnostic tests available through the CDC include microscopic agglutination test (MAT) serologic testing, and polymerase chain reaction (PCR) of whole blood, urine, or cerebrospinal fluid from a patient with signs of meningitis. Contact the CDC's Bacterial Special Pathogens Branch (bspb@cdc.gov) for identification and genotyping, molecular detection, or serology. Information about laboratory submission is at: https://www.cdc.gov/nceid/dhcpp/bacterial_special/labsubmission.html.

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How is Leptospirosis treated?

In patients with a high clinical suspicion of leptospirosis, initiate antibiotic treatment as soon as possible without waiting for laboratory results. Early treatment can be effective in decreasing the severity and duration of infection. For patients with mild symptoms, doxycycline is preferred if not contraindicated. Alternative treatment options include azithromycin, ampicillin, or amoxicillin. For patients with severe leptospirosis, intravenous penicillin is the drug of choice; ceftriaxone and cefotaxime are alternative antimicrobial agents. As with other spirochetal diseases, antibiotic treatment of patients with leptospirosis might cause a Jarisch-Herxheimer reaction; the reaction is rarely fatal. Patients with severe leptospirosis might require hospitalization and supportive therapy, including intravenous hydration and electrolyte supplementation, dialysis in cases of oliguric renal failure, and mechanical ventilation in cases of respiratory failure.

How can leptospirosis be prevented?

Avoid exposure to potentially contaminated bodies of freshwater, flood waters, potentially infected animals or their body fluids, and areas with rodent infestation. Use personal protective equipment to include clothing or footwear when potentially exposed to contaminated water or soil. Boil or chemically treat potentially contaminated drinking water. Limited studies have shown that chemoprophylaxis with doxycycline (200 mg orally, weekly) begun 1–2 days before and continuing through the period of exposure may be effective in preventing clinical disease in adults and could be considered for people at high risk and with short-term exposures. No human vaccine is available in the United States.

What are some public health considerations?

- Document relevant travel and deployment history occurring within the incubation period.
- Document circumstances under which the case patient was exposed including duty exposure, occupational activities, environmental exposures, or other high-risk activities.
- Report probable and confirmed cases. A CDC case report form is available at: https://www.cdc.gov/leptospirosis/health_care_workers/index.html

References:

Defense Health Agency. 2022. *Armed Forces Reportable Medical Events: Guidelines and Case Definitions*.

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Heymann, David L. ed. 2022. *Control of Communicable Diseases Manual*. 21st Edition. Washington, DC: APHA Press.

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