



Nebraska Department of Health and Human Services
HEALTH ALERT NETWORK
Update

NEBRASKA
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DEPT. OF HEALTH AND HUMAN SERVICES



TO: Primary care providers, infectious disease, laboratories, infection control, and public health

FROM: Thomas J. Safranek, M.D.
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RE: **TICK-BORNE DISEASES IN NEBRASKA**

DATE: April 3, 2017

The arrival of spring marks the beginning of another tick season. In the interest of public health and prevention, our office seeks to assure that Nebraska health care providers are aware of the known tick-borne illnesses in our state.

Key messages for Nebraska clinicians:

Rocky Mountain spotted fever (RMSF)

We see a median of 13 cases (range 5-31) every year. Health care providers risk overlooking this diagnosis because of its rarity. **RMSF NEEDS TO BE A DIAGNOSTIC CONSIDERATION** in any person with a fever and a history of exposure to environments where ticks might be present. The skin rash is not always present when the patient first presents to a physician. **This disease is frequently overlooked or misdiagnosed, with numerous reports of serious and sometimes fatal consequences.** Nebraska experienced a fatal case of RMSF in 2015 under circumstances where the diagnosis was missed and treatment was delayed until the disease was well advanced.

Laboratory diagnosis is made by detecting a rise in antibody titer to *Rickettsia rickettsii* between acute and convalescent sera. **Treatment requires tetracycline-class of antibiotics or chloramphenicol. Tetracycline-class treatment is recommended for persons of all ages, including children.** Beta lactam antibiotics or flouroquinolones use is contraindicated. Immediate empiric therapy is recommended and should not be delayed while awaiting diagnostic results. CDC RMSF Page: <https://www.cdc.gov/rmsf/>

Tularemia

Tularemia is caused by *Francisella tularensis*. Rabbits, hares, and rodents are susceptible. Humans can become infected through several routes, including tick or deer fly bites, skin contact with infected animals, bites from infected cats, ingestion of contaminated water, or inhalation of contaminated dusts or aerosols. **In 2016 Nebraska reported 11 cases and in 2015 there were 24 cases reported in Nebraska, the highest annual number in 25 years.**

Disease following a tick bite or deerfly bite is usually **ulceroglandular**. Diagnosis can be made by isolation of *F. tularensis* in a clinical specimen or by a four-fold rise between acute and convalescent serum antibody titers. In patients that present with symptoms and/or history highly suggestive of tularemia, clinicians should consider culture which will facilitate typing if an isolate is recovered. For surveillance purposes, typing of isolates is highly advantageous. Also, if tularemia is suspected, laboratory staff should be alerted accordingly to ensure necessary safety precautions are in place in the laboratory. Although tularemia can be life-threatening, most



infections are successfully treated with antibiotics. While streptomycin is the drug of choice, gentamicin is an acceptable alternative. Tetracyclines may be a suitable alternative to aminoglycosides for patients who are less severely ill. CDC Tularemia Page:

<https://www.cdc.gov/tularemia/>

Ehrlichiosis

Ehrlichiosis is caused by *Ehrlichia chaffeensis*, an intracellular bacterium that grows within cytoplasmic phagosomes of white blood cells, and can cause leukopenia. Symptoms may include severe malaise, fever and headache. If left untreated, the illness may progress with hypotension, coagulopathy, hemorrhage of internal organs and renal failure.

Diagnosis can be made by identifying the classic inclusion or morulae in the cytoplasm of monocytes or macrophages. Confirmation requires a four-fold rise in IgG antibody titer between acute and convalescent sera or by molecular detection of *Ehrlichia* DNA in clinical specimens. CDC Ehrlichiosis Page: <https://www.cdc.gov/ehrlichiosis/>

Lyme Disease

Lyme disease is transmitted by the tick *Ixodes scapularis* which is not yet established in Nebraska. **This fact makes any diagnosis of Nebraska-acquired Lyme disease caused by *Borrelia burgdorferi* highly suspect.** Lyme disease is highly regional in the United States. In 2016, Nebraska reported 15 cases to the national reportable disease system at the CDC.

Serologic testing for Lyme disease requires a two-step process consisting of an ELISA which if positive should be followed by a Western blot. Positive serologic evidence **requires BOTH the ELISA and Western blot to be positive.** This testing algorithm optimizes sensitivity and specificity in untreated patients (<https://www.cdc.gov/lyme/healthcare/index.html>). CDC Lyme Disease Page: <https://www.cdc.gov/lyme/>.

Anaplasmosis

Anaplasmosis is caused by *Anaplasma phagocytophilum*, an intracellular bacterium that targets neutrophils, altering their function, and forms morulae within vacuoles. Symptoms are similar to ehrlichiosis and include malaise, fever, and headache. If left untreated, anaplasmosis can be fatal, even in previously healthy people. Severe clinical presentations may include difficulty breathing, hemorrhage, renal failure or neurological deficits. Like Lyme disease, anaplasmosis is highly regional and transmitted by the *Ixodes scapularis* tick **and makes any diagnosis of Nebraska-acquired anaplasmosis highly suspect.** Nebraska sees a median of 1 case (range 0-3) every year; in 2016, 2 cases were reported to the national reportable disease system at the CDC.

Diagnosis can be made by identifying the classic inclusion or morulae in the cytoplasm of neutrophils or eosinophils. Confirmation requires a four-fold rise in IgG antibody titer between acute and convalescent sera or by molecular detection of *Anaplasma* DNA in clinical specimens. CDC Anaplasmosis Page: <https://www.cdc.gov/anaplasmosis/index.html>

Southern Tick-Associated Rash Illness (STARI)

A red, expanding “bull’s-eye” rash similar to those seen in patients with Lyme disease has also been observed in people bitten by *Amblyomma americanum*, often referred to as the lone-star tick. The condition has been named Southern Tick-Associated Rash Illness. Occasionally



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patients may also experience fever, malaise and headache. Whether the lesions and illness described in patients following an *Amblyomma americanum* tick bite are infectious or allergic/toxin mediated remains speculative. Studies have shown that **the rash is not caused by *Borrelia burgdorferi***. Though once thought to be caused by another species of *Borrelia*, research has not supported this idea. While the etiology of this condition is unknown, a 21-day course of a tetracycline-class antibiotic is often prescribed due to the resemblance of early Lyme disease. According to CDC, it is currently unknown whether antibiotic treatment is necessary or beneficial for patients with STARI (<https://www.cdc.gov/stari/symptoms/index.html>). CDC STARI Page: <https://www.cdc.gov/stari/>

Work in Progress: We Need Your Help

Nebraska’s state and local health departments need the assistance of patients and doctors to accurately define the spectrum of tick-borne diseases in Nebraska. People who want ticks identified should contact the UNL Veterinary Science Department (402-472-2952). Physicians who suspect non-endemic tick-borne disease (e.g., Lyme disease, anaplasmosis, or STARI-related disease) should contact a public health official (your local health department, or Tom Safranek, M.D., State Epidemiologist) for assistance in a diagnostic work-up. **Lesions consistent with erythema migrans found in Lyme disease should undergo punch biopsy of the leading edge of the skin lesion with tissue sent for culture and diagnostic testing at CDC, together with serologic testing.** PCR can be done on CSF, synovial fluid, or skin punch biopsy. Details for specimen collection and transport can be obtained by contacting the Nebraska Public Health Laboratory (Toll-Free:1-866-290-1406), <http://www.nphl.org/testdirectory.cfm>.

| Tick | Distribution | Associated Illness | Infectious Agent |
|---|-------------------------------|---|----------------------------------|
| <i>Dermacentor variabilis</i> (American dog tick or wood tick) | Statewide | Rocky Mountain spotted fever | <i>Rickettsia rickettsii</i> |
| | | Tularemia | <i>Francisella tularensis</i> |
| <i>Dermacentor andersoni</i> | NW Nebraska | Rocky Mountain spotted fever | <i>Rickettsia rickettsii</i> |
| | | Tularemia | <i>Francisella tularensis</i> |
| <i>Amblyomma americanum</i> (Lone star tick) | Southern and central Nebraska | Ehrlichiosis (formerly human monocytic ehrlichiosis) | <i>Ehrlichia chaffeensis</i> |
| | | Southern Tick Associated Rash illness | <i>Unknown etiology</i> |
| | | Tularemia | <i>Francisella tularensis</i> |
| <i>Ixodes scapularis</i> (deer tick or blacklegged tick) | Not established in Nebraska | Lyme disease | <i>Borrelia burgdorferi</i> |
| | | Anaplasmosis (formerly human granulocytic ehrlichiosis) | <i>Anaplasma phagocytophilum</i> |

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