LBOH Preparation for Tickborne Disease Case Investigations and Arboviral Surveillance

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Objectives

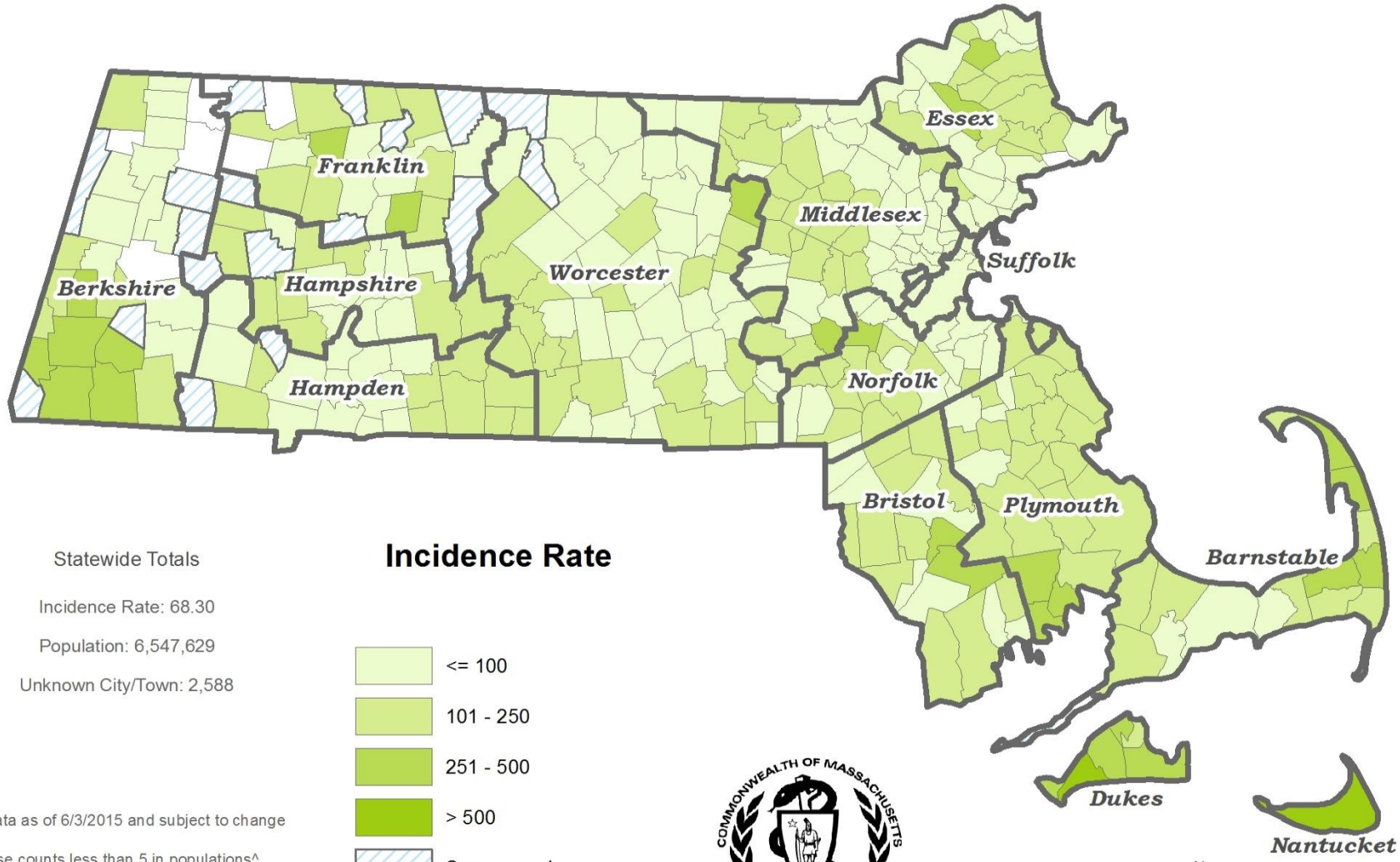
- Review of key steps and available tools for tickborne disease case investigations
- Introduction to Powassan
- Brief overview of statewide arbovirus surveillance and what you should know
- Health education resources
- The important role of your local arbovirus contact and how to update your town's 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^) for Confirmed and Probable Lyme Disease in Massachusetts 2010-2014*



Statewide Totals

Incidence Rate: 68.30

Population: 6,547,629

Unknown City/Town: 2,588

Incidence Rate

- <= 100
- 101 - 250
- 251 - 500
- > 500
- Suppressed ~
- No Reported Cases

* Data as of 6/3/2015 and subject to change

~ Case counts less than 5 in populations^ less than 50,000 are suppressed to maintain patient confidentiality.

^ Population based on 2010 Census data.

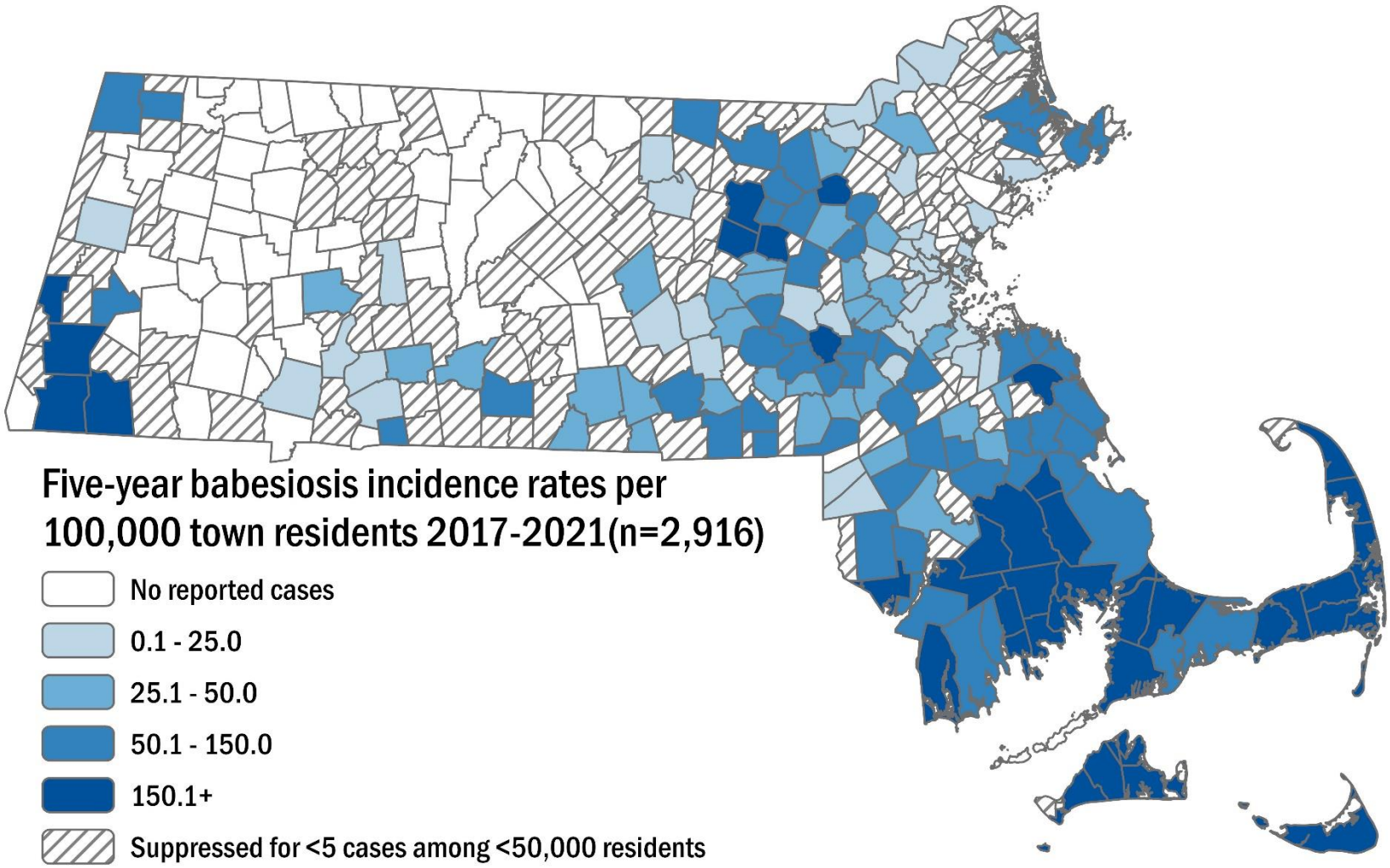
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH

N

1 inch = 20 miles

Bureau of Infectious Disease
Office of Integrated Surveillance & Informatics Services

Five-year Babesiosis incidence rates per 100,000



Population denominators are based on 2020 Census data.
Statewide rate=41.9 per 100,000 MA residents

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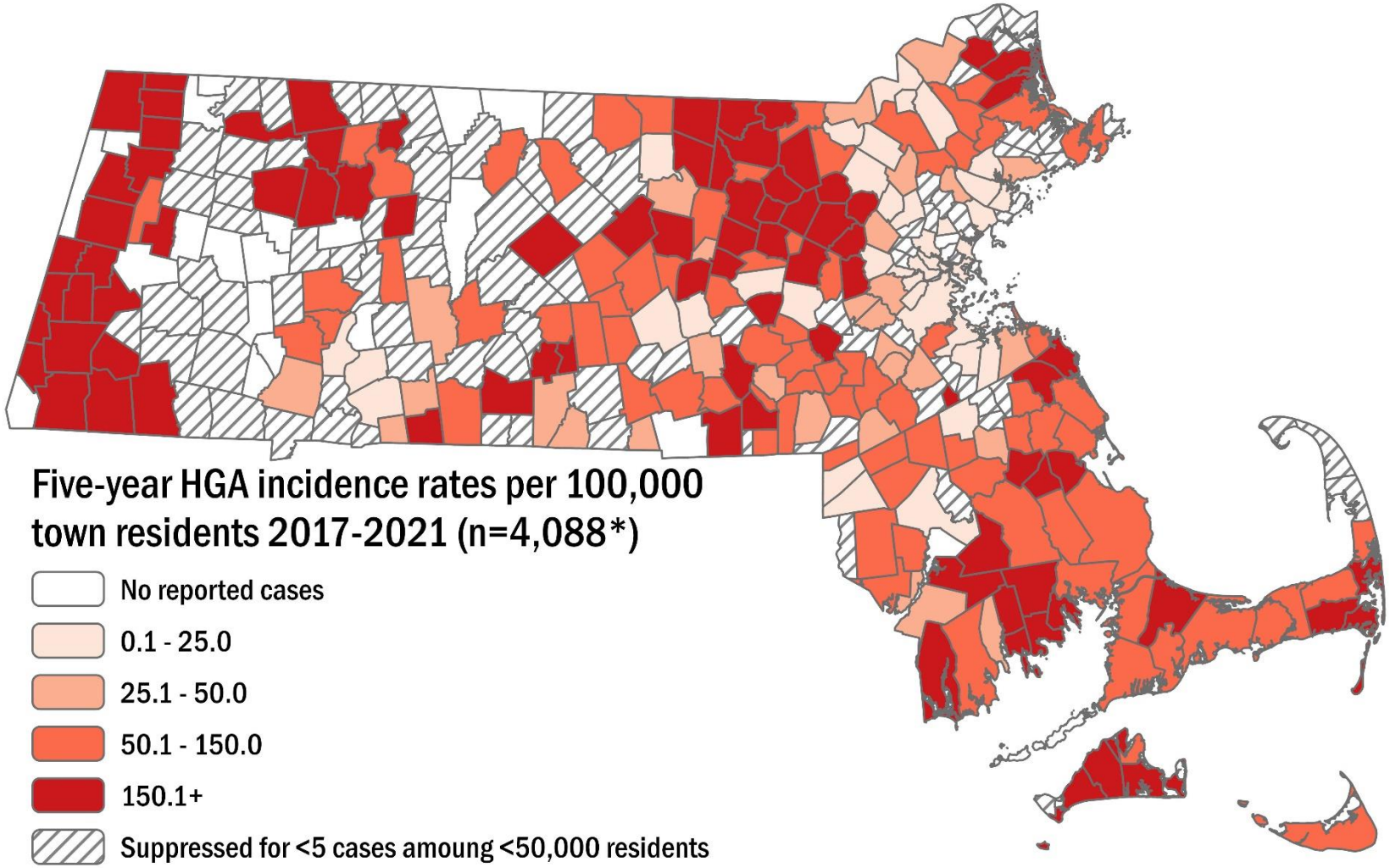
Data are current as of April 17, 2023 and are subject to change.

Five-year Anaplasmosis incidence rates per 100,000



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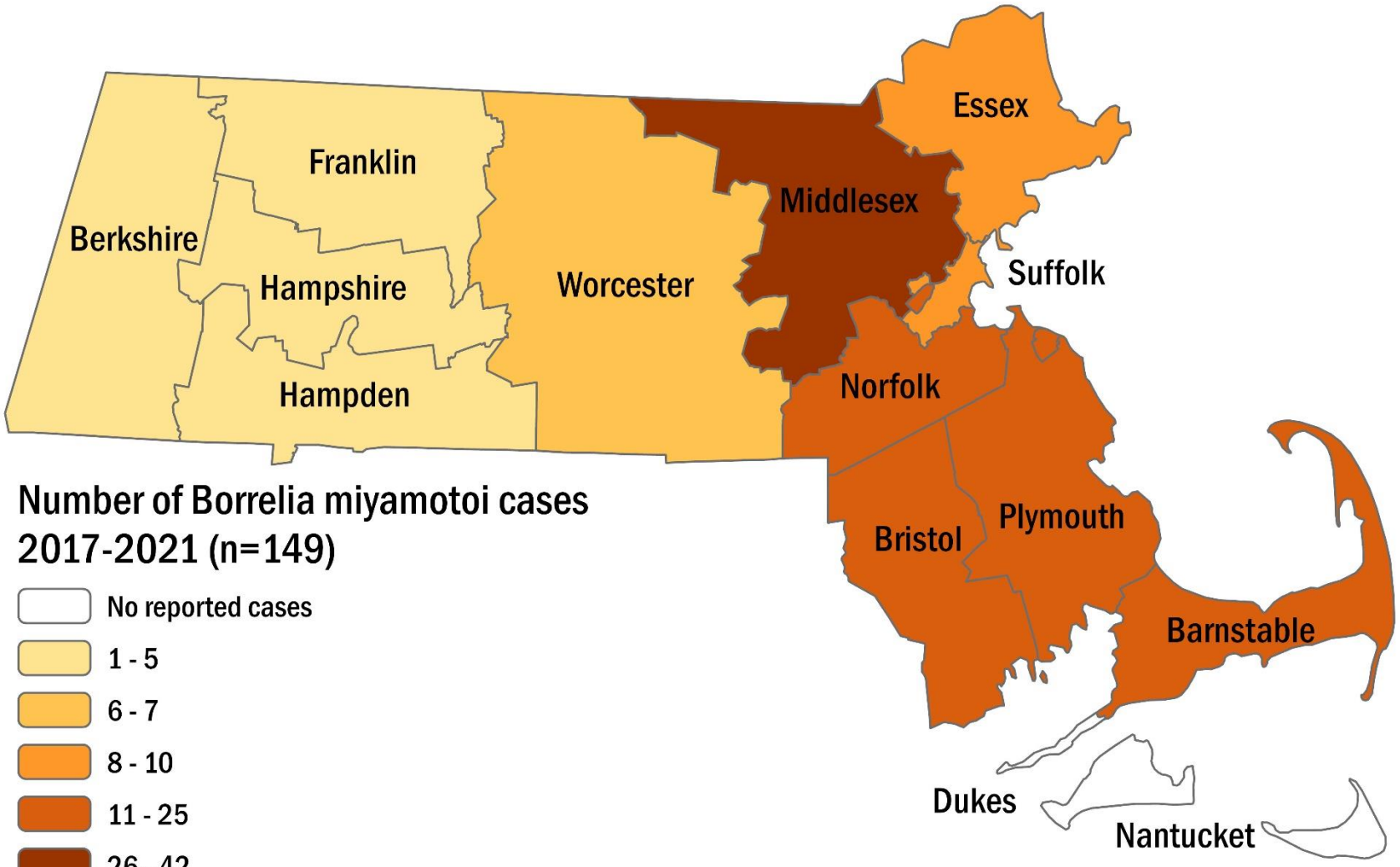
Population denominators are based on 2020 Census data.
Statewide rate= 58.7 per 100,000 MA residents

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.

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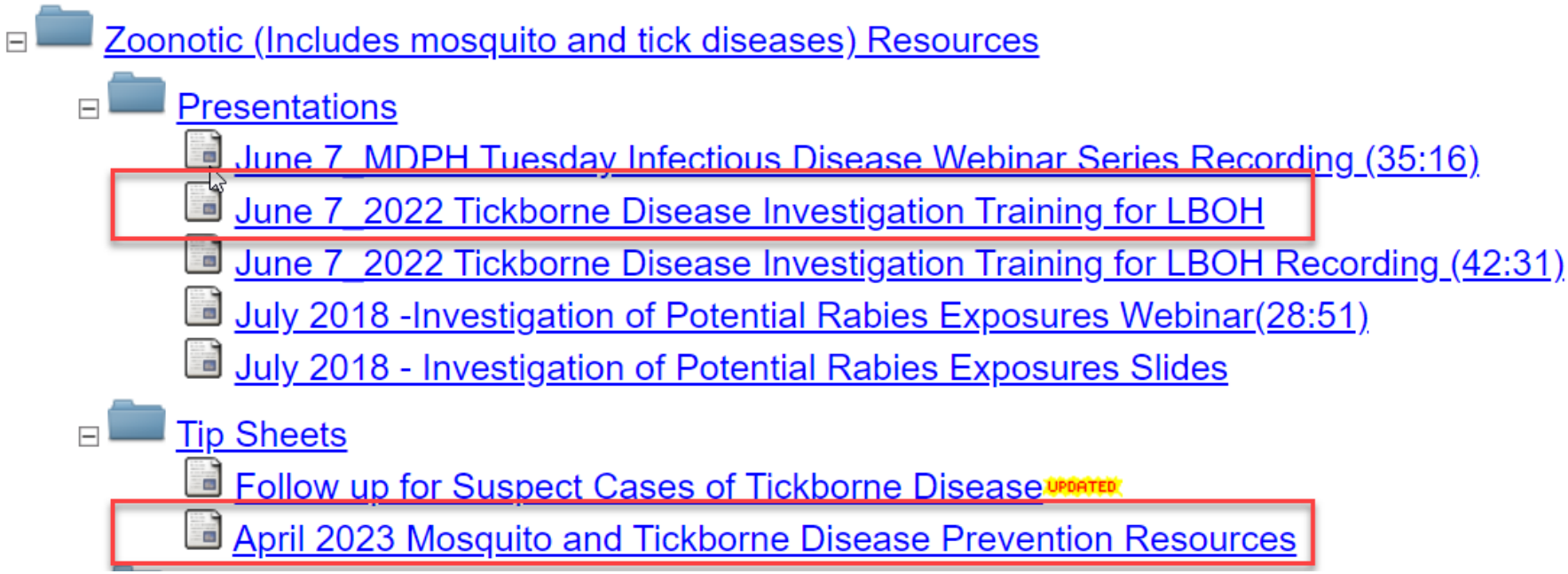
KEY HIGHLIGHTS

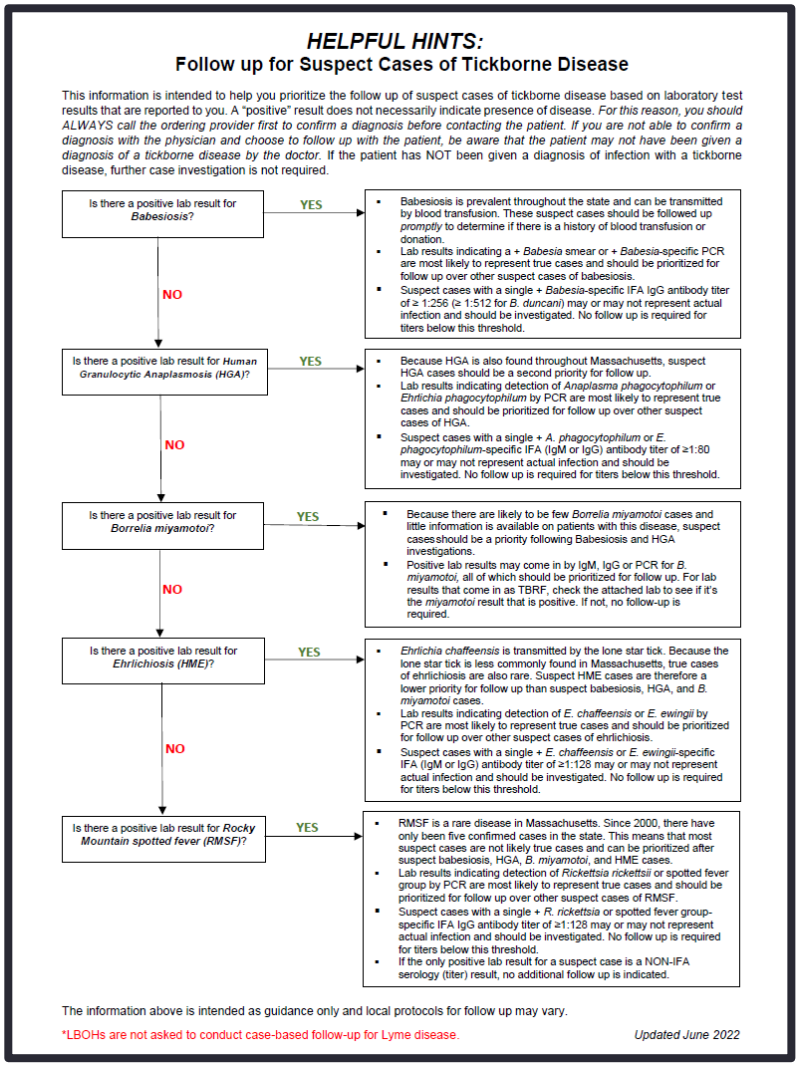
In case you missed it!

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



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”
  - http://www.maven-help.maventrainingsite.com/pdf/Tip_Sheet_Tickborne_Disease.pdf



HELPFUL HINTS:

Follow up for Suspect Cases of Tickborne Disease

This information is intended to help you prioritize the follow up of suspect cases of tickborne disease based on laboratory test results that are reported to you. A “positive” result does not necessarily indicate presence of disease. *For this reason, you should ALWAYS call the ordering provider first to confirm a diagnosis before contacting the patient. If you are not able to confirm a diagnosis with the physician and choose to follow up with the patient, be aware that the patient may not have been given a diagnosis of a tickborne disease by the doctor.* If the patient has NOT been given a diagnosis of infection with a tickborne disease, further case investigation is not required.

Is there a positive lab result for *Babesiosis*? — YES
- Babesiosis is prevalent throughout the state and can be transmitted by blood transfusion. These suspect cases should be followed up *promptly* to determine if there is a history of blood transfusion or donation.
- Lab results indicating a + *Babesia* smear or + *Babesia*-specific PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of babesiosis.
- Suspect cases with a single + *Babesia*-specific IFA IgG antibody titer of ≥ 1:256 (≥ 1:512 for *B. duncani*) may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Human Granulocytic Anaplasmosis (HGA)*? — YES
- Because HGA is also found throughout Massachusetts, suspect HGA cases should be a second priority for follow up.
- Lab results indicating detection of *Anaplasma phagocytophilum* or *Ehrlichia phagocytophilum* by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of HGA.
- Suspect cases with a single + *A. phagocytophilum* or *E. phagocytophilum*-specific IFA (IgM or IgG) antibody titer of ≥1:80 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Borrelia miyamotoi*? — YES
- Because there are likely to be few *Borrelia miyamotoi* cases and little information is available on patients with this disease, suspect cases should be a priority following Babesiosis and HGA investigations.
- Positive lab results may come in by IgM, IgG or PCR for *B. miyamotoi*, all of which should be prioritized for follow up. For lab results that come in as TBRF, check the attached lab to see if it's the *miyamotoi* result that is positive. If not, no follow-up is required.

NO

Is there a positive lab result for *Ehrlichiosis (HME)*? — YES
- *Ehrlichia chaffeensis* is transmitted by the lone star tick. Because the lone star tick is less commonly found in Massachusetts, true cases of ehrlichiosis are also rare. Suspect HME cases are therefore a lower priority for follow up than suspect babesiosis, HGA, and *B. miyamotoi* cases.
- Lab results indicating detection of *E. chaffeensis* or *E. ewingii* by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of ehrlichiosis.
- Suspect cases with a single + *E. chaffeensis* or *E. ewingii*-specific IFA (IgM or IgG) antibody titer of ≥1:128 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.

NO

Is there a positive lab result for *Rocky Mountain spotted fever (RMSF)*? — YES
- RMSF is a rare disease in Massachusetts. Since 2000, there have only been five confirmed cases in the state. This means that most suspect cases are not likely true cases and can be prioritized after suspect babesiosis, HGA, *B. miyamotoi*, and HME cases.
- Lab results indicating detection of *Rickettsia rickettsii* or spotted fever group by PCR are most likely to represent true cases and should be prioritized for follow up over other suspect cases of RMSF.
- Suspect cases with a single + *R. rickettsia* or spotted fever group-specific IFA IgG antibody titer of ≥1:128 may or may not represent actual infection and should be investigated. No follow up is required for titers below this threshold.
- If the only positive lab result for a suspect case is a NON-IFA serology (titer) result, no additional follow up is indicated.

The information above is intended as guidance only and local protocols for follow up may vary.

*LBOHs are not asked to conduct case-based follow-up for Lyme disease.

Updated June 2022

Summary of Case Investigation

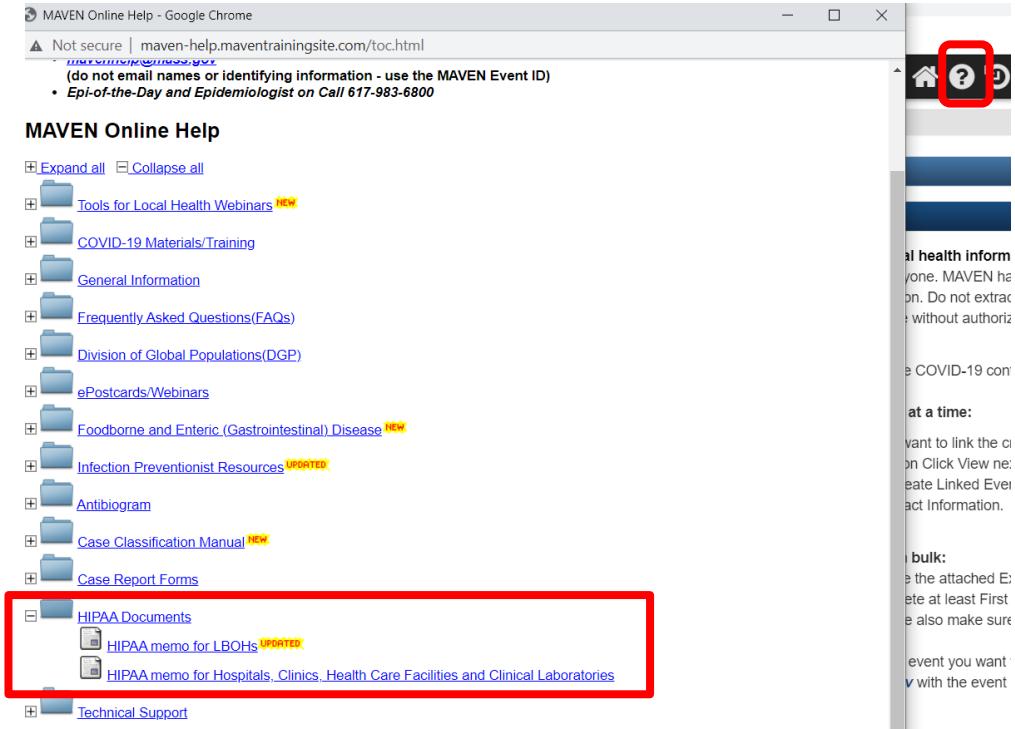
- Receive tickborne disease (TBD) event in your workflow.
- Check the lab tab and call the provider/IP to collect the clinical and risk information.
- Complete the variables in MAVEN (using the wizard where it's available).
  - Lab result is not reliable on its own, need compatible symptoms.
  - If you 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.**
- http://www.maven-help.maventrainingsite.com/pdf/LBOH_HIPAA_Letter_2020.pdf

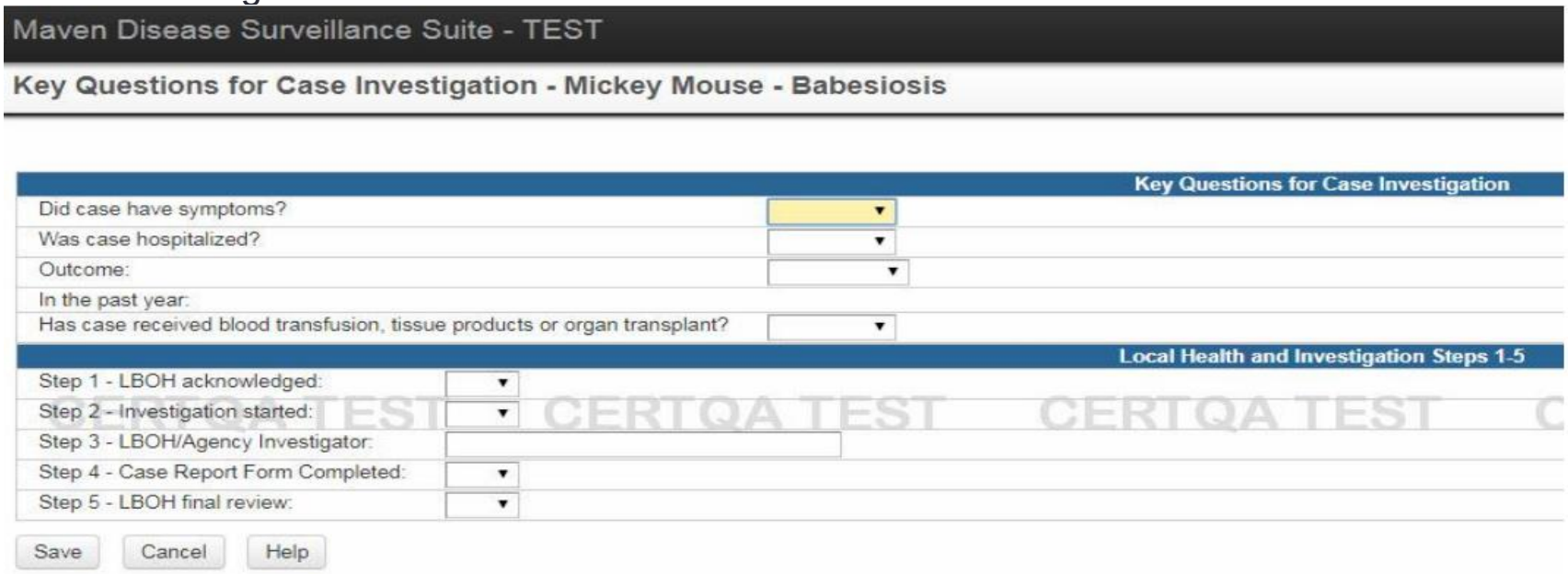


Example Call Script

- "*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?

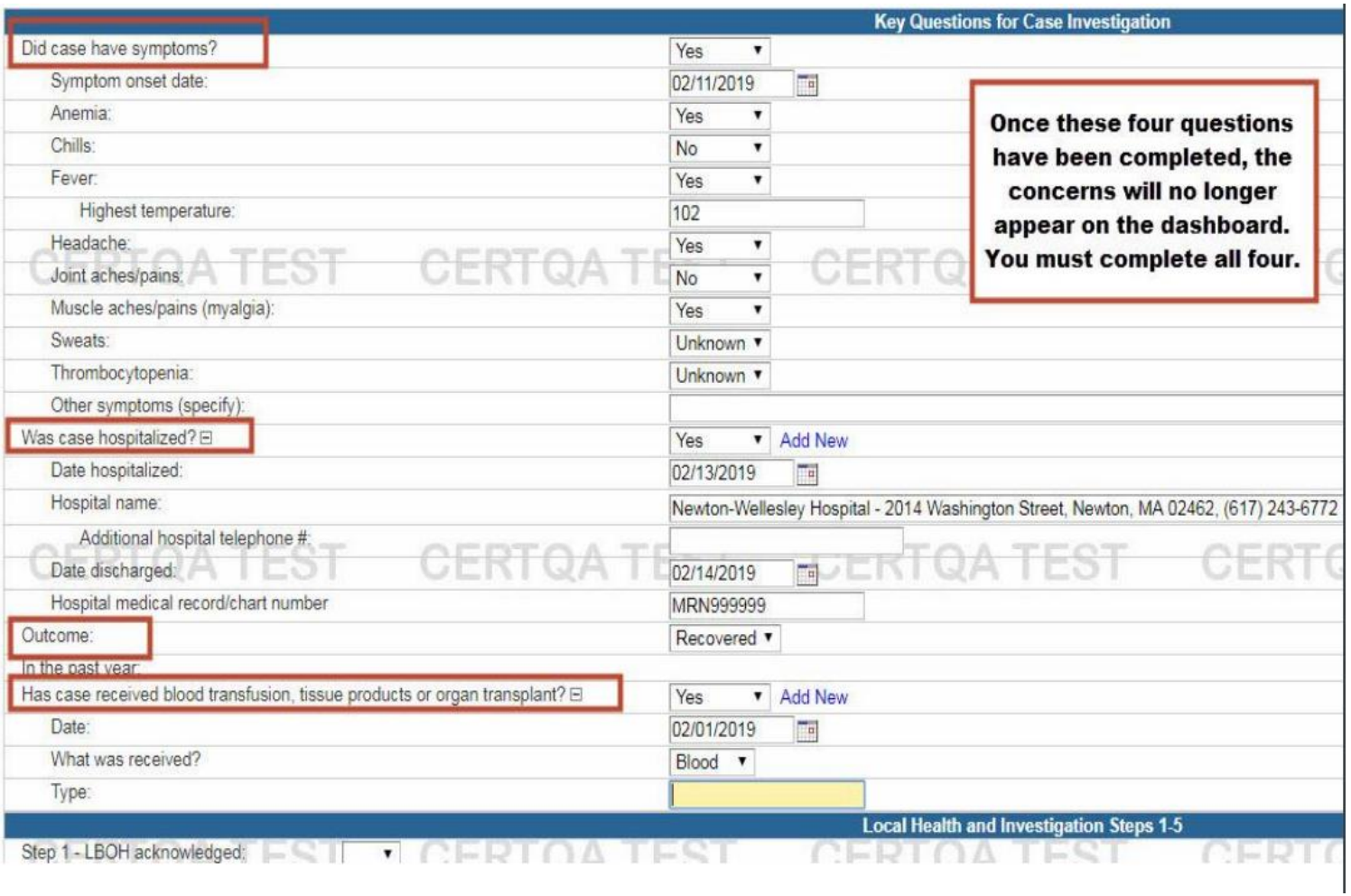
- The goal is to appropriately classify the case (confirmed, probable, revoked). In order to do that, we need data completeness.
  - MDPH Epidemiologists do a final review and classify these cases based upon information collected in your investigations.

- 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!

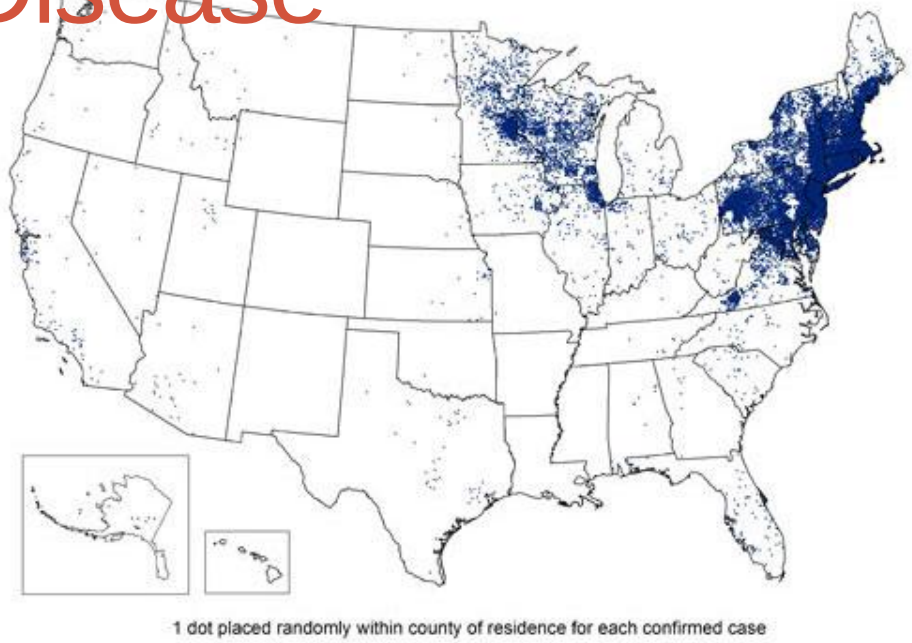


Key Questions for Case Investigation	
Did case have symptoms?	Yes
Symptom onset date:	02/11/2019
Anemia:	Yes
Chills:	No
Fever:	Yes
Highest temperature:	102
Headache:	Yes
Joint aches/pains:	No
Muscle aches/pains (myalgia):	Yes
Sweats:	Unknown
Thrombocytopenia:	Unknown
Other symptoms (specify):	
Was case hospitalized?	Yes Add New
Date hospitalized:	02/13/2019
Hospital name:	Newton-Wellesley Hospital - 2014 Washington Street, Newton, MA 02462, (617) 243-6772
Additional hospital telephone #:	
Date discharged:	02/14/2019
Hospital medical record/chart number	MRN999999
Outcome:	Recovered
In the past year:	
Has case received blood transfusion, tissue products or organ transplant?	Yes Add New
Date:	02/01/2019
What was received?	Blood
Type:	
Local Health and Investigation Steps 1-5	
Step 1 - LBOH acknowledged:	

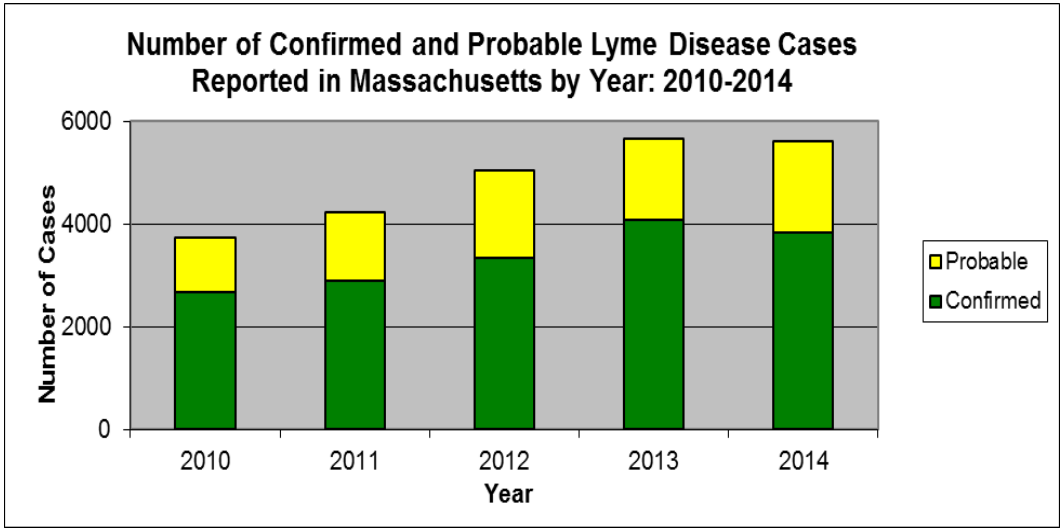
Once these four questions have been completed, the concerns will no longer appear on the dashboard. You must complete all four.

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.
  - https://www.mass.gov/report/2019-monthly-tick-reports



1 dot placed randomly within county of residence for each confirmed case

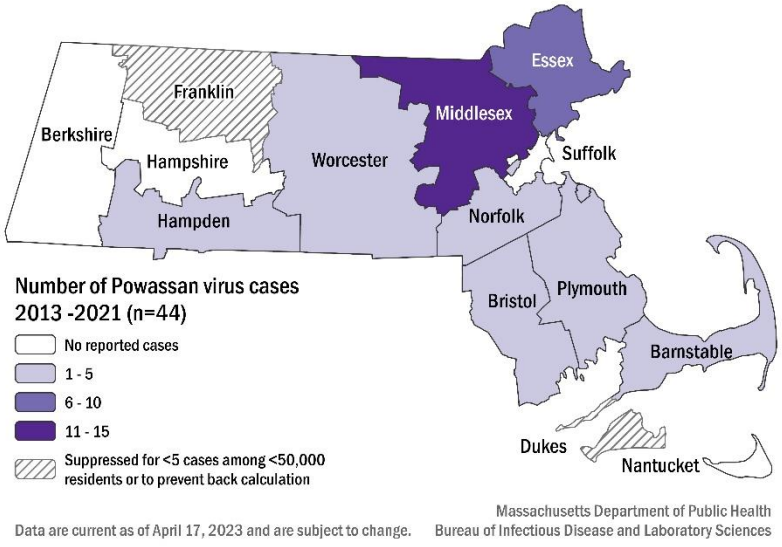


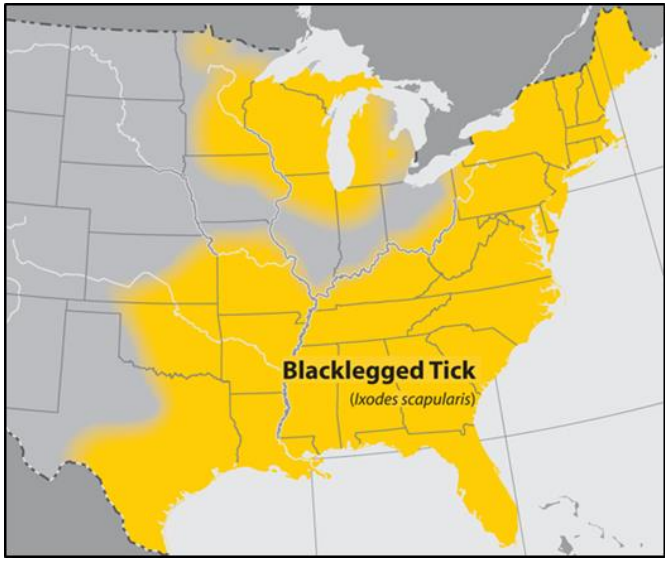
Town-Level Lyme Disease Surveillance

- 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

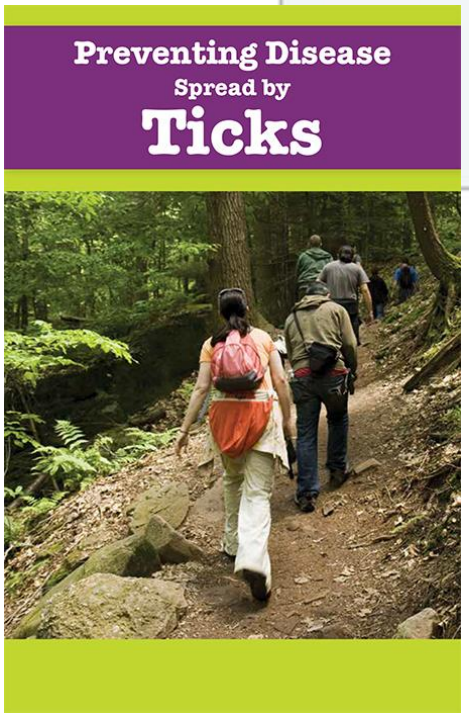
- A rare, but often serious disease caused by a virus spread by infected black-legged (deer) ticks, and is not spread person-to-person.
- Most cases have occurred in the northeastern and Great Lakes regions of the US from late spring through early winter, with those who work outdoors or engage in recreational 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.

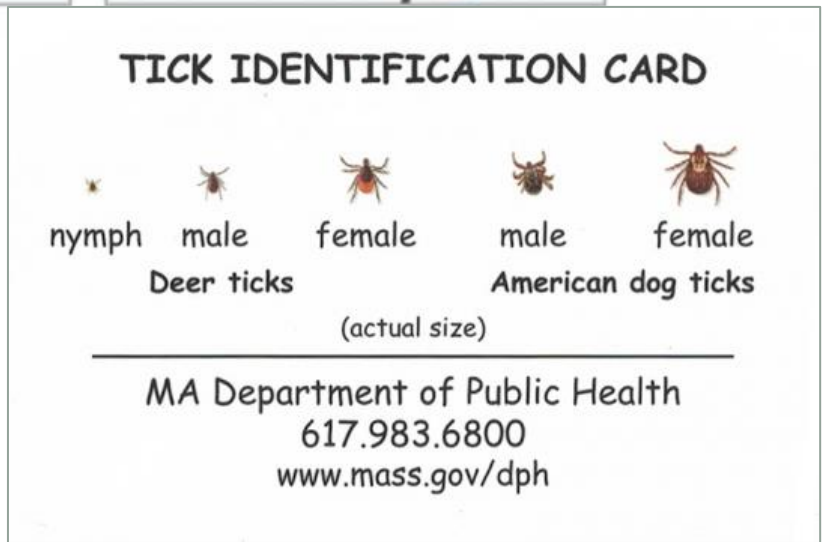




EDUCATION MATERIALS

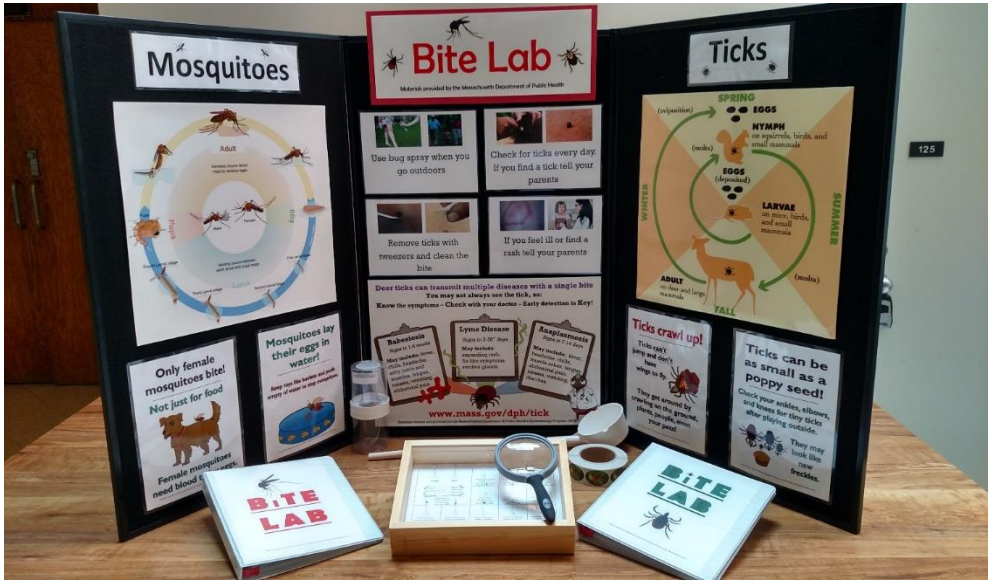
Education Resources





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.

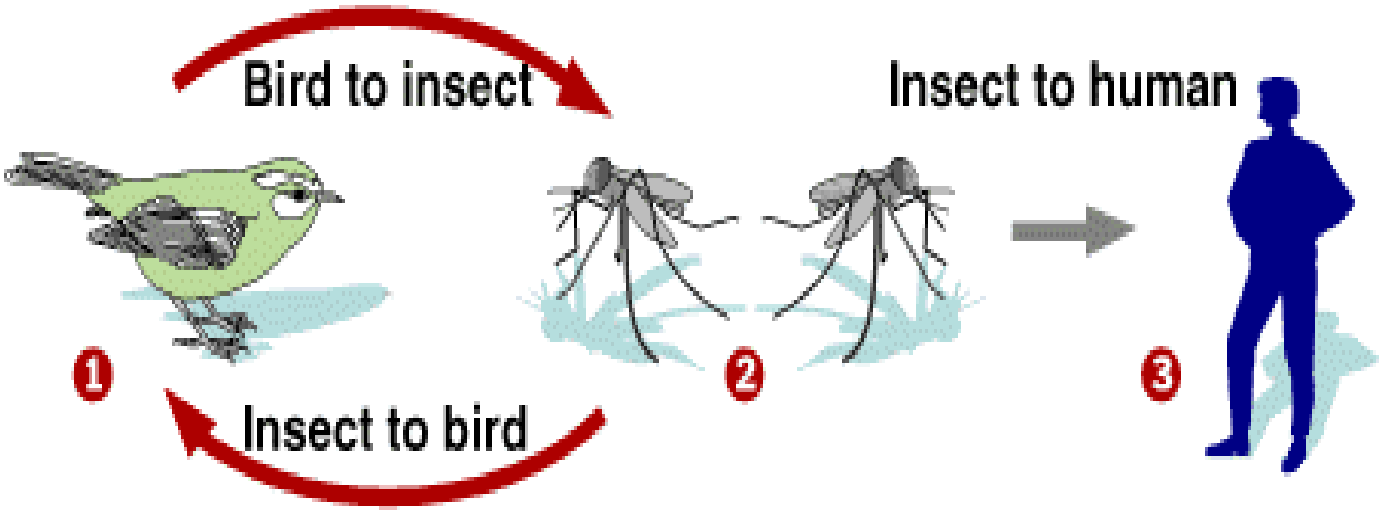
West Nile virus (WNV)

- 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		
June	July		August	September	October

Arbovirus Surveillance Activities

Field Collections

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

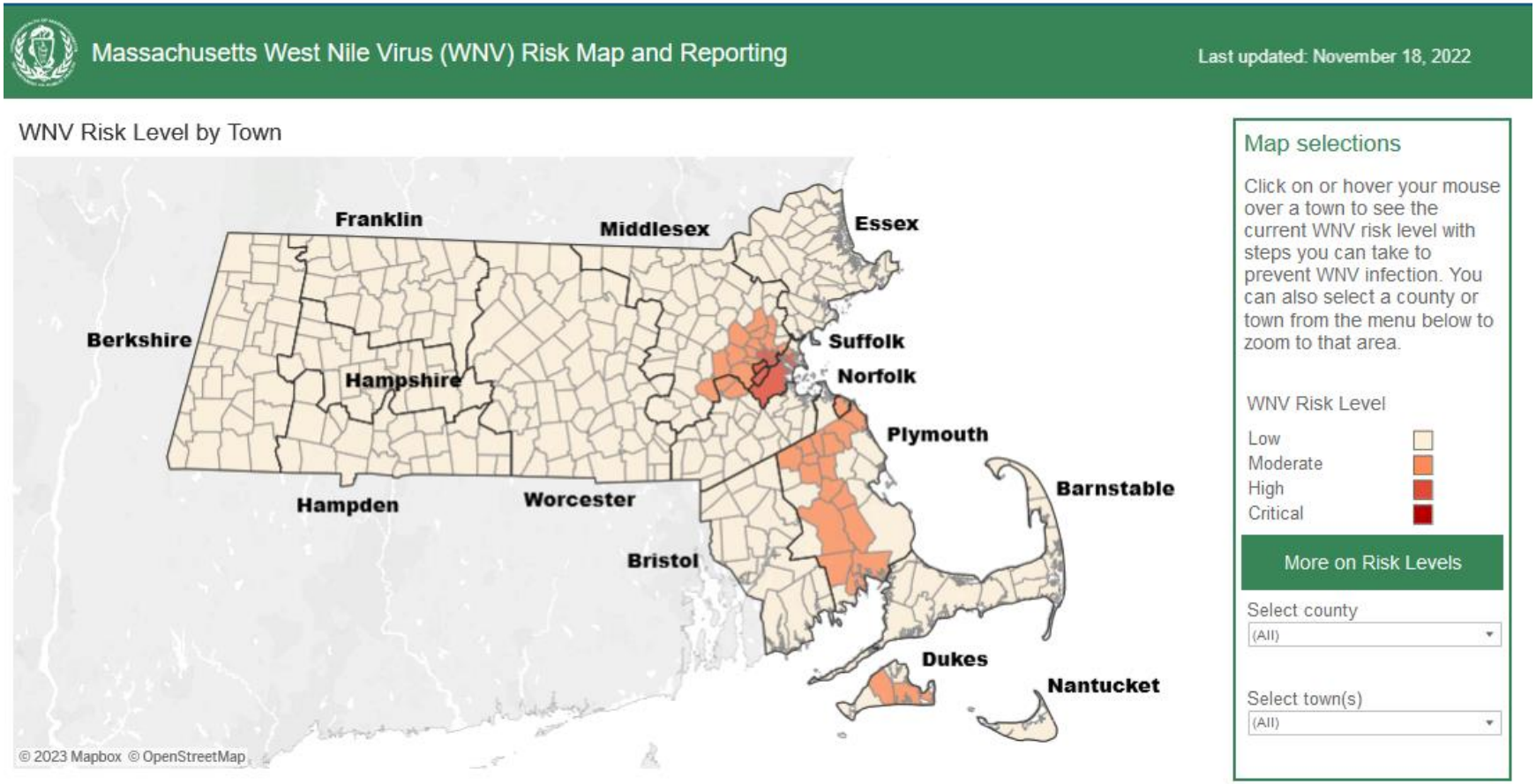
Laboratory Testing and Reporting of Results

- 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
  - https://www.mass.gov/lists/tick-borne-disease-surveillance-summaries-and-data
- 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?