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TICKBORNE DISEASES: Tularemia

Introduction

This series of Epi News articles aims to bring awareness and education about tickborne diseases including identification, diagnosis, and treatment in human populations.

Epidemiology

Tularemia is spread through the bacterium *Francisella tularensis* which can enter the body through the skin, eyes, mouth, or lungs. Tick bites are the most common mode of transmission in the United States. These ticks include the dog tick [Figure 1], wood tick [Figure 1], and lone star tick [not pictured]. In the western United States, deer flies [Figure 2] have also been attributed to confirmed cases of tularemia. Other sources of infection can include handling infected animal tissue (e.g., skinning or dressing carcasses), inhalation, or ingestion of food/water contaminated with the bacterium.¹

Figure 1: Ticks Found in Western U.S.

American Dog Tick Life Stages



Wood Tick Life Stages



Source: Tick Safety. Accessed May 2021

<https://ticksafety.com/tick-identification/>

Figure 2: Deer Fly

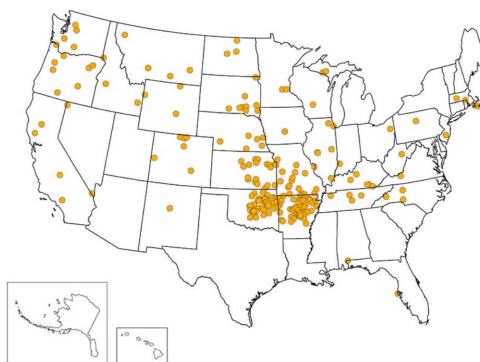


Source: University of Maryland Extension- Horse and Deer Flies

<https://extension.umd.edu/resource/horse-and-deer-flies>

Tularemia was more common in the early 20th century and has steadily declined since 1950. On average, there are approximately 250 reported cases each year. Nevada does not have a high incidence rate of cases.² Males have a higher incidence of cases which may be attributed to having greater risk of exposure through activities like hunting and landscaping. All age groups are affected but it is most common in children. Tularemia has been reported in all states except Hawaii. Most cases are reported in the south-central part of the country, the Pacific Northwest, and parts of Massachusetts [Figure 3].²

Figure 3: Tularemia Cases Reported to the CDC, 2018



Source: CDC Tularemia Statistics. Accessed May 2021

<https://www.cdc.gov/tularemia/statistics/index.htm>

Due to the infectious nature of *Francisella tularensis* the CDC has identified it as a potential bioterrorism agent. Tularemia would likely be made into an aerosolized weapon. The bacteria is widely occurring in nature and is only needed in small quantities to cause illness. This allows for isolation and rapid growth in laboratory settings. Vaccine development is prioritized; however, it is not currently available to the public.³

Signs & Symptoms

The symptoms of tularemia may develop within 3 to 5 days following a tick or deer fly bite. General symptoms include fever, chills, headache, malaise/fatigue, anorexia, myalgia, chest discomfort, cough, sore throat, diarrhea, vomiting, and abdominal

pain. Clinical presentation of tularemia may differ depending on entry route of the bacterium.⁴ The main forms of clinical presentation are listed below:

- **Ulceroglandular:** Most common form of presentation. An ulcer forms at the bite site and swelling of regional lymph glands may occur, usually in the armpit or groin.
- **Glandular:** Similar to ulceroglandular but does not form an ulcer at the site.
- **Oculoglandular:** This form occurs when the bacteria enter through the eyes. This presents with light sensitivity, conjunctivitis, eye irritation and swelling of lymph glands in front of the ear, jaw, and neck areas.
- **Oropharyngeal:** Results from eating or drinking contaminated food/water. Symptoms may include sore throat, mouth ulcers, tonsillitis, and swelling of lymph glands in the neck.
- **Pneumonic:** Most serious form of tularemia. Results from breathing in dusts or aerosols containing the bacterium. This can also occur when other forms of the disease are left untreated and the bacteria spreads through the bloodstream to the lungs. Symptoms include chest pain, cough, and difficulty breathing.
- **Typhoidal:** Presents as a combination of the general symptoms (without localizing symptoms of the other forms).⁴

Diagnosis & Testing

Tularemia is very rare. It is recommended that if a healthcare provider suspects tularemia to alert the laboratory so cultures can be incubated for extended periods due to the slow growth rate of the bacterium. Serum collection dates should also be considered to allow for IgM and IgG antibody responses with the first serum specimen collected within first week of onset and the second paired serum collected 2-3 weeks later.⁵

Confirmatory

- Isolation of *F. tularensis* from a clinical specimen from ulcers, lymph node aspirates or biopsies, pharyngeal swabs, or respiratory specimens (e.g. pleural fluid).
- Seroconversion from negative to positive IgM and/or IgG antibodies in paired sera.

Supportive

- Detection of *F. tularensis* in a clinical specimen by direct immunofluorescence assay (DFA), immunohistochemical staining, or polymerase chain reaction (PCR) assay.

- Detection of antibodies to *F. tularensis* through a single serologic test.

Treatment

Most patients will make a full recovery, however, symptoms may last for several weeks. Tularemia is treated with antibiotics that may be adjusted for age, medical history, pregnancy status, underlying health conditions, or allergies. Treatment usually lasts between 10 to 21 days depending on the stage of illness and antibiotics used (streptomycin, gentamicin, doxycycline, and ciprofloxacin).^{5,6}

Reporting

The list of reportable communicable diseases and reporting forms can be found at:

<http://tinyurl.com/WashoeDiseaseReporting>

Report communicable diseases to the Washoe County Health District. To report a communicable disease, please call 775-328-2447 or fax your report to the WCHD at 775-328-3764.

Acknowledgement

Thank you to all health care providers, infection control practitioners, laboratory staff, as well as schools and daycares for their reporting and collaboration to make this work possible.

References

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Thank you!