Tickborne Diseases: A CDC Update

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Objectives

- Understand the **challenges**
  - Expansion of tick vectors and increasing incidence of tickborne disease
  - Complexities of Lyme disease surveillance

- Learn about new CDC **resources**
  - Scripted presentations
  - Handouts
  - Surveillance guidelines
Increasing Tickborne Disease
Overview of Trends, New Concerns

- Majority of vector-borne diseases in the U.S. are tickborne diseases
- Increasing number of tickborne disease cases over time
- Expanding geographic range of tickborne cases
- Growing number of tickborne agents recognized to cause human disease
Majority of Reported Vector-Borne Diseases Spread by Ticks

N = 62,399 cases

- Lyme disease (68%)
- Other tickborne diseases (27%)
- Mosquito- or flea-borne diseases (5%)

Cases of Nationally Notifiable Vector-Borne Diseases Reported in the U.S., 2017
Increasing Number of Reported Lyme Disease Cases

Expanding Geographic Range of Lyme Disease Cases

cdc.gov/lyme/stats/index.html

N=17,209

2001

N=38,069

2015
Growing Number of Tickborne Agents Recognized to Cause Human Disease, 1909-1960

- **Borrelia hermsii** (tick-borne relapsing fever)
- **Borrelia turicatae** (tick-borne relapsing fever)
- **Rickettsia rickettsii** (Rocky Mountain spotted fever)
- **Francisella tularensis** (tularemia)
- **Borrelia parkeri** (tick-borne relapsing fever)
- Colorado tick fever virus (Colorado tick fever disease)
- Powassan virus (Powassan encephalitis)
Growing Number of Tickborne Agents Recognized to Cause Human Disease. 1960-2018

- *Babesia microti* (babesiosis)
- *Borrelia burgdorferi* (Lyme disease)
- *Rickettsia philipii* (Pacific Coast tick fever)
- *Ehrlichia ewingii* (ehrlichiosis)
- *Ehrlichia chaffeensis* (ehrlichiosis)
- *Rickettsia parkeri* (rickettsiosis)
- Heartland virus (Heartland virus disease)
- *Anaplasma phagocytophilum* (anaplasmosis)
- *Borrelia mayonii* (Lyme disease)
- *Borrelia miyamotoi* (B. miyamotoi disease)
- *Ehrlichia muris eauclairensis* (ehrlichiosis)
Ixodes scapularis: An Increasing Public Health Concern

Invasive Tick Species
Multistate Infestation with the Exotic Disease-Vector Tick

*Haemaphysalis longicornis*

*As of February 12, 2019*
Number of Counties With Confirmed Local *H. longicornis**

*As of February 12, 2019*
Expanding Tick Vector Range
Distribution of Lyme Disease Vectors Has Expanded

**Established:** >6 or more ticks or >1 life stage recorded in a single year

**Reported:** <6 ticks of a single life stage recorded in a single year


Distributions of ticks and tickborne pathogens change over time.

Likelihood of human encounters with ticks and tickborne pathogens change over time and space.

Tick surveillance is intended to monitor trends in presence, abundance, and infection prevalence in medically important ticks to direct public health action.
Uses of Tick Surveillance Data in Public Health

- **Provide actionable, evidence-based information to clinicians, the public, and policy-makers**
  - Tracking changes in tick distribution, abundance
  - Detecting which pathogens are present in ticks and quantifying prevalence
  - Identifying when ticks are active

- **Explain and predict epidemiological trends**
  - Rarity of Lyme disease in the south, despite presence of the vector
  - Risk of exposure to agents of tickborne diseases that are not notifiable
  - Predicting future expansion of ticks and tickborne disease cases
Ticks of Public Health Significance

- Frequent human biters

- Capable of:
  - Acquiring human pathogens during blood feeding on zoonotic hosts
  - Maintaining infection between life stages
  - Transmitting pathogens through a tick bite

- Of more than 80 species of ticks described in the U.S., roughly a dozen are ticks of public health significance
Range Maps of Ticks that Bite Humans in the U.S.

https://www.cdc.gov/ticks/geographic_distribution.html
Three Species as Vectors of Majority of Human Diseases

- Lyme disease
- Anaplasmosis
- Babesiosis
- *Borrelia miyamotoi* disease
- Powassan disease
- Ehrlichiosis (*E. muris eauclairensis*)
- *Borrelia miyamotoi* disease
- Powassan disease
- Ehrlichiosis (*E. muris eauclairensis*)

**Map**:

- **Ixodes scapularis**
- **Amblyomma americanum**
- **Dermacentor variabilis**

**Diseases**:

- Ehrlichiosis; Heartland virus disease; Tularemia
- Rocky Mountain spotted fever; Tularemia
CDC Goals for Tick Surveillance

- Update species distribution maps (reported and established counties)
- Define which pathogens are present in ticks and at what prevalence
- Assess regional differences in the density of host-seeking infected ticks
Challenges of Lyme Disease Surveillance
Lyme Disease Surveillance Challenges Vary by Jurisdiction

- **Valuable information generated in low-incidence and emerging jurisdictions**
  - Investigation to understand local risk and associated messaging
  - Evidence-based information dissemination

- **Contrasting utility in many high-incidence jurisdictions**
  - LD occurs in the same places year after year: the risk is well understood
  - Case counts generate minimal new public health action
  - Clinical and public educational activities and outreach happen to the extent resources allow
CDC Is Exploring a Broad Concept of Lyme Disease Surveillance

- Traditional passive public health surveillance
- Novel data streams to assess the frequency, geographic distribution, and clinical manifestations of diagnosed Lyme disease
  - Medical insurance claims data
  - Advanced molecular detection of pathogens in human specimens
  - Syndromic surveillance
  - Systematic tick surveillance
Opportunities for Local Outreach and Education

- Academic institutions
- Schools and health educators
- Commercial entities
- Special interest groups
New CDC Resources:
Updated NACCHO Lyme Disease Toolkit
NACCHO Toolbox: Lyme Disease Toolkit
NACCHO Lyme Disease Toolkit

- Info-sheets: What to do after a tick bite

- Tick surveillance guidance
  - *Ixodes scapularis*
  - *Ixodes pacificus*

- Scripted presentations
  - Tickborne disease prevention & Lyme disease
  - Lyme disease surveillance in low incidence states: A resource for health departments

http://toolbox.naccho.org/

Search “Lyme disease”
Tick Surveillance Guidance

Surveillance for *Ixodes scapularis* and pathogens found in this tick species in the United States

Table of Contents

- Contributors and Reviewers .................................................. 4
- Intended Audience and Objectives .......................................... 4
- Public Health Importance of *Ixodes scapularis* .......................... 5
- Life Cycle of *Ixodes scapularis* ............................................ 8
- Tick Surveillance Objectives .................................................. 9
  - Classify County Status for *Ixodes scapularis* ......................... 10
  - Identify Presence and Prevalence of Human Pathogens in *Ixodes scapularis* Ticks ........................................... 10
  - Estimate the Density of Host-Seeking (Infected) *Ixodes scapularis* Ticks ..................................................... 11
  - Document Host-Seeking Phenology of *Ixodes scapularis* Ticks ................................................................. 12
- Tick Collection Methods ...................................................... 13
  - Drag Sampling or Flagging .................................................. 13
  - Background and methods ................................................. 13
  - Acceptable to use to address the following key surveillance objectives .............................................. 14

www.cdc.gov/ticks/surveillance
Scripted Presentations

- **Tickborne disease prevention & Lyme disease**
  - 40-slide deck with script
  - For use in local presentations and outreach

- **Lyme disease surveillance in low incidence jurisdictions**
  - 40-slide deck with script
  - For training epidemiologists and disease investigators
Handouts

Tick Bite: What to Do

1. Remove the tick as soon as possible
   1. Use fine-tipped tweezers to grasp the tick as close to the skin as you can.
   2. Pull upward with steady, even pressure. Do not twist or jerk the tick.
   3. After removing the tick, clean the bite area and your hands with rubbing alcohol or soap and water.
   4. Dispose of the tick by flushing it down the toilet. If you would like to bring the tick to your healthcare provider for identification, put it in rubbing alcohol or place it in a sealed bag/container.

2. Consider calling your healthcare provider
   In general, CDC does not recommend taking antibiotics after tick bites to prevent tick-borne diseases. However, in certain circumstances, a single dose of doxycycline after a tick bite may lower your risk of Lyme disease. Consider talking to your healthcare provider if you live in an area where Lyme disease is common.

3. Watch for symptoms for 30 days
   Call your healthcare provider if you get any of the following:
   - Rash
   - Fever
   - Fatigue
   - Headache
   - Muscle pain
   - Joint swelling and pain
   Treatment for tick-borne diseases should be based on symptoms, history of exposure to ticks, and in some cases, blood test results. Most tick-borne diseases can be treated with antibiotics.

Common questions after a tick bite

Should I get my tick tested for germs?
Some companies offer to test ticks for specific germs. CDC strongly discourages using results from these tests when deciding whether to use antibiotics after a tick bite.
   - Results may not be reliable. Laboratories that test ticks are not required to meet the same quality standards as laboratories used by clinics or hospitals for patient care.
   - Positive results can be misleading. Even if a tick contains a germ, it does not mean that you have been infected by that germ.
   - Negative results can also be misleading. You might have been bitten unknowingly by a different infected tick.

Tick testing for germs can be expensive. Your money might be better spent on tick bite prevention efforts, including insect repellents and permethrin-treated clothing.

Can I get sick from a tick that is crawling on me but has not yet attached?
Ticks must bite you to spread their germs. A tick that is crawling on you but not attached or full of blood could not have spread germs. However, if you have found a tick crawling on you, it’s a sign there may be others: do a careful tick check.

How long does a tick need to be attached before it can spread infection?
Depending on the type of tick and germ, a tick needs to be attached to you for different amounts of time (minutes to days) to infect you with that germ.

Your risk for Lyme disease is very low if a tick has been attached for fewer than 36 hours. Check for ticks daily and remove them as soon as possible.
Other CDC Resources: www.cdc.gov/ticks
Lyme Disease Brochure

TICK REMOVAL

Grasp the tick firmly and as close to the skin as possible. With a steady motion, pull the tick’s body away from the skin. Do not be alarmed if the tick’s mouthparts remain in the skin. Cleanse the area with rubbing alcohol or soap and water.

https://www.cdc.gov/lyme/toolkit
PREVENT TICK BITES!

- WEAR REPELLENT
- CHECK FOR TICKS DAILY
- SHOWER SOON AFTER BEING OUTDOORS
- CALL YOUR DOCTOR IF YOU GET A FEVER OR RASH

For more information: www.cdc.gov/ticks