Tick-borne Diseases: What NJ Public Health Professionals Need to Know

Speakers
- Kim Cervantes, Vectorborne Disease Program Coordinator, New Jersey Department of Health
- Andrea Egizi, Research Scientist, Tick-borne Disease Laboratory, Monmouth County Mosquito Control Division and Visiting Professor, Rutgers University Center for Vector Biology
- Jim Occi, Doctoral Student, Rutgers University Center for Vector Biology and Research Teaching Specialist, NJ Medical School
- Krista Reale, Vectorborne Disease Health Educator, New Jersey Department of Health

Objectives
1. Name major tick species in New Jersey and explain tick ecology and tick biology
2. Recognize current and previous tick surveillance methods in New Jersey
3. Review a state summary of human tick-borne disease trends
4. List education resources and strategies to promote tick-borne disease prevention

Continuing Education Credits
- Credits offered for this webinar:
  1.0 Public Health
  Pesticide recertification credits (8A & 8B)
- Credits provided to those who attend the webinar "live"
  - Must also be registered on GoToWebinar and NJLMN to be eligible for PH credits
- NOTE: Those viewing the webinar in the archived version are not eligible to receive continuing education credits.

Questions during the webinar?
- All attendee lines are muted. Please use the “Question” box to ask a question.
- Questions will be answered at the end of the webinar, time permitting.

Webinar handouts
- Handouts (slides and resources) may be accessed in the “Handouts” box.
- Handouts on GoToWebinar are only available during “live” webinars
- Handouts also posted to NJLMN in Practice Exchange
Tick-borne Diseases: What NJ Public Health Professionals Need to Know

Jennifer DiCicco
Center for Vector Biology
Department of Entomology and
Research Microbiologist
New Jersey Medical School
diocco@rutgers.edu

Topics Covered:
• The major tick species in New Jersey
• Tick ecology (where and when ticks are found)
• Tick biology (feeding, reproduction, life stages)

Reminder...
• You must be registered on both “Go to Webinar” and NJLMN for PH credits
• Complete the evaluation for continuing education credits
• Attendance verified on NJLMN and Go to Webinar

After the webinar

• You will be sent a link to the evaluation
• Those seeking continuing education credits MUST complete the evaluation within 5 days
• Evaluation link closes after 5 days
• Those who do not complete the evaluation will not receive credits

Three Most Abundant Indigenous Species in New Jersey

- Blacklegged tick, *Ixodes scapularis*
  - Female, male, nymph
- American dog tick, *Dermacentor variabilis*
  - Female, male
- Lone star tick, *Amblyomma americanum*
  - Female, male, nymph

Tick photograph courtesy J. Occi
**Amblyomma americanum**

**Ixodes scapularis** (blacklegged tick), female, male and two nymphs

**Scale = mm**

**Ticks and Poppy Seeds**

**Ixodes scapularis** nymph, male, female

**Poppy seeds**

**Haemaphysalis longicornis** nymph, female

**Poll Question #1**

Which stage of the blacklegged tick (*Ixodes scapularis*) is the size of a poppy seed?

How small is a blacklegged tick nymph?
Adult *I. scapularis* season and environment

Ixodes scapularis

Nymphal (May-July)

and larval (Aug-Sep) environment

*Dermacentor variabilis*, American dog tick

Long Beach Island (Ocean Co.)

55 *Dermacentor variabilis* in 40 min

Stokes State Forest (Sussex Co.)

14 *D. variabilis*, 11 *A. americanum* ~ 40 min @ Shark River Pk, Monmouth Co.

*Amblyomma americanum* collections

*Amblyomma americanum*:

51 nymphs and 16 adults

~ 20 min @ Tuckerton, NJ

Ocean Co.

14 *D. variabilis*, 11 *A. americanum* ~ 40 min @ Shark River Pk, Monmouth Co.

How does a tick find its host?

*Dermacentor variabilis* (J. Occi)

*Ixodes scapularis* (J. Occi)

*Amblyomma americanum* (J. Occi)

R. Robbins

Feeding and pathogen transmission

SAT (saliva-assisted transmission)

Vasodilators

Platelet inhibitors

Anticoagulants

Thrombin inhibitors

Kininases

J. Occi

unengorged

→ replete

*Ixodes scapularis*

Poll Question #2

True or False? Ticks feed just like mosquitoes and can complete blood feeding in less than a minute.
Tick surveillance in New Jersey: Past and Present

Andrea M. Egizi, PhD
Tick-borne Disease Laboratory, Monmouth County Center for Vector Biology, Rutgers University

Ticks before Lyme disease

1938

DEPARTMENT OF HEALTH
TICKS OCCURRING IN NEW JERSEY
By Theodore J. Hessler

Tick surveillance before Lyme disease:
- No mention of blacklegged ticks

Ticks after Lyme disease

First Lyme disease case in NJ = 1978

Deer surveys:

Egizi et al. 2018 Ticks and Tick-borne Diseases

Last statewide survey

+ Ticks collected from hunter-killed white-tailed deer in 2002

Egizi et al. 2018 Ticks and Tick-borne Diseases
Last statewide survey

- Ticks collected from hunter-killed white-tailed deer in 2002

Borrelia miyamotoi
Avg infection 2.7%

Egizi et al. 2018 Ticks and Tick-borne Diseases

Monmouth County Program

- Active surveillance
- Passive surveillance
- Education

Who gets bitten by ticks?

- 7,725 ticks acquired in MC 2006-2016
- “Other” includes 11 cats, 8 rabbits and 1 chicken...

Location where tick acquired

- Home 56%
- Park 24%
- School 4%
- Other 6%

Activity where tick acquired

- Employment 56%
- Recreation 20%
- Over 50 15%
- 16 and under 11%

Where do people get bitten?

Poll slide

When do people get bitten?

- A. americanum
- D. variabilis
- I. scapularis

“tick season”

Jordan et al. unpublished—do not distribute
Implications: Ehrlichiosis

- Based on relative tick abundance and infection rates, Ehrlichiosis should occur 0.604x as often as Lyme disease
- Lyme cases in Monmouth in 2016: 492
- Expected Ehrlichiosis cases: 0.604 * 492 = 297
- Actual Ehrlichiosis cases: 6

Underreported? Asymptomatic? Both??

Species to watch for

- Amblyomma maculatum
- Collected in Maryland, Delaware in 2013
- Vector of Rickettsia parkeri

Poll slide
Species to watch for

- Longhorned tick (Haemaphysalis longicornis)
- Native to east Asia, invasive in Australia and New Zealand
- Detected on Hunterdon County sheep with no travel history in 2017

Rainey et al. 2018 J Med Entomol

Longhorned tick detections

- As of 5/17/2018
- Hunterdon County (sheep, grass, deer)
- Union County (grass)
- Middlesex County (grass)

And... on May 16, Virginia (calf)!

2018 NJ Tick Blitz

- Funding from Northeast IPM Center
- Organized by Rutgers Center for Vector Biology and Monmouth County Tick-borne Diseases Laboratory
- Participants: 21 county mosquito control agencies

Photos from Jonathan Cassidy (Burlington)

2018 NJ Tick Blitz

- Data analysis is ongoing
- Hoping to identify distribution of:
  - American dog ticks
  - Spotted fever rickettsiae
  - Gulf coast tick
  - Invasive longhorned tick

OVERVIEW

- Overall tickborne disease trends
- Diseases transmitted by
  - Ixodes scapularis (deer tick)
  - Amblyomma americanum (lone star tick)
  - Dermacentor variabilis (american dog tick)
- New tick on the block - Haemaphysalis longicornis (longhorned tick)
IXODES SCAPULARIS (DEER TICK, BLACKLEGGED TICK) TRANSMITTED DISEASES

Select Tickborne Diseases Transmitted by Deer Ticks, NJ, by Year 2005-2017

- Lyme disease (Borrelia burgdorferi, B. mayonii)
- Babesiosis
- Anaplasmosis
- Powassan

ANAPLASMOSIS, BABESIOSIS, Lyme DISEASE 5-YEAR INCIDENCE RATES BY COUNTY 2013-2017 (PER 100,000 POPULATION)
**AMBYLOMMA AMERICANUM (LONE STAR TICK) TRANSMITTED DISEASES**

- Ehrlichiosis (E. chaffensis, E. ewingii)
- Tularemia
- Heartland virus
- Spotted Fever Group Rickettsiosis
- STARI

**DERMACENTOR VARIABILIS (AMERICAN DOG TICK) TRANSMITTED DISEASES**

- Spotted Fever Group Rickettsiosis (SFGR)
- Rocky Mountain Spotted Fever
- Tularemia

**EHRLICHIOSIS AND SPOTTED FEVER GROUP RICKETTSIOSIS 5-YEAR INCIDENCE RATES BY COUNTY, 2013-2017 (PER 100,000 POPULATION)**

- Impact on human health in NJ is as yet unknown
- Ticks identified in Hunterdon, Union, and Middlesex counties
- Human pathogen testing so far negative
- Southeast Asia — associated with Rickettsia japonica, Severe fever with thrombocytopenia syndrome virus, Powassan, and Huaiyangshan virus hemorrhagic fever
- Surveillance is ongoing

**HUMAN HEALTH IMPACT OF HAEMAPHYSALIS LONGICORNIS (LONGHORNED TICK)**

- Impact on human health in NJ is as yet unknown
- Ticks identified in Hunterdon, Union, and Middlesex counties
- Human pathogen testing so far negative
- Surveillance is ongoing

**NJ LONGHORNED TICK RESPONSE**

- Partners: NJDA (lead agency); NJDEP, NJDOH, Rutgers University Center for Vector Biology, Hunterdon County Division of Health Services, USDA, CDC, SCWDS
- Outreach with livestock owners, veterinarians, slaughterhouses
- Wildlife surveillance
- Tick surveillance
- Focal treatment
- Information and education
- Public tick submission/drop-off

**IN CONCLUSION**

- Tickborne diseases in NJ are increasing
- Cases are under-reported!
- Rare diseases (B. miyamotoi, Powassan, Bourbon virus, Heartland virus) rely on clinician awareness and specialized testing
- Travelers and ticks are on the move
- Human AND tick surveillance are needed to identify new pathogens and monitor ones we know about

**INFORMATION:**

- [http://www.state.nj.us/agriculture](http://www.state.nj.us/agriculture)

**NJ Tick Line Coming Soon**

**Thank You!**
Education resources & strategies
KRISTA M. REALE MA, CHES
NEW JERSEY DEPARTMENT OF HEALTH

NJDOH resources for the public
- Tickborne Diseases brochure
- Print copies available!
- Tick Safety Tips video
- How to Remove a Tick flyer
- How to Avoid Tick Bites flyer
http://www.nj.gov/health/cd/topics/vectorborne.shtml

Resources for professionals
- Tick Management Handbook (Connecticut Agricultural Experiment Station)
- Tickborne Diseases of the United States: A Reference Manual for Health Care Providers (CDC)
- Tickborne Disease Basics toolkit (NJDOH)
http://www.nj.gov/health/cd/topics/vectorborne.shtml

Education strategies
- Local community presentations, health fairs, etc.
- May is “Lyme Disease Awareness Month”
- NJDOH Websites / Disease Chapters
- Social Media – @NJDeptofHealth
- Press Releases / Health Alert Network Messaging
- NJDOH Reportable Disease Statistics
Education strategies

▪ Local community presentations, health fairs, etc.
▪ May is “Lyme Disease Awareness Month”
▪ NJDOH Websites / Disease Chapters
  ▪ http://www.nj.gov/health/cd/topics
▪ Social Media – @NJDeptofHealth
▪ Press Release / Health Alert Network Messaging
▪ NJDOH Reportable Disease Statistics
  ▪ http://www.nj.gov/health/cd/statistics/reportable

Education strategies

▪ Local community presentations, health fairs, etc.
▪ May is “Lyme Disease Awareness Month”
▪ NJDOH Websites / Disease Chapters
  ▪ http://www.nj.gov/health/cd/topics
▪ Social Media – @NJDeptofHealth
▪ Press Release / Health Alert Network Messaging
▪ NJDOH Reportable Disease Statistics
  ▪ http://www.nj.gov/health/cd/statistics/reportable

After the webinar

▪ You will be sent a link to the evaluation
▪ Those seeking continuing education credits MUST complete the evaluation within 5 days
▪ Evaluation link closes after 5 days
▪ Those who do not complete the evaluation will not receive credits

Contact Information

Krista M. Reale, MA, CHES
New Jersey Department of Health
609-826-5964
krista.reale@doh.nj.gov

Kim Cervantes, MA, MPH, CIC
kim.cervantes@doh.nj.gov

Andrea M. Egizi, PhD
andrea.egizi@co.monmouth.nj.us

Jim Occi, PhD Candidate
james.occi@rutgers.edu

Krista M. Reale, MA, CHES
krista.reale@doh.nj.gov