



Report Immediately

Tularemia

(Rabbit Fever, Deer-Fly Fever, Ohara Disease, Francis Disease)

Disease Plan

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Last updated: December 22, 2016 by Bree Barbeau.

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ WHY IS TULAREMIA IMPORTANT TO PUBLIC HEALTH?

The bacterium that causes tularemia, *Francisella tularensis*, is highly infectious and can enter the human body through the skin, eyes, mouth, or lungs. It has been classified as a "category A" agent for bioterrorism because of its very low infectious dose (10–50 organisms), its ability to survive in the environment, the fact that it can be easily disseminated by aerosol, and its potential to cause severe illness and death in cases of untreated inhalational tularemia. One should suspect bioterrorism if there is a cluster of unusual pneumonia cases with an atypical patient profile, e.g., young, otherwise healthy individuals affected with severe illness and low response to standard antibiotic treatment, particularly if the cluster is identified in persons who live or work in a building with a common ventilation system.

If there is any suspicion of potential bioterrorism, call the Bureau of Epidemiology immediately (24/7) at 1-888-EPI-UTAH or 801-538-6191.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Tularemia usually has an abrupt onset of flu-like symptoms, including some combination of fever, chills, anorexia, and malaise. Patients also may complain headache, fatigue, soreness in the chest or muscles, abdominal pain, vomiting, or diarrhea. Classically the fever may abate after a few days, but then quickly return. Symptoms related to route of exposure are listed in detail below but include painful lymph nodes, ulcerated lesions (particularly at site of insect bite) and painful pharyngitis.

To a great extent, the nature of the illness that occurs with tularemia reflects the route of transmission as well as the virulence of the infecting strain. Almost all cases have a rapid onset of fever and lymphadenopathy (inflamed lymph nodes). Bacteremia (bacteria in the blood), if present, may last for two weeks if untreated, and lesions may contain the organism for up to a month.

Glandular	Patients present with one or more enlarged and painful lymph nodes that may become filled with pus.
Oculoglandular	Patients presenting with pus-producing conjunctivitis, enlarged lymph nodes of the neck or near the ears, and usually, fever, chills, and malaise.
Oropharyngeal	After ingestion of bacteria in contaminated food or water, patients present with a painful pharyngitis (with or without ulceration), abdominal pain, diarrhea, and vomiting.
Pneumonic	This form occurs as a primary infection following inhalation of organisms, or secondary to bacteremia; symptoms include non-productive cough, difficulty breathing, and chest pain. Patchy bilateral infiltrates are typically seen on chest x-ray.
Typhoidal	This is a rare form of tularemia, with development of enlarged and inflamed mesenteric lymph nodes, septicemia, abdominal pain (often protracted), diarrhea, vomiting, and gastrointestinal bleeding.
Ulceroglandular	Patients present with large, tender lymph nodes and a non-healing skin ulcer (see image below) at the site of introduction of the bacteria, often accompanied by fatigue, chills, and malaise.

Ulceroglandular disease is the most common form of tularemia, and it is the clinical form most easily recognized as tularemia. Patients with ulceroglandular disease usually report recent animal contact, or exposure to potential insect vectors (particularly ticks).

Figure 1. Tularemia Eschar



Figure 2. Enlarged Lymph Node in Patient with Pharyngeal Tularemia



Causative Agent

Francisella tularensis, the agent of tularemia, is a gram-negative bacterium. Two types of *F. tularensis* (A and B) occur in the U.S. Type A organisms are classified as *F. tularensis* biovar tularensis, and Type B organisms are classified as *F. tularensis* biovar holarctica. The different types present differently. Type A organisms are more virulent. Respiratory or ulceroglandular disease from Type A may result from contact with very few organisms. Type B organisms cause milder disease, and require a higher dose to cause infection. Most infections in Utah have been caused by Type A.

Differential Diagnosis

The differential diagnosis of ulceroglandular and glandular tularemia is broad and includes spider bites, cat scratch disease, malignancy, mycobacterial infection, syphilis, lymphogranuloma venereum, chancroid, streptococcal or staphylococcal lymphadenitis, fungal infection, toxoplasmosis, rat-bite fever, herpes simplex infection, anthrax, and plague. The differential diagnosis for oculoglandular disease includes adenoviral infection and pyogenic bacterial infection. The differential diagnosis for oropharyngeal disease includes adenoviral pharyngitis, infectious mononucleosis, and streptococcal pharyngitis. In addition, a pharyngeal membrane mimicking diphtheria may occur. The differential diagnosis for typhoidal disease includes *Salmonella spp* typhoid fever, brucellosis, Q fever, endocarditis, and the many infectious and noninfectious causes of fever. The differential diagnosis of pneumonic tularemia includes Q fever, psittacosis, tuberculosis, pulmonary mycoses, pneumonic plague, and many other causes of community-acquired pneumonia.

Laboratory Identification

Tularemia is generally identified via culture of the organism from lesions, blood, or sputum.

Supportive

- Elevated serum antibody titer(s) to *F. tularensis* antigen (without documented fourfold or greater change) in a patient with no history of tularemia vaccination, OR
- Detection of *F. tularensis* in a clinical or autopsy specimen by fluorescent assay, OR
- Detection of *F. tularensis* in a clinical or autopsy specimen by polymerase chain reaction (PCR)

Confirmatory

- Isolation of *F. tularensis* in a clinical or autopsy specimen, OR
- Fourfold or greater change in serum antibody titer to *F. tularensis* antigen.

The Utah Public Health Laboratory (UPHL) must provide confirmation of isolates from clinical laboratories. UPHL will forward all isolates to CDC for typing.

Treatment

Streptomycin is the drug of choice based on experience, efficacy, and FDA approval. Gentamicin is considered an acceptable alternative, but some series have reported a lower primary success rate. Treatment with aminoglycosides should be continued for 10 days. Tetracyclines may be a suitable alternative to aminoglycosides for patients who are less severely ill. Tetracyclines are static agents and should be given for at least 14 days to avoid relapse. Ciprofloxacin and other fluoroquinolones are not FDA-approved for treatment of tularemia, but have shown good efficacy in vitro, in animals, and in humans. For further details regarding treatment see: <http://www.bt.cdc.gov/agent/tularemia/treatment.asp>.

Case Fatality

The case-fatality rate in untreated typhoidal tularemia can be 30–60%. Pneumonic tularemia requires prompt treatment to prevent a fatal outcome. The case-fatality rate of Type A tularemia is 5–15% if untreated, primarily due to typhoidal or pneumonic disease. Risk factors for a poor outcome include older age, serious underlying disease, a delay in correct diagnosis, prolonged symptoms prior to treatment, pneumonic or typhoidal disease, renal failure, and inadequate antibiotic treatment.

Reservoir

Tularemia is associated most often with wild animals; key reservoirs include rabbits, hares, voles, muskrats, beavers, and other rodents. Certain tick species can also act as a reservoir. Domestic mammals, including livestock and cats, can acquire and spread the disease. Tularemia vectors in the U.S. include certain ticks, deer flies, and horse flies. The deer fly, (*Chrysops* sp.) is most often implicated in cases in Utah. Two ticks, *Dermacentor variabilis* (American dog tick), and *Dermacentor andersoni* (Rocky Mountain wood tick) capable of transmitting tularemia can be found in Utah.

Figure 2. Possible exposures for Tularemia



Transmission

F. tularensis infection can occur through multiple, diverse modes of transmission, including:

- Direct contact with an infected animal (e.g., while skinning/dressing wild game, especially rabbits and rodents, touching dead carcasses, handling sick pets);
- By arthropod bite (deer flies, horse flies, and ticks);
- By ingestion (e.g., contaminated untreated drinking water, contaminated unpasteurized milk, or contaminated undercooked rabbit or hare meat);
- By inhalation (following exposure to cats with pulmonary tularemia, infectious aerosols generated while handling animal hides or cleaning areas with dried rodent carcasses, or infectious aerosols generated by winnowing, moving, or loading contaminated grain).
- Less commonly, infection may occur by mechanical transmission of the bacteria through bites or scratches of dogs, cats, carnivorous mammals, or birds of prey that have recently killed or fed on infected animals.
- Laboratory infections can also occur; these frequently present as pneumonic or typhoidal tularemia. NOTE: This organism is extremely dangerous to handle in a laboratory. It easily aerosolizes. Cultures for a patient (or animal) with suspected tularemia should not be attempted without special containment facilities. Clinicians suspecting tularemia should alert the laboratory receiving the suspected specimen.

Tularemia is not typically transmitted from person to person.

F. tularensis is quite hardy. It survives for weeks to months in cool water or mud, for up to three months in tap water, and for as long as six months in dry straw litter. It may remain infective for several years if frozen (e.g., in rabbit meat). Concentrations of chlorine attained in routine water purification are very effective at killing *F. tularensis*, as are trace amounts of copper sulfate and zinc.

Susceptibility

All unimmunized people are susceptible to tularemia. All ages are susceptible and long-term immunity follows recovery. Reinfection is rare but has been reported in laboratory staff.

Incubation Period

The incubation period for tularemia ranges from 1–21 days, but is usually 3–5 days.

Period of Communicability

Tularemia is not typically transmitted from person to person. Not directly transmitted from person to person. Unless treated, the infectious agent may be found in the blood during the first two weeks of disease and in lesions for a month, sometimes longer.

F. tularensis is quite hardy, surviving in water, mud, and animal carcasses for prolonged periods. Rabbit meat frozen at -15°C (5°F) has remained infective longer than 3 years. Ticks can be infected for life. Flies are not thought to be maintenance vectors; they can be infective for 14 days.

Epidemiology

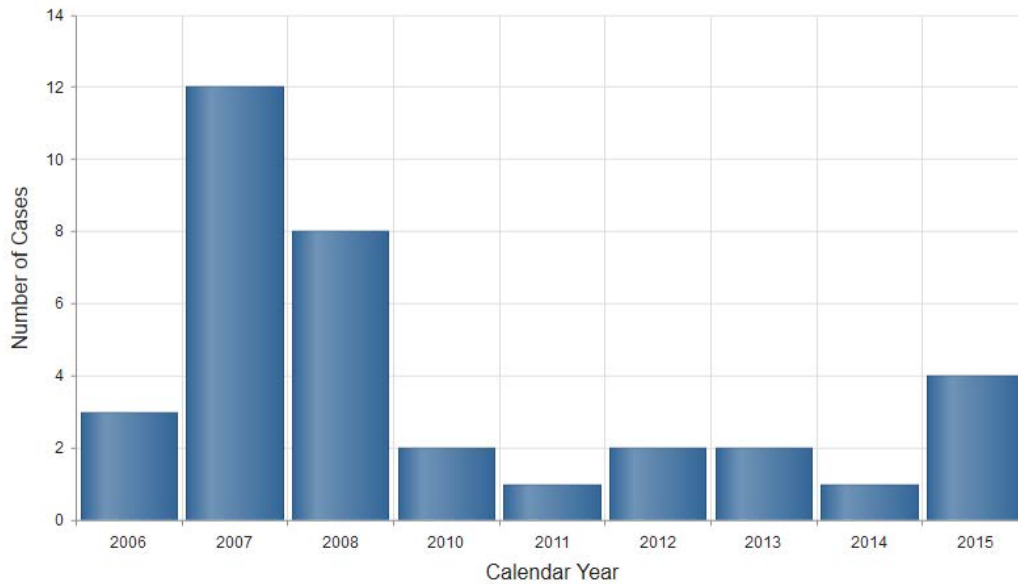
Tularemia occurs throughout North America and in many parts of continental Europe, the former Soviet Union, China, and Japan. Approximately 180 cases of tularemia were reported in the U.S. in 2014.

Type A *F. tularensis*, found only in the U.S., is common in rabbits (cottontail, jack, and snowshoe) and is frequently transmitted by a tick bite. In North America, Type B *F. tularensis* strains are commonly found in mammals other than rabbits.

On average, two cases of tularemia are reported to public health each year in Utah. In Utah, tularemia is usually seen in those that do not wear appropriate protection against tick and fly bites, or when skinning animals. Tularemia cases are most common during summer and fall months. Clusters in 2007 and 2008 occurred in individuals who were recreating outside.

A pneumonic tularemia outbreak on Martha's Vineyard, spanning the summers from 2000–2005, is believed to be associated with inhalation of contaminated particles of dust, soil, or grass generated during outdoor landscaping activities.

Figure 3. Number of tularemia cases in Utah by calendar year



✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.
- Assure that cases of disease are not associated with bioterrorism; if suspicion of bioterrorism, report immediately to UDOH, who will report immediately to the CDC.

Prevention

Personal Preventive Measures/Education

There is no vaccine for tularemia that is available to the general public. The best way to be protected against tularemia is to avoid tick-infested areas or contact with potentially infected animals, and to take precautions when conducting landscaping activities. Preventive measures include:

- In areas where contact with ticks cannot be avoided:
 - Wear long, light-colored pants tucked into socks or boots, and a long-sleeved shirt.
 - Stay on trails when walking or hiking, and try to avoid areas with tall grass.
 - Use tick repellent when necessary, and carefully follow instructions on the label. Products containing 20-30% DEET, picardin, or Insect Repellent 3535 (IR3535) are very effective in repelling ticks. Take special care when using repellents on children. DEET products should not be used on children <2 months of age and

should be used in concentrations of 30% or lower for older children and adults. Repellents that contain permethrin can only be applied to clothing, not to exposed skin.

- After spending time in tick-infested areas, individuals should check themselves, their children, and any pets for ticks. Adult dog ticks are about the size of a small watermelon seed. Parts of the body that ticks prefer include the back of the knees, armpits, scalp, groin, and back of the neck. Any attached ticks should be removed using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out using steady pressure.
- When mowing or landscaping, don't mow over sick or dead animals. When possible, check the area for carcasses prior to mowing.
- Avoid any direct contact with wild animals (dead or alive; especially rabbits and rodents), their droppings, or carcasses. Individuals who notice a sick or injured wild animal should call the local animal control officer.
- Minimize rodent and rabbit populations near the home by keeping woodpiles off the ground and in sunny areas, fencing off any garden areas, never leaving pet food outside after a pet has eaten, and securing all garbage in rodent-proof containers.
- Avoid drinking water that may have been contaminated by wild animals or their carcasses, especially rabbits or rodents. If drinking water is received from a well, be sure it is protected from contamination by wild animals. Don't drink untreated water.
- Use gloves, an appropriate respirator, and eye protection (e.g., goggles) when skinning or dressing wild animals. Any wild game should be thoroughly cooked before being eaten, and as with other raw meats, steps should be taken to avoid cross-contamination (e.g., hands, utensils, and surfaces should all be thoroughly washed after handling any raw meats or meat products, and the juices from raw meats should not come into contact with any cooked or ready-to-eat foods.)
- Domestic cats and dogs can become infected with tularemia if they come into contact with an infected animal. In rare situations, they may spread tularemia to people. Do not allow pets to roam outdoors unsupervised. If your pets do go outside unsupervised, they should be in a secured yard or kennel. Individuals should speak to their veterinarian if their dog or cat shows any signs of illness, such as fever, loss of appetite, or listlessness.

Talk to a veterinarian about appropriate tick control measures (tick collars, repellents) to protect pets from ticks and to prevent pets from bringing ticks into the home.

Preventing potential laboratory exposures to *Francisella tularensis*

Laboratory workers should limit exposures (e.g., working with the culture on an open bench, sniffing a plate, conducting procedures that generate aerosols such as spills, vortexing, catalase tests, etc.) without proper personal protective equipment.

Chemoprophylaxis

The preferred prophylaxis is doxycycline 100mg orally twice a day or ciprofloxacin 500mg orally twice a day for 14 days. Generally, the only individuals who will be provided with prophylaxis are laboratory workers who have been occupationally exposed to tularemia.

Vaccine

There is a vaccine available for at-risk military personnel only.

Isolation and Quarantine Requirements

Isolation: None.

Hospital: Body substance precautions.

Quarantine: None.

✓ CASE INVESTIGATION

Reporting

All suspect and confirmed cases of tularemia should be immediately reported to public health.

Table 1. Criteria to determine whether a case should be reported to public health authorities.

Criterion	Reporting	
<i>Clinical Evidence</i>		
Fever (>38°C)		N
Cutaneous ulcer		N1
Regional lymphadenopathy		N1, N2
Conjunctivitis		N3
Preauricular lymphadenopathy		N3
Stomatitis		O4
Pharyngitis		O4
Tonsillitis		O4
Cervical lymphadenopathy		N4
Intestinal Pain		N5
Vomiting		N5
Diarrhea		N5
Pleuropneumonitis		O6
Hilar lymphadenopathy		O6
Clinical suspicion of tularemia	S	
Healthcare record contains a diagnosis of tularemia	S	
Death certificate lists tularemia as a cause of death or a significant condition contributing to death	S	

<i>Laboratory Evidence</i>		
Elevated serum antibody titer(s) to <i>F. tularensis</i> antigen (without documented fourfold or greater change)	S*	
Detection of <i>F. tularensis</i> in a clinical or autopsy specimen by fluorescent assay	S*	
Detection of <i>F. tularensis</i> in a clinical or autopsy specimen by PCR	S*	
Isolation of <i>F. tularensis</i> from a clinical or autopsy specimen	S*	
Fourfold or greater change in serum antibody titer to <i>F. tularensis</i> antigen	S*	
<i>Epidemiological Evidence</i>		
Evidence or history of tick or deerfly bite		O
Exposure to tissues of a mammalian host of <i>F. tularensis</i>		O
Exposure to potentially contaminated water		O
Working in a laboratory that handles tularemia specimens or <i>F. tularensis</i> cultures		O
Living in—or recently traveling to—rural areas of states with significant numbers of recent cases of tularemia		O

Notes:

S = This criterion alone is Sufficient to identify a case for reporting.

N = All —NII criteria in the same column are Necessary to identify a case for reporting.

O = At least one of these —OII (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all —NII criteria in the same column—is required to identify a case for reporting.

*A requisition or order for any of the —SII laboratory tests is sufficient to meet the reporting criteria.

1 = Ulceroglandular tularemia: cutaneous ulcer with regional lymphadenopathy (21–87% of cases in the U.S.)

2 = Glandular tularemia: regional lymphadenopathy with no ulcer (3–20% of cases in the U.S.)

3 = Oculoglandular tularemia: conjunctivitis with preauricular lymphadenopathy (0–5% of cases)

4 = Oropharyngeal tularemia: stomatitis or pharyngitis or tonsillitis and cervical lymphadenopathy (0–12% of cases)

5 = Intestinal tularemia: intestinal pain, vomiting, and diarrhea

6 = Pneumonic tularemia: primary pleuropulmonary disease (7–20% of cases)

7 = Typhoidal tularemia: febrile illness without early localizing signs and symptoms (5–30% of cases)

Case Definition

Tularemia (2016)

Clinical description

An illness characterized by several distinct forms, including the following:

- Ulceroglandular: cutaneous ulcer with regional lymphadenopathy
- Glandular: regional lymphadenopathy with no ulcer
- Oculoglandular: conjunctivitis with preauricular lymphadenopathy
- Oropharyngeal: stomatitis or pharyngitis or tonsillitis and cervical lymphadenopathy
- Intestinal: intestinal pain, vomiting, and diarrhea
- Pneumonic: primary pleuropulmonary disease
- Typhoidal: febrile illness without early localizing signs and symptoms

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

Laboratory criteria for diagnosis

Supportive

- Elevated serum antibody titer(s) to *F. tularensis* antigen (without documented fourfold or greater change) in a patient with no history of tularemia vaccination, OR
- Detection of *F. tularensis* in a clinical or autopsy specimen by fluorescent assay, OR
- Detection of *F. tularensis* in a clinical or autopsy specimen by polymerase chain reaction (PCR)

Confirmatory

- Isolation of *F. tularensis* in a clinical or autopsy specimen, OR
- Fourfold or greater change in serum antibody titer to *F. tularensis* antigen between acute and convalescent specimens

Case classification

Probable: A clinically compatible case with supportive laboratory evidence.

Confirmed: A clinically compatible case with confirmatory laboratory evidence.

Table 2. Table of criteria to determine whether a case is classified.

Case Definition		
Criterion	Confirmed	Probable
<i>Clinical Evidence</i>		
Fever (>38°C)	N	N
Cutaneous ulcer	N1	N1
Regional lymphadenopathy	N1,N2	N1,N2
Conjunctivitis	N3	N3
Preauricular lymphadenopathy	N3	N3
Stomatitis	O4	O4

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Pharyngitis	O4	O4
Tonsillitis	O4	O4
Cervical lymphadenopathy	N4	N4
Intestinal Pain	N5	N5
Vomiting	N5	N5
Diarrhea	N5	N5
Pleuropneumonitis	N6	N6
Hilar lymphadenopathy	N6	N6
<i>Laboratory Evidence</i>		
Elevated serum antibody titer(s) to <i>F. tularensis</i> antigen (without documented fourfold or greater change)		O
Detection of <i>F. tularensis</i> in a clinical or autopsy specimen by fluorescent assay		O
Detection of <i>F. tularensis</i> in a clinical or autopsy specimen by PCR		O
Isolation of <i>F. tularensis</i> from a clinical or autopsy specimen	O	
Fourfold or greater change in serum antibody titer to <i>F. tularensis</i> antigen	O	
<i>Epidemiological Evidence</i>		
Exposure to tissues from a mammalian host, including via an animal bite	O	O
Exposure to soil or water in an endemic region	O	O
Evidence of a deerfly or tick bite	O	O
No additional clinically compatible symptoms within the past 12 months	O	O
No history of tularemia vaccination	O	O

Notes:

N = All “N” criteria in the same column—in conjunction with at least one of the “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—are required to classify a case. A number following an “N” indicates that this criterion is only required for a specific clinical presentation (see below).

O = At least one of these “O” criteria in each category (e.g., clinical presentation and laboratory findings) in the same column—in conjunction with all other “N” criteria in the same column—is required to classify a

case. A number following an “O” indicates that this criterion is only required for a specific clinical presentation (see below).

1 = Ulceroglandular tularemia: cutaneous ulcer with regional lymphadenopathy (21–87% of cases in the U.S.)

2 = Glandular tularemia: regional lymphadenopathy with no ulcer (3–20% of cases in the U.S.) 3 = Oculoglandular tularemia: conjunctivitis with preauricular lymphadenopathy (0–5% of cases)

4 = Oropharyngeal tularemia: stomatitis or pharyngitis or tonsillitis and cervical lymphadenopathy (0–12% of cases)

5 = Intestinal tularemia: intestinal pain, vomiting, and diarrhea

6 = Pneumonic tularemia: primary pleuropulmonary disease (7–20% of cases)

7 = Typhoidal tularemia: febrile illness without early localizing signs and symptoms (5–30% of cases)

Case Investigation Process

- Fill out a morbidity form.
- Fill out the tularemia case investigation form.
- Rule out the possibility of bioterrorism; if there is a possibility, report to UDOH (or UDOH report to CDC) immediately.
- Call the laboratory that performed the culture to see whether anyone was occupationally exposed.
 - If personnel were exposed, work with the laboratory director to identify all personnel that were exposed to assure that they receive prophylaxis.
- Make sure that the isolate is forwarded to UPHL for confirmation.
- See whether educational materials are needed to prevent additional cases.

Outbreaks

An outbreak is defined as more than one case of tularemia, in any county in Utah, reported within a 30-day period.

Identifying Case Contacts

Identify persons who participated with the case in any exposure activities and contact them, as well as any acquaintance or household member with similar illness. If any are ill, inform them (or their physician) of possible exposure to tularemia, in order to facilitate proper diagnosis and therapy. NOTE: Anyone meeting the probable case definition for tularemia should be reported and investigated in the same manner as a confirmed case.

Case Contact Management

Since the infection is not spread person-to-person, no follow-up is necessary for contacts of the case. Laboratory-acquired infections are a significant concern, thus prompt follow-up is required to evaluate laboratory staff for exposure to a culture.

✓ REFERENCES

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✓ VERSION CONTROL

Update. Aug 2015: General revisions to document formatting.

Update. Feb 2016: Updated Disease and Epidemiology, Public Health Control Measures, Case Investigation, Reporting, and References sections.

Update. May 2016. Edited sections based on comments from reviewer. Updated References section.

Update. December 2016. Updated Laboratory Identification and Case Definition sections to reflect CSTE's revision of the standardized case definition for tularemia.

✓ UT-NEDSS Minimum/Required Fields by Tab

Demographic

- First Name
- Last Name
- Date of Birth
- County
- Birth Gender
- Race
- City
- Street Name
- Zip Code
- Ethnicity
- Area Code
- Phone Number

Clinical

- Date Diagnosed
- Died
- Date of Death
- Disease
- Onset Date
- Clinical Presentation (check one):
 - Ulceroglandular: cutaneous ulcer with regional lymphadenopathy
 - Oculoglandular: conjunctivitis with preauricular lymphadenopathy
 - Oropharyngeal: stomatitis or pharyngitis or tonsillitis and cervical lymphadenopathy
 - Intestinal: intestinal pain, vomiting, and diarrhea
 - Pneumonic: primary pleuropulmonary disease
 - Typhoidal: febrile illness without early localizing signs and symptoms
- Abdominal pain/tenderness/cramping
- Conjunctivitis
- Cutaneous ulcer
- Diarrhea
- Fever >38°C
- Lymphadenopathy
- Lymphadenopathy, regional
- Lymphadenopathy, preauricular
- Lymphadenopathy, cervical
- Pharyngitis

- Pleuropneumonitis
- Stomatitis
- Tonsillitis
- Vomiting
- History of vaccination for the indicated disease?

Laboratory

- Organism
- Result Value
- Test Result
- Test Type
- Lab Test Date
- Specimen sent to State Lab
- Specimen source

Epidemiological

- Imported from
- Occupation

Investigation

- Within 2 weeks of the onset of illness, did the patient travel or stay overnight somewhere other than main residence? If yes, list dates and locations.
- Was there a known tick exposure?
- Was there a known deerfly exposure?
- Was patient exposed to tissues of rabbits or rodents such as mice, rats or squirrels?
- Does the patient work in a clinical or microbiological lab, processing samples that could potentially contain the organism?
- Did patient drink untreated water or have contact with recreational water? If yes, where was the location and date of exposure?
- Did patient have contact with rabbits?
- Did this patient have an appropriate exposure history for this disease? (e.g., outdoors exposure)
- Is this an appropriate time of year for this disease? (e.g., summer)
- Are the symptoms appropriate for this disease?

Reporting

- Date first reported to public health

Administrative

- Outbreak name
- Outbreak associated
- State case status