Lyme Disease: A Global and Local One Health Challenge

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Lyme Disease as a One Health Example

- Environment: warming temperatures resulting in a expansion of tick habitat

- Humans: movement toward suburbs with land abutting wooded areas, reforestation

- Animals: explosion in mice population due to loss of predators, pets as carriers of ticks into the home
Lyme Anxiety
Objectives

• Describe the clinical presentation, epidemiology, and transmission of Lyme Disease

• Present options for personal and community prevention

• Provide links to resources from various public health agencies
What is Lyme Disease

• Most common vector-borne disease in the U.S.
• Caused by a bacterium, *Borrelia burgdorferi* or rarely, *Borrelia mayonii*
• Named after Lyme, Connecticut after epidemic in resident children in in 1970s
• Bacterium transmitted by hard bodied ticks: deer tick in East and Midwest, and western-black legged tick in West, sheep tick and taiga tick in Europe

Clinical Presentation of Lyme Disease

• Early signs and symptoms (3 to 30 days after bite)
  • *Erythema migrans* or “Bulls Eye” rash
  • Fever chills and other “flu-like symptoms”

• Later signs and symptoms (days to months after bite)
  • Headaches and neck stiffness
  • Facial palsy (droop on one or both sides of face)
  • Arthritis particularly in knees and other large joints

https://www.cdc.gov/lyme/signs_symptoms/index.html
Clinical Presentation of Lyme Disease

https://www.cdc.gov/lyme/signs_symptoms/index.html
Lyme Disease as a Global Issue

Figure 1. Geographic Extension of Lyme Disease (LD) activities. Figure 1 shows that Lyme Disease (LD) has extended to many countries around the world beyond the endemic foci. Reported LD activities that were mapped include diagnosed cases as well as infected ticks, infected animals, and seropositive human samples. The dark gray shading signifies countries with (at least) some reported LD activity, and the presence of activity is known only at the country level. The lighter gray shading represents areas in which Lyme disease has been reported at the sub-national level in particular regions of some countries. The lightest gray represents counties with rare or unknown activity. This map is compiled from various resources such as published articles reviewed in this paper, Lyme Disease Association, Inc. [30], and World Health Organization websites [31].

U.S. Reported Cases of Lyme Disease

https://www.cdc.gov/lyme/datasurveillance/index.html
Lyme Disease Risk in Michigan

Ticks in Michigan

American dog tick (wood tick) 76% of ticks submitted for testing
Widespread throughout the Lower and Upper Peninsulas of Michigan in wooded and grassy areas.

American dog ticks are large brown ticks with ornate white markings. Female ticks are generally active from May through July and will bite people and pets. They carry Rocky Mountain Spotted Fever and tularemia.

Blacklegged tick (deer tick) 15% of ticks submitted for testing
Emerging and sporadic throughout the Lower and Upper Peninsulas of Michigan in wooded and grassy areas.

The blacklegged tick is a small tick with black legs, and has a rounded black scutum, or shield shaped plate behind its head. It may be hard to distinguish from other species. The blacklegged tick is an emerging species in Michigan and is a possible vector of several diseases including Lyme disease.

Left to right: American dog tick female, Lone star tick female, blacklegged tick female, blacklegged tick nymph.

https://www.michigan.gov/documents/emergingdiseases/Ticks_and_Your_Health_05_19_661429_7.pdf
Life Cycle of a Tick

Blacklegged Tick (*Ixodes scapularis*)

- adult female
- adult male
- nymph
- larva

Risk of human infection greatest in late spring and summer

https://www.michigan.gov/documents/emergingdiseases/Ticks_and_Your_Health_05_19_661429_7.pdf
**Personal Protective Behaviors**

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**FOR PEOPLE LIVING AROUND WOODS, FIELDS OR DEER....**
**THREE SIMPLE STEPS TO PROTECT YOURSELF FROM TICS!**

**Protect**
- Prevent ticks from getting on your clothes and under your skin.
- Use a permethrin-containing repellent to apply to your outdoor clothing and a 20% DEET containing repellent to apply to exposed skin.
- Permethrin will remain bound to the fabric for a couple of washings in a 2 week period. It is safe for adults and kids and is odorless. It will not protect you if sprayed directly to the skin.
- DEET (one photo above) is the most widely used repellent in the world. 20% DEET is safe for adults but not recommended for young children.

**Detect**
- Detect any attached ticks with a 2 Minute Tick Check!
- An ideal time to check is after nixing.
- Check your whole body for ticks. Look rather than feel. Start with feet and legs and move upwards. Pay special attention to your belt, thin and underwear lines. Use a mirror to inspect your back and hard-to-check areas.
- Do a 2 Minute Tick Check today and every day, after coming back from outdoors. Remember, don’t just check your hair, check everywhere.

**Remove**
- Remove any attached ticks you find every day!
- Grab with tweezers, as close to the tick’s head as possible, pull straight up and run from the skin surface.
- Wash the bite with soap and water. Apply antiseptic if available.
- Flush the ticks down the toilet. Ticks are very hard to destroy!
- An infected deer tick needs to be attached 24 to 48 hours before it starts to inject Lyme disease bacteria into you.

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Malouin et al. Longitudinal evaluation of an educational intervention for preventing tick bites in an area with endemic Lyme disease in Baltimore County, Maryland, American Journal of Epidemiology; 2003; 11 (1); 1039-1051.
Residential Management of Ticks

https://www.michigan.gov/documents/emergingdiseases/Ticks_and_Your_Health_05_19_661429_7.pdf
Community Prevention Efforts

• Signage in known areas of Lyme disease risk (e.g., state and local parks)

• Community education efforts (e.g. public service announcements)

• Environmental spraying of highly utilized, local, high risk areas (e.g. school yards)
Helpful Resources

Ticks and Your Health
Preventing tick-borne illness in Michigan

Actual Size Comparison

- Blacklegged (Deer) tick
- American dog (Wood) tick
- Lone star tick

Tick removal tips
- Remove as quickly as possible.
- Use tweezers to grasp the head close to the skin.
- Pull gently.
- Use soap and water, or antiseptic on the bite.

...preventing tick bites
- Use a repellent containing no more than 30 percent DEET.
- Use repellents that contain permethrin on clothing.
- See your healthcare provider if you have symptoms of fever, rash, body aches or fatigue after a tick bite.

Common ticks found in Michigan
From left to right: Blacklegged tick nymph, Blacklegged tick female, Lone star tick female, American Dog tick female

M I n i  Call ID Card

www.michigan.gov/lyme

Training One Health Professionals

• MSU is launching an online Master of Science in Global Health in January 2020
• Collaboration from medicine, veterinary medicine, social sciences, environmental sciences and many others
• Goal to train US and international technical experts to collaboratively address One Health challenges around the world

https://globalhealth.msu.edu/
For more information:

globalhealth.msu.edu