

Tularemia

Summary

Tularemia, also known as rabbit fever, is a zoonotic disease caused by the bacterium *Francisella tularensis*. Tularemia is found throughout the northern hemisphere. The primary reservoir hosts are rabbits and rodents. Ticks serve as both reservoirs and vectors of tularemia. Typically, humans become infected through tick or deerfly bites or by handling infected animals. Less commonly, infection may be acquired by direct contact or ingestion of contaminated water, food, or soil, inhaling airborne bacteria, or from animal bites. Dogs and cats are also susceptible to tularemia and typically become infected through ingestion of infected rodents or rabbits.

The most common clinical presentation is the ulceroglandular form as a skin ulcer or eschar at the site of inoculation of the organism together with swelling of the regional lymph nodes. Other presentations include glandular (lymphadenitis with no apparent primary ulcer), oropharyngeal (from ingestion of contaminated food or water), primary pneumonic (inhalation of infectious material), oculoglandular (conjunctivitis and lymphadenitis after inoculation of the conjunctival sac), and typhoidal with no localizing signs. All forms of tularemia can progress to secondary pneumonia, meningitis, or sepsis. Tularemia has not been shown to spread from person to person. Tularemia is treatable with antibiotics but has been fatal with inadequate or delayed treatment. Tularemia preventive measures include avoidance of tick and deer fly bites, use of impervious gloves when skinning or handling rabbits or rodents, cooking rabbit or rodent meat thoroughly, using tick control products on pets, and preventing pets from hunting.

Tularemia is considered a Tier 1 select agent due to its potential for aerosolization and low infectious dose.

Agent

Tularemia is caused by *Francisella tularensis*, a small, non-motile, gram-negative coccobacillus. Two subspecies cause human infection in North America: *F. tularensis* subspecies *tularensis* (type A) which is considered more virulent, and *holarctica* (type B) which causes most of the infections in humans and animals.

Transmission

Reservoir:

Wild rodents and lagomorphs (rabbits and hares) are the natural vertebrate reservoirs of tularemia. Hard ticks (Ixodidae) can also serve as a reservoir, while deer fly bites, contaminated water or soil, and infected domestic animals may also be a source of infection to humans.

Vector:

In New Mexico, hard ticks and deer flies are the most important vectors of tularemia to humans. In Europe, there has been demonstrated transmission from mosquitoes.

Mode of Transmission:

Most humans acquire tularemia through handling infected rabbits or rodents, or from deer fly or tick bites.

Tularemia may also be transmitted by:

- 1) Direct contact with tissues and fluids of infected rodents and rabbits

- 2) Bites or scratches from infected domestic cats (more common) or dogs (less common)
- 3) Inhalation of dust from contaminated soil, grain, or hay, or during landscaping if a lawnmower runs over an infected animal carcass
- 4) Ingestion of contaminated water or undercooked meat from an infected animal
- 5) Rarely the mishandling of tularemia cultures by laboratory workers.

Period of Communicability:

No direct person-to-person transmission. Infected cats or dogs may have draining lesions or saliva that should be considered infectious until 48 hours of appropriate antimicrobial therapy has been given AND there is evidence of clinical improvement. *Francisella tularensis* may be found in the blood of untreated patients during the first two weeks of disease and in lesions for a month or more. Flies can be infective for 14 days and ticks throughout their lifetime (about two years). Tularemia is exceptionally hardy in the environment, and *F. tularensis* bacteria have been shown to survive for weeks at low temperatures in water, moist soil, hay, straw, and decaying animal carcasses. Frozen rabbit meat has remained infective for years.

Clinical Disease

Incubation period:

Related to size of inoculum, usually 3-5 days with a range of 1-21 days.

Clinical Manifestation:

The common symptoms of tularemia include sudden onset of high fever, chills, fatigue, general body aches, headache, and nausea. Tularemia can infect humans through the skin, mucous membranes, GI tract, and lungs; the clinical presentation will likely reflect the route of infection.

Specific clinical presentations of tularemia include:

- ☐ **Ulceroglandular:** This is the most common form of tularemia, as a slow healing skin ulcer or eschar at the site of inoculation of the organism together with swelling of the regional lymph nodes usually in the armpit or groin.
- ☐ **Glandular:** Lymphadenitis with no apparent primary ulcer.
- ☐ **Oropharyngeal:** A painful pharyngitis can develop from ingestion of contaminated food or water, along with abdominal pain, diarrhea and vomiting.
- ☐ **Oculoglandular:** Follows direct contamination of the eye with ulceration of the conjunctiva, chemosis, vasculitis, and regional lymphadenitis.
- ☐ **Pneumonic:** Tularemia pneumonia can be the direct result of inhaling contaminated aerosols or be secondary to hematogenous spread from a distal site. Bronchiolitis, pleuro-pneumonitis, and hilar lymphadenitis accompanied by systemic illness may be present.
- ☐ **Typhoidal:** Systemic infection manifested as fever and other constitutional signs/symptoms without cutaneous or mucosal membrane lesions or regional lymphadenitis.

Tularemia **cannot be distinguished clinically from plague, as well as other infectious diseases including staphylococcal and streptococcal infections, cat scratch fever and tuberculosis**, and should be considered in any patient who presents with fever and acute lymphadenitis and resides in an area where tularemia is endemic. Human cases in New Mexico have occurred in Bernalillo, Rio Arriba, and San Juan Counties while animal cases have occurred in San Juan, Torrance, Rio Arriba, Bernalillo, Santa Fe, Los Alamos, and San Miguel Counties.

Laboratory Diagnosis

Diagnosis of tularemia usually is **confirmed** by culture or PCR detection of *F. tularensis* from blood, skin lesion, lymph node aspirate, or another clinical specimen, or with a fourfold or greater change in serum antibody titer. Samples should be submitted to the New Mexico Department of Health Scientific Laboratory Division (SLD). Prompt diagnosis and treatment are critical for preventing tularemia from progressing to more serious clinical forms. **For those with suspected disease and/or positive initial titer, a repeat titer should be done in 2 to 4 weeks in order to confirm acute infection and rule out an elevated titer due to prior infection.**

Tularemia is frequently diagnosed by serologic testing. **Patients do not develop antibodies until the second week of illness.** A single positive serologic test result (>1:128 for total antibody) by passive hemagglutination assay or enzyme immunoassay in an unimmunized patient who has not previously had tularemia provides presumptive evidence of infection. A 4-fold rise in total antibody titer between two serum specimens **obtained two or more weeks** apart provides serologic confirmation. **In acute infection, an antibody titer of > 1:1024 is commonly found.**

When human tularemia is suspected on clinical and epidemiological grounds, appropriate specimens for diagnosis should be obtained immediately, and the patient should be started on specific antimicrobial therapy pending laboratory confirmation. **At SLD, contact the General Microbiology section (505-383-9127) or the Virology/Serology section (505-383-9124) for questions about specimen submission.**

Treatment

Prompt diagnosis and treatment are critical for preventing tularemia from progressing to more serious clinical forms. When human tularemia is suspected on clinical and epidemiological grounds, appropriate specimens for diagnosis should be obtained immediately, and the **patient should be started on specific antimicrobial therapy pending laboratory confirmation.**

Treatment of disease:

CDC recommends first-line treatment with ciprofloxacin, levofloxacin, gentamicin, or doxycycline for adults and children aged ≥1 month and ciprofloxacin or gentamicin for neonates (≤28 days). When treatment initiation is delayed, ciprofloxacin, levofloxacin, or gentamicin is preferred over doxycycline. Treatment duration is 10 days for ciprofloxacin, levofloxacin, and gentamicin and 14-21 days for doxycycline.

It is important for physicians with suspected cases to consult with an infectious disease specialist. Additional treatment questions may be answered in consultation with UNM PALS: 1-888-866-7257.

Prophylactic therapy: Postexposure prophylactic antibiotic treatment of close contacts of tularemia patients is not recommended since human-to-human transmission of *F. tularensis* is not known to occur. **Persons exposed to a known case of tularemia in an animal** (skinning an infected dead rabbit or rodent, scratch or bite from an infected cat) **should consider antibiotic prophylaxis.** CDC recommends using ciprofloxacin, levofloxacin, or doxycycline for nonpregnant adults, children, and neonates and ciprofloxacin or levofloxacin for people who are pregnant. PEP duration is 7 days for ciprofloxacin and levofloxacin and 10-14 days for doxycycline. PEP should

not be delayed if the preferred antimicrobial is not available. Providers should begin prophylaxis with an available alternative antimicrobial until the preferred antimicrobial is available.

If exposure is less certain, then a fever watch is recommended. For a fever watch, contacts should be instructed to measure their temperature twice a day for 14 days and see a physician immediately if fever greater than 100° F develops.

Laboratory cultures of *F. tularensis* are easily aerosolized and antibiotic prophylaxis may be indicated for laboratory staff if cultures were not kept under a hood while open.

Contact the Infectious Disease Bureau at 1-833-SWNURSE (1-833-796-8773) regarding specific recommendations for tularemia prophylaxis.

Surveillance

Case Definition:

Clinical diagnosis is supported by evidence or history of a tick or deerfly bite, exposure to tissues of a mammalian host of *Francisella tularensis*, or exposure to potentially contaminated water.

Confirmed – a clinically compatible case with confirmatory laboratory results (isolation of *F. tularensis* from a clinical specimen; four-fold or greater change in serum antibody titer to *F. tularensis* antigen between acute and convalescent specimens; or change from a negative immunoglobulin G (IgG) AND a negative immunoglobulin M (IgM) serologic test result to *F. tularensis* antigen on an acute specimen to either a positive (IgG), a positive IgM, or both on a convalescent specimen).

Presumptive – a clinically compatible case with presumptive laboratory results: Elevated serum antibody titer(s) to *F. tularensis* antigen (without documented fourfold or greater change) in a patient with no history of tularemia vaccination; detection of *F. tularensis* in a clinical specimen by fluorescent assay; or detection of *F. tularensis* DNA directly from a clinical or autopsy specimen by molecular testing (e.g., polymerase chain reaction (PCR) or sequencing assay).

Reporting:

Report all suspected or confirmed cases of tularemia to the **Infectious Disease Bureau at 1-833-SWNURSE (1-833-796-8773)**. Information needed includes patient's name, age, sex, race, ethnicity, home address, home phone number, occupation, and health care provider. The Infectious Disease Bureau will complete a tularemia case report form.

Case Investigation:

Tularemia requires immediate reporting by telephone to the Infectious Disease Bureau at (1-833-796-8773). IDEB will complete the CDC Tularemia Surveillance Report form and

Control Measures

1. Case management

1.1. Isolation: Not recommended for tularemia patients given the lack of human-to-human transmission. In hospital settings, standard precautions are recommended. If plague has not yet been ruled out of the diagnosis, then droplet isolation should be continued until 48 hours of

appropriate antimicrobial therapy has been given and there has been a favorable clinical response (e.g., defervescence).

2. Contact management

2.1. Isolation: None required.

2.2. Prophylaxis (see Treatment section also):

- ☐ Asymptomatic persons having direct exposure to infectious materials from sick or dead animals with tularemia or ingestion or inhalation of known tularemia infected material should receive post-exposure antibiotic prophylaxis.
- ☐ Contacts who have not had direct exposure to infectious material should measure their temperature twice a day for 14 days and see a physician immediately if fever greater than 100° F develops, or if any other symptoms occur.
- ☐ Laboratory workers in hospitals or other settings exposed to a potentially aerosolized tularemia culture may also need postexposure prophylaxis. Consult with the Infectious Disease Bureau for further recommendations.

3. Prevention

3.1. Immunization: A vaccine for tularemia has been developed but is not yet available to the general public.

3.2. Surveillance of rabbits and rodents: The Department of Health Zoonoses team submits rodent and rabbit carcasses for routine plague & tularemia surveillance. These carcasses will occasionally test positive for tularemia.

Report rabbit and rodent die offs to the Infectious Disease Bureau at 1-833-SWNURSE (1-833-796-8773). Within Bernalillo County, report rabbit and rodent die-offs to the Albuquerque Environmental Health Department's Urban Biology Division, 505-452-5300.

3.3. Public education: Educate the public about risk factors, preventive measures, and signs and symptoms of tularemia.

- ☐ Control ticks on pets and prevent pets from roaming.
- ☐ Protect yourself from tick and fly bites by wearing EPA-approved insect repellent and long sleeves.
- ☐ Avoid contact with dead and sick animals, and
- ☐ Never drink untreated water from lakes and streams
- ☐ Reduce rodent harborage around the home, such as junk piles and abandoned vehicles.
- ☐ Rodent proof houses and outbuildings.
- ☐ Wear rubber gloves when handling wild game and thoroughly cook wild game meat.
- ☐ Check yard for dead animals before landscaping and farming, and avoid mowing directly over carcasses.

Sources:

Nelson, C. A. (2025). Tularemia antimicrobial treatment and prophylaxis: CDC recommendations for naturally acquired infections and bioterrorism response—United States, 2025. *MMWR. Recommendations and Reports*, 74.

See Tularemia Fact Sheets ([English](#)) ([Spanish](#))