TO: Vermont Health Care Providers and Health Care Facilities
FROM: Natalie Kwit, DVM; State Public Health Veterinarian

Tickborne Diseases: Updates and Resources

Background:

Tickborne diseases are increasing nationally and in Vermont. The blacklegged tick, *Ixodes scapularis,* is responsible for the transmission of all five tickborne diseases in Vermont: Lyme disease (*Borrelia burgdorferi*), anaplasmosis (*Anaplasma phagocytophilum*), babesiosis (*Babesia spp.*), *Borrelia miyamotoi* disease, and Powassan virus. Lyme disease is the most common, followed by anaplasmosis; both diseases have been reported in all counties of Vermont. Although both adult and nymph stages of the blacklegged tick can transmit pathogens, people are most likely to be infected April through August when the abundance of host-seeking tick nymphs is highest. Nymphs are very small (< 2mm) and difficult to see unless they become engorged with blood. Even when engorged, nymphs may evade timely detection and removal. Up to half of people diagnosed with Lyme disease don't recall being bitten by a tick.

Many people with tickborne diseases present initially with **nonspecific signs and symptoms** that may include:

- fever
- chills
- malaise
- headache
- muscle and joint pains
- lymphadenopathy

Erythema migrans – a circular, expanding rash commonly associated with Lyme disease – is reported in ~70% of Lyme disease cases in Vermont. Some patients with tickborne disease may also present with neurological, cardiovascular, or gastrointestinal symptoms. Powassan virus infection, in particular, can progress to meningoencephalitis and ~10% of Powassan encephalitis cases are fatal. About half of those who survive clinical disease have permanent neurological sequelae.

Requested Actions:

- **Don't wait to treat for tickborne diseases.** Tickborne diseases can be difficult to diagnose, particularly in the early stages of illness. Patients should be treated presumptively based on

clinical suspicion while awaiting test results. Doxycycline may be used as first-line treatment for suspected Lyme disease or anaplasmosis in patients of all ages.[1]

- **Consider testing for tickborne diseases** in patients presenting with non-specific influenza-like illness in the summer or fall, especially if there is a history of a tick bite or exposure to tick habitat. Use established clinical testing networks to order tickborne disease laboratory tests (except Powassan virus). Testing varies by organism, and co-infections are possible:
    - **Lyme disease**: Serologic testing is the principal means of laboratory diagnosis of Lyme disease. Current recommendations include using a sensitive enzyme immunoassay (EIA) or immunofluorescence assay, followed by a western immunoblot assay for specimens yielding positive or equivocal results. Some tests give results for two types of antibody, IgM and IgG. Positive IgM results should be disregarded if the patient has been ill for more than 30 days. In 2019, FDA cleared several Lyme disease serologic assays based on a modified two-test methodology using a second EIA in place of a western immunoblot assay.
    - **Anaplasmosis**: Diagnosed by PCR (most sensitive during the first week of illness), or a 4-fold increase in IgG antibody titers (one obtained the first week of illness followed by a second 2–4 weeks later). IgM tests alone should not be used for diagnosis.
    - **Babesiosis**: Diagnosed by peripheral blood smear or PCR. An IgG antibody titer can be supportive evidence, but positive antibody tests do not differentiate between recent and past infection.
    - ***Borrelia miyamotoi* disease**: Diagnosed by PCR and antibody-based tests. Most patients acutely symptomatic with *Borrelia miyamotoi* infection are seronegative, so PCR testing is preferred.
    - **Powassan virus**: Diagnosed by finding virus-specific IgM antibodies in serum or cerebrospinal fluid (CSF); coordinate testing for Powassan virus through the Vermont Department of Health Laboratory.

- **Use clinical judgement when ordering and interpreting antibody-based laboratory tests.** Antibodies can take several weeks to develop, so patients may test negative if infected recently. Antibodies normally persist in the blood for months or even years after the infection is gone; therefore, antibody tests cannot be used to determine cure and a single positive antibody titer cannot differentiate between recent and past infection.

[1] American Academy of Pediatrics., In Kimberlin, D. W., In Brady, M. T., In Jackson, M. A., & In Long, S. S. (2018). *Red book: 2018-2021 report of the Committee on Infectious Diseases.*

- **Counsel patients on how to prevent tickborne diseases by preventing tick bites.** People who present with a tick bite are likely to encounter ticks again.
    - Stay away from places where ticks are commonly found (wooded areas, tall grass, areas where lawns meet wooded areas).
    - Use EPA-registered tick repellents.
    - Do daily tick checks and quickly remove attached ticks with tweezers.
    - Bathe within 2 hours of coming indoors.
    - Put clothes in dryer on high heat for 10 minutes after coming indoors.
    - Consult with a veterinarian on how to prevent tick bites in pets.
    - Reduce tick habitat through yard management using tips from CDC.
    - Order professionally printed educational materials from the Health Department to have on hand at your practice.

- **Consider use of tick bite prophylaxis to prevent Lyme disease**. Most tick bites do not result in disease transmission, but antimicrobial post-exposure prophylaxis can be appropriate after high-risk tick bites – the tick bite occurred in Vermont or surrounding states, the tick can be identified as an adult or nymph blacklegged tick, and the estimated time of attachment was ≥36 hours.

- **Testing ticks after removal is not recommended as a diagnostic tool.** Tick testing results should not be used as a proxy for tickborne disease testing in patients. Results can lead to unnecessary antibiotic treatment without conclusive evidence of patient infection. Instead, advise patients to return immediately for clinical evaluation if symptoms occur.

- **Ask about travel history.** While it is more likely for Vermonters to be exposed to a locally-transmitted tickborne pathogen, travel to other areas of the United States may pose a risk for other tickborne diseases not found in Vermont.

- **Learn more about effectively diagnosing and treating tickborne diseases**. New and updated resources are available for healthcare providers and organizations to assist with diagnosis and management of tickborne diseases:
    - 2020 Guidelines for the Prevention, Diagnosis and Treatment of Lyme Disease
    - Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever and other Spotted Fever Group Rickettsioses, Ehrlichioses, and

Anaplasmosis – United States: A Practical Guide for Health Care and Public Health Professionals

- 2020 Guideline on Diagnosis and Management of Babesiosis
- Suggested Reporting Language, Interpretation and Guidance Regarding Lyme Disease Serologic Test Results
- Lyme Disease Updates and New Educational Tools for Clinicians

- **Report suspected or confirmed cases of tickborne disease.** Contact the Department of Health Infectious Disease Epidemiology Program at 802-863-7240 or 800-640-4374 (within Vermont only) 7:45 a.m. to 4:30 p.m. on business days. Providers can also fax paper reports to the Epidemiology Program's confidential fax machine at 802-951-4061.

If you have any questions, please contact the HAN Coordinator at 802-859-5900 or vthan@vermont.gov.

HAN Message Type Definitions
Health Alert: Conveys the highest level of importance; warrants immediate action or attention.
Health Advisory: Provides important information for a specific incident or situation; may not require immediate action.
Health Update: Provides updated information regarding an incident or situation; unlikely to require immediate action.
Info Service Message: Provides general correspondence from VDH, which is not necessarily considered to be of an emergent nature.