Tularemia
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Tularemia

Case Definition – 2017 Case Definition – Tularemia

Overview

- ***Agents*** – Tularemia is a bacterial infection caused by *Francisella tularensis*. There are two subspecies associated with human infection: *F. tularensis* subspecies tularensis (type A) and *F. tularensis* subspecies holarctica (type B). Type A is only found in North America and is the more virulent subspecies. Type B is endemic throughout the Northern Hemisphere. *F. tularensis* is a highly infectious pathogen and requires a very low infectious dose (approximately 10-50 organisms) to cause disease. This low infectious dose makes *F. tularensis* a potential bioterrorism weapon.
- ***Reservoir*** – The primary reservoirs are wildlife such as rabbits, hares, and rodents which include voles, muskrats, water rats, beavers, and prairie dogs. Domestic pet species such as cats and dogs can become infected but are considered dead-end hosts (they cannot spread the infection).
- ***Occurrence*** – Tularemia has been reported throughout the Northern Hemisphere. Continental Europe, central Asia, the Middle East, Russia, and parts of China and Japan have reported cases. In North America, cases have been identified from northern Mexico up to the Arctic Circle. In the U.S., tularemia infections have been reported from all states except for Hawaii. Infections are most commonly identified in the central and western states of the country.
- ***Risk Factors –*** Risk for tularemia infection is higher for those who have outdoor occupational or recreational exposures. Hunters, trappers, veterinarians, game wardens, hikers, campers, landscapers, or any others with frequent animal or arthropod exposure are at an increased risk of infection.
- ***Mode of Transmission*** – Transmission of tularemia can occur through a number of routes including through the bite of an infected tick (Lone Star ticks or American dog ticks are known vectors in Missouri) and deer fly bites, direct contact with infected animals (such as rabbits) or infected animal tissues, ingestion of contaminated food or water, or inhalation of contaminated aerosols (e.g., dust). If *F. tularensis* were to be used as a bioterrorism weapon, the bacteria would likely be aerosolized and result in a severe respiratory illness. Missouri cases of tularemia are most often associated with tickborne transmission.
- ***Incubation Period*** – 1-21 days (typically 3-5 days).
- ***Clinical Illness*** – Clinical presentation can vary depending on the route of exposure. Generalized signs and symptoms that can occur for all presentations include fever and chills, headache, malaise, fatigue, anorexia, myalgia, chest discomfort, cough, sore throat, vomiting, diarrhea, and abdominal pain. The specific clinical presentations of tularemia that can be reported include: ulceroglandular, glandular, oculoglandular, oropharyngeal, pneumonic, and

typhoidal. For more detailed information about each of these specific clinical presentations, see the Clinical Signs and Symptoms of Tularemia page.

- ***Laboratory Testing*** – Serologic testing for tularemia can be obtained through commercial laboratories. The Missouri State Public Health Laboratory (MSPHL) offers culture testing for tularemia, which is the gold-standard test type, but this requires that a hospital laboratory facility be able to obtain an isolate for submission.
- ***Treatment*** – Antibiotic treatments are effective for tularemia infection. In many cases, doxycycline is used to treat infections, but alternative antibiotic options are available. For more information about treatment recommendations from CDC, see the Clinical Care of Tularemia page.
- ***Priority*** **–** High; Tularemia should be reported to DHSS within 1 day due to the possibility of this pathogen being used as an act of bioterrorism.

Quick References / Factsheets

- Health Professionals:
  - Tickborne Diseases of the United States: A Reference Manual for Healthcare Providers (07/25)
  - Clinical care of Tularemia (07/25)

Forms

- Disease Case Report (CD-1)
- CDC Tularemia Case Investigation Report
- Missouri Outbreak Report Form (MORF)

Notifications

- Local public health agencies (LPHAs) should notify the District Epidemiologists or the Missouri Department of Health and Senior Services (MDHSS) Bureau of Communicable Disease Control and Prevention (BCDCP), phone (573) 751-6113, Fax (573) 526-0235. After-hours and weekend reports can be directed to the MDHSS Emergency Response Center (ERC) at 800-392-0272.

Reporting Requirements

- Pneumonic tularemia, or any other case of tularemia for which an act of bioterrorism is suspected, is a Category 1(A) reportable condition and shall be reported to the Missouri Department of Health and Senior Services (MDHSS) immediately upon first suspicion. **Suspected intentional release** of *F. tularensis* is an **immediate, extremely urgent** situation that would require MDHSS to notify the CDC Emergency Operations Center within 4 hours of determining a case meets this notification criteria.
- Non-pneumonic tularemia cases, or any other case of tularemia for which an act of bioterrorism is NOT suspected, are Category 2(A) reportable conditions and shall be reported to the MDHSS within 1 calendar day of first knowledge or suspicion.

- The MDHSS reports confirmed and probable cases to the CDC by routine electronic transmission. Routine tularemia reporting includes the following:
  1. For confirmed and probable cases, complete a Disease Case Report (CD-1) and a CDC Tularemia Case Investigation Report.
  2. Entry of the completed CD-1 into the ShowMe World Care (SMWC) database negates the need for the paper CD-1 to be forwarded to the District Office.
  3. All outbreaks or "suspected" outbreaks must be reported as soon as possible (by phone, fax, or e-mail) to the District Communicable Disease Coordinator. This can be accomplished by completing the Missouri Outbreak Report Form (MORF).
  4. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the District Communicable Disease Coordinator.

Laboratory Testing and Diagnosis

Physicians who suspect tularemia should promptly collect appropriate specimens and alert the laboratory to the need for special diagnostic and safety procedures. Rapid diagnostic testing for tularemia is not widely available. Growth of *F. tularensis* in culture is the gold standard test type for confirming the diagnosis of tularemia. Appropriate specimens include swabs or scrapings of skin lesions, lymph node aspirates or biopsies, pharyngeal washings, sputum specimens, or gastric aspirates, depending on the form of illness. Paradoxically, blood cultures are often negative. The Missouri State Public Health Laboratory (MSPHL) can perform confirmatory culture testing for suspected *F. tularensis* **isolates**. For guidance related to the submission of specimens for F. tularensis, the MSPHL Special Microbiology Unit can be contacted at 573-751-3334.

Routine clinical specimens for *F. tularensis* can be submitted to a commercial clinical laboratory for testing. A presumptive diagnosis of tularemia may be made through testing of specimens using direct or indirect fluorescent antibody, immunohistochemical staining, or PCR. The diagnosis of tularemia can also be established serologically by demonstrating a 4-fold change in specific antibody titers between acute and convalescent sera. Convalescent sera are best drawn at least 4 weeks after illness onset. For this reason, serologic testing is not useful for clinical management.

Conducting the Investigation

- **Verify the diagnosis**. What laboratory tests were conducted and what were the results? What is the primary clinical presentation? Obtain demographic, clinical, and laboratory information on the case from the provider, laboratory, and/or patient. Complete both the Disease Case Report (CD-1) and the CDC Tularemia Case Investigation Report.

- **Establish the extent of illness.** The investigation should consider family members, pets, and other contacts who have or have recently had a febrile illness and shared environmental

exposures with the patient. Persons with similar illness may require medical evaluation and should be encouraged to contact their physician to discuss.

- **Establish the source of infection.** Human-to-human transmission of tularemia has not been documented. However, F. tularensis can be transmitted to humans through various mechanisms. For all cases, please obtain the following information from the patient, patient's family, or health care provider:
    - Travel history:
        - Determine the start and end dates of the trip and the location(s) of travel. Start and end dates will be requested for all locations if the patient visited multiple locations. What was the patient's travel history (including specific locations and start/end travel dates)?
    - Outdoor exposures or time spent in tick habitat (including in-state, out-of-state, or out-of-country)
    - Non-tick transmission pathways:
        - Does case work in a laboratory or clinical setting?
        - Has the case had any recent exposure to untreated water?
        - Has the case recently performed any aerosol-generating activities (e.g., brush-cutting, lawn mowing, power washing, etc.)?
        - Has the patient recently received any blood, blood products, tissues, or organs?
            - If the patient is a recent organ, tissue (e.g., corneas, skin), or blood donor or recipient within the incubation period:
                - Notify the Zoonotic Disease Program.
                - Assure relevant partners have been notified (blood collection agencies, hospitals, etc.).
                - Determine the patient/donor identification numbers and any other available details regarding blood products/organs received.
                - Assure quarantine of any remaining co-component blood or tissues.
                - If assistance is needed with this tracing process, please reach out to the Zoonotic Disease Program for guidance.

Control Measures

In the United States, there is currently no licensed vaccination to prevent tularemia in humans. Most often, cases of tularemia in Missouri are determined to be associated with tick bites. However, contact with sick or dead animals (such as rabbits or small rodents) or contaminated water sources can also be sources of exposure.

When working or recreating outdoors:

- Whenever possible, avoid tick habitat during the peak time of year when ticks are most active (generally April through September). Ticks are often found in areas with tall grass, brush, or in heavily wooded areas. However, they can also be present in neighborhoods and backyards!
- Use an insect repellent product with at least 20% DEET, picaridin, or other EPA-registered active ingredients labeled specifically for ticks on all exposed skin.
  - The American Academy of Pediatrics has recommended that repellents containing up to 30% DEET are safe to use on children over 2 months of age.
  - For other active repellent ingredients, check the product label for minimum age requirements before applying to children.
  - EPA offers an insect repellent search tool that can be used by the public to identify repellent products that work best for their needs.
- Weather-permitting, wear long sleeves and pants to help reduce the amount of exposed skin. This will make it harder for ticks to find a place to attach.
  - Wearing light colored clothing can make it easier to spot ticks that may be crawling on clothing when you are outdoors.
- Consider applying permethrin to clothing, boots, and outdoor gear when spending time in tick habitat. Permethrin binds tightly to fabric and will remain effective after multiple washings.
  - This product should not be applied directly to the skin. Product directions and labels should be read carefully before use.

Resources

1. American Academy of Pediatrics. [Tularemia]. In: Kimberlin DW, Barnett, ED, Lynfield, R, Sawyer, MH, eds. *Red Book: 2021 Report of the Committee on Infectious Diseases*. 32nd ed. Itasca, IL: American Academy of Pediatrics; 2021: [822-825]
2. American Public Health Association. [Tularemia]. In: Heymann DL, ed. *Control of Communicable Diseases Manual*. 21st ed. Washington, DC: American Public Health Association; 2022 [678-681]
3. Centers for Disease Control and Prevention. Tularemia. https://www.cdc.gov/tularemia/about/index.html (07/25)
4. Centers for Disease Control and Prevention. Tickborne Diseases of the United States: A Reference Manual for Healthcare Providers. https://www.cdc.gov/ticks/hcp/data-research/tickborne-disease-reference-guide/index.html (07/25)