LBOH Preparation for Tickborne Disease Case Investigations and Arboviral Surveillance

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Objectives

• Review of key steps and available tools for tickborne disease case investigations

• Introduction to Powassan

• Brief overview of statewide arbovirus surveillance and what you should know

• Health education resources

• The important role of your local arbovirus contact and how to update your town’s arbovirus contact information in MAVEN
Tickborne Diseases in MA

- Lyme Disease
  - ~5,000 probable cases in 2022 (Additional ~8,000 suspect cases in individuals with positive Lyme testing reported). NOTE: There is no confirmed designation for Lyme disease in states designated as high incidence (This applies to MA)
- Babesiosis
  - 441 confirmed & probable cases as of 2022
- Human Granulocytic Anaplasmosis (HGA)/Anaplasmosis
  - 620 confirmed & probable cases as of 2022
- Borrelia *miyamotoi*
  - 32 confirmed & probable cases as of 2019, as of 2022 there are 2 confirmed, but this is likely due to poor follow-up and most labs not having the capability to test for this species.

- *In MA, but rare: Tularemia, Ehrlichiosis, Rocky Mountain Spotted Fever, Powassan*
Incidence Rates (per 100,000 population\textsuperscript{\textdegree}) for Confirmed and Probable Lyme Disease in Massachusetts 2010-2014\textsuperscript{*}

Statewide Totals

Incidence Rate: 68.30
Population: 6,547,629
Unknown City/Town: 2,588

\begin{itemize}
\item \text{Incidence Rate:} \leq 100
\item \text{101 - 250}
\item \text{251 - 500}
\item \text{> 500}
\item \text{Suppressed ~}
\item \text{No Reported Cases}
\end{itemize}

\textsuperscript{*} Data as of 6/3/2015 and subject to change
\textsuperscript{\textdegree} Case counts less than 5 in populations\textsuperscript{\textdegree} less than 50,000 are suppressed to maintain patient confidentiality.
\textsuperscript{\textdegree} Population based on 2010 Census data.
Five-year Babesiosis incidence rates per 100,000 town residents 2017-2021 (n=2,916)

- No reported cases
- 0.1 - 25.0
- 25.1 - 50.0
- 50.1 - 150.0
- 150.1+
- Suppressed for <5 cases among <50,000 residents

Population denominators are based on 2020 Census data. Statewide rate = 41.9 per 100,000 MA residents. Data are current as of April 17, 2023 and are subject to change.
Five-year Anaplasmosis incidence rates per 100,000
town residents 2017-2021 (n=4,088*)

- No reported cases
- 0.1 - 25.0
- 25.1 - 50.0
- 50.1 - 150.0
- 150.1+
- Suppressed for <5 cases among <50,000 residents

Population denominators are based on 2020 Census data. Statewide rate = 58.7 per 100,000 MA residents

Massachusetts Department of Public Health
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Data are current as of April 17, 2023 and are subject to change.
Five-year Borrelia *miyamotoi* total cases

Number of Borrelia *miyamotoi* cases 2017-2021 (n=149)

- No reported cases
- 1 - 5
- 6 - 7
- 8 - 10
- 11 - 25
- 26 - 42

Suppressed for <5 cases among <50,000 residents

Data are current as of April 17 2023 and are subject to change.

Massachusetts Department of Public Health
Bureau of Infectious Disease and Laboratory Sciences
KEY HIGHLIGHTS
In case you missed it!

- Within MAVEN help, under the Zoonotic folder: June 2022 presentation provides in depth training on how to conduct tickborne disease case investigations

Zoonotic (Includes mosquito and tick diseases) Resources

- June 7, MDPH Tuesday Infectious Disease Webinar Series Recording (35:16)
- June 7, 2022 Tickborne Disease Investigation Training for LBOH
- June 7, 2022 Tickborne Disease Investigation Training for LBOH Recording (42:31)
- July 2018 - Investigation of Potential Rabies Exposures Slides

Tip Sheets

- Follow up for Suspect Cases of Tickborne Disease
- April 2023 Mosquito and Tickborne Disease Prevention Resources
Tip Sheet Available

- Follow-up Tip Sheet is available to help you with different Tickborne Diseases.
- Nested under the question mark symbol (?) in MAVEN, under “Zoonotic – Tip Sheets”

Summary of Case Investigation

• Receive tickborne disease (TBD) event in your workflow.
• Check the lab tab and call the provider/IP to collect the clinical and risk information.
• Complete the variables in MAVEN (using the wizard where it’s available).
  • Lab result is not reliable on its own, need compatible symptoms.
  • If you leave a field blank, we will assume it wasn’t asked.
  • Example: if you ask about symptoms in general and the provider says “headache, fever” – ask specifically about each symptom, or select “no” if the doctor clearly states: “they only had headache.”
• Call the case if you have time to provide resources and education
  • Guide people to seek tickborne panel testing, not just Lyme (includes HGA, Babesia, TBRF/Borrelia *miyamotoi*), as there is potential for co-infection.
Investigation Tip

- Always call the provider first to confirm the diagnosis and obtain clinical information BEFORE contacting the patient.
- If you can collect all the information from the provider/IP, the investigation is complete.
- It is NOT REQUIRED, but you may choose to contact the patient directly to provide yourself as a resource to answer questions and provide educational materials.
  - Data completion is better when there are fewer calls to conduct, you can certainly call case if you have time and want to provide additional education. Our goal is to streamline follow up for you to make it more efficient.
- Instead of individual-level education, your efforts are better targeted toward town awareness and prevention campaigns!
A Word on HIPAA

- If providers refuse to provide you with the necessary information, remind them that providing information for public health investigations is **necessary and permissible** under HIPAA.

Example Call Script

• “Hi, my name is ___ I am calling from the local health department. I’d like to speak with the doctor or nurse who worked with patient [provide name and DOB].

• [Once transferred to the nurse/doctor] We received a report of a case you treated as being positive for Babesiosis. In order to determine if this is a true case I need to collect clinical information.”

• [allow them to ask questions, navigate to the medical notes]

• “All I need are the symptoms they presented with, and any risk information you collected, particularly if they mentioned tick bites, any travel (if so, where), and any mention of recent blood transfusions.”
Data completeness

- Focus on the clinical and risk question packages (the wizard will pull the key questions needed for classification – only available for HGA and babesiosis)
- Lab results are not reliable on their own.
- For all tickborne diseases collect the clinical and risk information by completing the MAVEN variables following the wizard.
  - Check the most important symptom information needed for that disease by consulting the case classification manual.
Why is this important?

- The goal is to appropriately classify the case (confirmed, probable, revoked). In order to do that, we need data completeness.
  - MDPH Epidemiologists do a final review and classify these cases based upon information collected in your investigations.

- If we don’t have enough information to classify, the case is left as suspect, this negatively impacts our surveillance reporting.

- If we have an underestimate of surveillance reporting we cannot allocate the adequate resources toward tickborne disease prevention efforts.
A Note on Babesiosis

Please complete the question on blood transfusion!

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did case have symptoms?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Symptom onset date:</td>
<td>02/11/2019</td>
<td></td>
</tr>
<tr>
<td>Anemia</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Chills</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>Yes 102</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Joint aches/pains</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Muscle aches/pains (myalgia)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Sweats</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Other symptoms (specify):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was case hospitalized?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Date hospitalized:</td>
<td>02/13/2019</td>
<td></td>
</tr>
<tr>
<td>Hospital name:</td>
<td>Newton-Wellesley Hospital - 2014 Washington Street, Newton, MA 02462, (617) 243-6772</td>
<td></td>
</tr>
<tr>
<td>Additional hospital telephone #</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date discharged:</td>
<td>02/14/2019</td>
<td></td>
</tr>
<tr>
<td>Hospital medical record/chart number</td>
<td>MRN999999</td>
<td></td>
</tr>
<tr>
<td>Outcome:</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Has case received blood transfusion, tissue products or organ transplant?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>02/01/2019</td>
<td></td>
</tr>
<tr>
<td>What was received?</td>
<td>Blood</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Once these four questions have been completed, the concerns will no longer appear on the dashboard. You must complete all four.
A Note on Lyme Disease

- Lyme disease is the most common tickborne disease in MA. It is spread by deer ticks which also carry our other diseases of concern.
- MA no longer conducts active surveillance of Lyme.
- Why? MA is a high Lyme disease incidence state. DPH utilizes syndromic surveillance along with laboratory reporting.
Town-Level Lyme Disease Surveillance

- Interested in evaluating the prevalence of Lyme in your town? Here are some things to consider:
  - Surveillance data is available from MAVEN extracts for confirmed and probable cases through 12/21/2015
  - MDPH discontinued individual case investigations on 1/1/2016 due to an overburden on LBOHs and clinicians and a lack of actionable information that could guide health interventions
  - In 2019, MDPH transitioned to syndromic surveillance only for endemic tick-borne diseases with monthly reports available online
  - As of 2022, Lyme disease case classification changes have allowed MDPH the capability to report out probable cases moving forward, though these reports should not be compared to historical data
  - Lyme specific surveillance summaries are planned for 2023
Brief Introduction to Powassan

- A rare, but often serious disease caused by a virus spread by infected black-legged (deer) ticks, and is not spread person-to-person.
- Most cases have occurred in the northeastern and Great Lakes regions of the US from late spring through early winter, with those who work outdoors or engage in recreational activities having higher risk of infection.
- Approximately 194 cases have been reported in the US from 2011-2020.
- MA has reported 45 cases from 2011-2021.
- Symptom onset is 1 week to 1 month after exposure to tick bite. Symptoms: encephalitis, fever, headache, vomiting, double vision, weakness, confusion, loss of coordination, speech difficulties, and seizures. ~10% with severe disease die.
- There is no specific medicine to cure or treat POWV disease.
EDUCATION MATERIALS
Education Resources

Protect Yourself from Mosquitoes
Mosquitoes can spread diseases that make you very sick. Take steps to prevent mosquito bites.

Protect Yourself from Ticks
Ticks are everywhere. They can carry diseases that can make you, your family or your pets very sick. Take steps to prevent tick bites.

Preventing Disease Spread by Ticks

TICK IDENTIFICATION CARD

nymph  male  female  male  female
Deer ticks       American dog ticks
(actual size)

MA Department of Public Health
617.983.6800
www.mass.gov/dph
Bite Lab

• Tick and mosquito-borne disease physical resource. Designed to be used accompanied or stand alone

• Target ages 8 – 14

• Health and Science Curriculum

• Decentralized Resource

• 2023 Survey Incoming!
ARBOVIRUS SURVEILLANCE
**Endemic Mosquito-borne Disease**

**Eastern Equine Encephalitis virus (EEE)**
- 50% mortality; up to 80% of survivors left with permanent neurologic damage
- All ages can be affected, including children
- Headache, high fever (103-106 degrees), nausea, vomiting, fatigue, diarrhea, seizures, and coma
- Outbreaks occur in 2-3 year cycles.

**West Nile virus (WNV)**
- 80% infections are asymptomatic/subclinical
- 20% West Nile Fever
  - fever, body aches, headache, swollen lymph glands and rash
  - <1% (~1:150) develop neuroinvasive disease (65+ demographic at increased risk)

**Jamestown Canyon virus (JCV)**
- Most infections are asymptomatic
- Fever, fatigue, headache. Severe cases can progress to meningitis or encephalitis.
Arbovirus Transmission

Amplification Cycle:
Escalating interactions between infected birds and bird-biting mosquitoes

Spill-over:
Incidental Transmission by mammal-biting mosquitoes

<table>
<thead>
<tr>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
</table>

1. Bird to insect
2. Insect to bird
3. Insect to human
Arbovirus Surveillance Activities

Field Collections
- Set and collect mosquito traps from long-term and statewide sentinel sites

Laboratory Testing and Reporting of Results
- Test specimens for EEE / WNV infection
  - Mosquitoes – PCR Testing (24 HR Turnaround-time)
  - Suspect animal & human specimens (Serologic and PCR)

Disease Surveillance and Risk Communication
- MDPH epidemiologists conduct primary investigation steps
- Communicate findings and recommendations with LBOHs, MCD’s and the public
- Provide information to guide the decision-making process to reduce the risk of disease
Arboviral Risk Maps

https://www.mass.gov/info-details/massachusetts-arbovirus-update
LBOH Arbovirus Coordinator

- Each town has a designated arbovirus coordinator – this is the person the Zoonotic Epidemiologist calls to notify you of any positive WNV/EEE mosquitoes, animals, or humans in your town
  - The coordinator collects this information and decides on a plan of action to notify the residents
  - DPH can also provide sample press releases!

- Not sure who the arbovirus coordinator is for your town? Check MAVEN!
  - The information in the LBOH communication event is based off who the assigned coordinator was the previous year. If this is outdated, please review and update where appropriate!
Resources

- Information on ticks and mosquitoes in MA, as well as links to the risk maps of WNV and EEE
  - https://www.mass.gov/mosquitoes-and-ticks
  - https://www.mass.gov/info-details/massachusetts-arbovirus-update
- Videos
  - Mosquitos: https://www.mass.gov/info-details/mosquito-borne-disease-prevention#videos-
  - Ticks: https://www.mass.gov/info-details/tick-borne-disease-prevention#videos-
- Information about mosquito control programs and aerial spraying FAQs
  - https://www.mass.gov/service-details/mosquito-control-and-spraying
- Links to educational materials on tickborne disease, as well as surveillance reports
  - https://massclearinghouse.ehs.state.ma.us/
  - https://www.mass.gov/tick-borne-diseases
- Other key resources
  - https://web.uri.edu/tickencounter/fieldguide/ticks-by-species/ - great website for identifying ticks and prevention tips!
  - Places that conduct tick testing:
    - https://ag.umass.edu/resources/tick-testing-resources -
    - https://www.mass.gov/service-details/tick-identification-and-testing-services
    - the best resource for MA residents is likely ECO Laboratories in Acton, MA: https://ticktests.com/
QUESTIONS
Questions received

- Why is Tularemia reported in the Immediate disease workflow queue, as opposed to the routine disease?
- Why are tickborne diseases categorized as "suspect"?
- Which are tickborne diseases required to follow up on?
- When following up with a provider to ensure titer is actual disease, and they don't call back, do you call case or declare lost to follow up?
- What can the collective "we" do to spread the word to physicians in the Commonwealth about tickborne illness reporting?
- Interested in trends of case # over the last few years (Town of Carlisle anxious about Powassan!)
- I want to learn the appropriate way to take out the tick.
- How does Massachusetts handle geographically unusual diseases (ex., Rocky Mountain spotted fever)?
- Do patients need to save tick and bring it in for ID testing?
- Because of the increase in prevalence are there any plans related to prevention of tick infestation or Lyme disease?
- Will the presenter touch on the older theory that diagnosing Lyme is difficult? Before I went to nursing school, I think I remember hearing that it was commonly thought that a definitive diagnosis was “hard to attain” - is that even a thing?