Tickborne Disease and Prevention in New Hampshire

NH Health Officer Association Annual Meeting
May 20, 2015

Abigail Mathewson, DVM, MPH
State Public Health Veterinarian
Division of Public Health Services, DHHS
Infectious Disease Surveillance Section

abigail.mathewson@dhhs.state.nh.us
(603) 271-0274

Tickborne Diseases in NH

- Lyme (bacterial)
- Anaplasmosis (bacterial)
- Babesiosis (parasite)
- Powassan Virus (viral)
NH DHHS Tickborne Disease Activities

- Human case surveillance
- Tick surveillance as funding allows
- Distribution of surveillance data
  - Maps, Data Reports, Incidence by County
- Healthcare provider clinical messaging
  - Annual health alert message with clinical, diagnosis, and treatment information
- Public education and prevention messaging
  - NH DHHS website
  - Annual Press Release
  - Availability of public health staff to respond to public inquiries by phone or email

Ticks in NH

- Common human-biting species in NH
  - American dog tick: *Dermacentor variabilis*
  - Blacklegged tick (deer tick): *Ixodes scapularis*

- Other ticks
  - Winter tick: generally does not bite humans, looks similar to dog tick
  - Lone star tick: may be moving north to NH eventually
Lyme Disease Biology

*Borrelia burgdorferi*

- Spirochete - motile, corkscrew shaped bacteria
- Transmitted by the bite of an infected deer tick
- Ticks need to be attached for 24-36 hours before the bacterium can be transmitted
- Nymphs very small and can go unnoticed
Symptoms of Lyme Disease

- **Early localized disease**
  - Incubation: 3 to 32 days
  - Early localized disease within 1 month of infection
  - Slowly expanding skin lesion (80%): erythema migrans rash
  - Usually accompanied by influenza-like illness: headache, arthralgias, myalgias, fever, lymphadenopathy.

- **Early disseminated disease**
  - Weeks to months after initial infection and can involve skin, joints, heart, CNS
  - Neurologic disease in 15% of untreated patients
  - Cardiac disease in 5% of untreated patients
  - Recent publication on Lyme carditis deaths
  - Musculoskeletal involvement in 60% of untreated patients

- **Late disseminated disease**
  - Months to years after initial infection
  - Lyme arthritis – 60% (untreated)
  - Neuroborreliosis – 5% (untreated)

Distribution of Lyme Disease

Reported Cases of Lyme Disease -- United States, 2013

1 dot placed randomly within county of residence for each confirmed case
Number of Reported Lyme Disease Cases by Year, New Hampshire, 2001-2013

- Change in Case Definition

New Hampshire Department of Health and Human Services
Division of Public Health Services
Bureau of Infectious Disease Control

Reported Cases of Lyme Disease in New Hampshire, 2013

- Rates per 100,000

- “Rates not calculated for towns with between 1 and 4 cases.”

Notes: There is a potential for underreporting at the local level due to the nature of disease vectors and reduced emphasis on reporting since 2008.
Number of reported Lyme disease cases by month, NH, 2008-2013.

Presence of the *Borrelia* bacteria in the NH Black-legged Ticks 2007-2010
Anaplasmosis and Babesiosis

**Anaplasmosis**
- **Bacterium** *Anaplasma phagocytophilium*
- Rarely causes a rash
- Potential to cause renal failure, difficulty breathing
- Severity ranges from mild to life-threatening

**Babesiosis**
- **RBC parasite** *Babesia microti*
- No rash
- Potential to cause hemolytic anemia, renal failure
- Severity ranges from asymptomatic to life-threatening

Images from cdc.gov
Powassan Virus

- Viral encephalitis
- Incubation from 1 week to 1 month
- Two strains associated with human disease
  - Powassan Virus (POW) – Lineage 1
  - Deer Tick Virus (DTV) – Lineage 2
  - Ixodes scapularis – white-footed mice (DTV)
- Possible symptoms: Drowsiness, headache, confusion, fever, vomiting, weakness, speech difficulties,
- Illness could progress to encephalitis (brain), meningitis (membranes), or meningoencephalitis
- Severe, long lasting sequelae in ≥ 50%
- Case fatality ~ 10% (encephalitis)

Distribution of Powassan Virus
2004-2013

Source: cdc.gov and ArboNET
Treatment for Tickborne Disease

- Lyme Disease and Anaplasmosis are most commonly treated with Doxycycline
  - Alternatives are used in children and pregnant women, or in Lyme patients with neurologic or heart-related symptoms
- Babesiosis is treated with a combination of Atovaquone with Azithromycin OR Clindamycin with Quinine (similar to malaria)
- Powassan Virus is treated with supportive care

Tickborne Disease Prevention

- We have a NEW state plan
Protect Yourself Against Tick Bites

- **EVERYONE** should be doing/advocating for these
- Use an EPA registered repellent
- Stay on cleared trails when possible
- Wear long pants, long sleeves, hat, closed-toe shoes
  - Tuck shirts into pants and pants into socks
  - Light colors may make ticks on clothing easier to spot
- Daily tick checks for you and your pets, remove promptly
- Shower after returning indoors
- Dry clothes in hot dryer

Personal Protective Measures: Mosquito and Tick Repellent

- **DEET**
  - Mosquitoes and Ticks
- **Oil of Lemon Eucalyptus**
  - Mosquitoes and Ticks
- **Picaridin**
  - Mosquitoes

- **Permethrin**
  - Mosquitoes and Ticks
  - Applied to clothing
  - Permethrin impregnated clothing
Mosquito and Tick Repellent

- Always use according to the product label
- For information on EPA registered repellents and their active ingredients:

http://www.epa.gov/pesticides/insect/choose.htm

http://lymediseaseguide.org/lyme-disease-prevention
**Tick Removal**

- Cleanse your hands and the area around the tick
- Grasp tick’s mouth parts close to the skin with tweezers
- Pull the tick slowly upwards using a gentle, straight-up motion
- Apply an antiseptic to the site

**Do NOT:**
- Twist or jerk the tick
- Squeeze the tick
- Rub petroleum jelly on the tick
- Pour kerosene or nail polish on the tick
- Use a hot match or cigarette
Tick Habitat

Ticks prefer sheltered, humid areas away from direct sunlight

- Tall grass
- Brush
- Leaf litter

All make great tick habitat

Create a “Tick-Safe Zone”

1. Tick zone: Avoid areas with forest and brush where deer, rodents, and ticks are common.
2. Wood chip barrier: Use a 3 ft. barrier of wood chips or rock to separate the “tick zone” and rock walls from the lawn.
3. Wood pile: Keep wood piles on the wood chip barrier, away from the house.
4. Tick migration zone: Maintain a 0 ft. barrier of lawn between the wood chips and areas such as patios, gardens, and play sets.
5. Tick safe zone: Enjoy daily living activities such as gardening and outdoor play inside this perimeter.
6. Gardens: Plant deer resistant crops. If desired, an 8 ft. fence can keep deer out of the yard.
7. Play sets: Keep play sets in the “tick safe zone” in sunny areas where ticks have difficulty surviving.

Based on a diagram by K. Stafford, Connecticut Agricultural Experiment Station
Prevention Methods and Priorities

- Management of landscaping for schools and community use areas
- Treatment and/or exclusion of deer
  - An option for communities, but requires extensive maintenance and other considerations
- Treatment and exclusion of mice
  - Owner based decisions
- What about host elimination?
- Area wide acaricide treatment
Acknowledgments

- NH DHHS Division of Public Health Services
  - Jose Montero, Chris Adamski, Elizabeth Daly, Tylor Young, Whitney Howe
- NH Public Health Laboratories
  - Christine Bean, Fengxiang Gao, Denise Bolton, Carol Loring, Amanda Archambault, Trevor Lester
- Dragon Mosquito Control
- Municipal Pest Management
- Atlantic Pest Solutions
- NH Towns and Cities

Helpful resources

- http://www.cdc.gov/ncezid/dvbd/

Contact information:
abigail.mathewson@dhhs.state.nh.us
(603) 271-0274 or
(603) 271-4496