



2018 DOHMH Advisory #8: Tickborne Disease Advisory

Please share with your colleagues in Internal and Family Medicine, Pediatrics, Infectious Disease, Infection Control, Laboratory Medicine, Hematology, Cardiology, Neurology, Rheumatology, Critical Care and Emergency Medicine.

- Tickborne diseases, with the exception of Rocky Mountain spotted fever (RMSF), are associated primarily with travel outside of New York City (NYC). Locally acquired cases of Lyme disease and babesiosis continue to be reported from Staten Island and smaller numbers have been reported from the Bronx.
- Isolated cases of locally acquired anaplasmosis and ehrlichiosis have also been reported from Staten Island.
- The following tickborne diseases are reportable in NYC: Lyme disease, RMSF, babesiosis, anaplasmosis, ehrlichiosis, and Powassan disease.
- Refer to the *Reference Manual for Physicians on Tickborne Diseases in the New York City Area* for extensive details and guidance on identification, diagnosis, treatment and prevention available at: <http://www1.nyc.gov/assets/doh/downloads/pdf/ehs/tick-borne-dx-physician.pdf>. Call 311 to order copies.

May 30, 2018

Dear Colleagues,

New York City (NYC) clinicians should be on the alert for patients with tickborne diseases. This advisory presents key epidemiologic findings regarding reportable tickborne diseases in NYC and reminds clinicians of reporting requirements. Please refer to the revised 3rd edition of the *Reference Manual for Physicians on Tickborne Diseases in the New York City Area* for details and guidance on identification, diagnosis, treatment and prevention available at: <http://www1.nyc.gov/assets/doh/downloads/pdf/ehs/tick-borne-dx-physician.pdf> or call 311 to order copies.

Recent travel to upstate NY, Long Island, and other parts of New England should prompt consideration of tickborne diseases. A history of a tick bite is not a prerequisite for considering tickborne diseases for patients with compatible illness, since only a small proportion of patients diagnosed with these diseases recall being bitten by a tick. The following tickborne diseases are reportable in NYC:

| Disease | Organism | Vector | Endemic US States | Ticks in NYC |
|------------------------------|------------------------------------|---|---|---|
| Lyme disease | <i>Borrelia burgdorferi</i> | <i>Ixodes scapularis</i> (blacklegged or deer tick) | Northeast, mid-Atlantic, and Upper Midwest esp. CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, WV & MN, WI | Blacklegged tick found in Staten Island and northern Bronx. |
| Babesiosis | <i>Babesia microti</i> | | Northeast & MN, WI | |
| Anaplasmosis | <i>Anaplasma phagocytophilum</i> | | Northeast, esp. NY, CT, NJ, RI & MN, WI | |
| Ehrlichiosis | <i>Ehrlichia chaffeensis</i> | <i>Amblyomma americanum</i> (lone star tick) | Southeast and south-central | Lone star tick has become more common in Staten Island and limited areas of the Bronx |
| Rocky Mountain spotted fever | <i>Rickettsia rickettsii</i> | <i>Dermacentor variabilis</i> (American dog tick) | Throughout US, esp. NC, OK, AR, TN, MO | Dog tick found in all 5 boroughs |
| Powassan disease | <i>Powassan or deer tick virus</i> | <i>Ixodes cookei</i> (groundhog tick) or <i>Ixodes scapularis</i> | Cases reported from CT, MN, WI, NY, ME, MA, NH, NJ, PA, NC, RI, & VA, 2004-2016 | Groundhog tick not identified in NYC; blacklegged tick see above |

NYC Tickborne Disease Epidemiology

Tickborne diseases in NYC have been trending upward since 2000, with fluctuations from year to year. In 2017, the number of anaplasmosis and babesiosis cases approximately doubled in all boroughs except Queens, compared to 2016. There was a slight increase in Lyme disease cases in Brooklyn, Manhattan, and Queens. (Figure and Tables 1-5). Incidence rates of tickborne diseases are typically significantly higher in residents of Manhattan compared with other boroughs. However, since 2015, Staten Island has had the highest incidence rate of Lyme disease in NYC, which may be due to an increasing number of locally acquired cases. A subset of Lyme disease cases, those with a physician reported erythema migrans (EM) lesion with onset between April 1 and October 31, are interviewed to assess travel. EM is a reliable indicator of recent infection and is used to identify locally acquired cases. Most interviewed cases with EM report a history of travel outside the City during the incubation period, most commonly to upstate New York, Long Island, Connecticut, Pennsylvania, New Jersey, and Massachusetts. Approximately half of interviewed Lyme disease patients with EM in Staten Island reported no history of travel during the incubation period (Table 4a). Local transmission of babesiosis was also reported in the Bronx and Staten Island and there was one report each of locally acquired anaplasmosis and ehrlichiosis in Staten Island residents. Blacklegged ticks collected in the Bronx and Staten Island have tested positive for *Borrelia burgdorferi* and *Babesia microti* (see tick surveillance below). Locally acquired RMSF cases while rare, have been reported in the past from all five boroughs.

Tickborne diseases may also be transmitted via blood transfusion. In 2017, there was one transfusion-associated babesiosis case and the first anaplasmosis case acquired from a blood transfusion in NYC. The incubation period for transfusion-associated babesiosis is two to nine weeks. Consider babesiosis in the differential diagnosis for patients with febrile illnesses and/or hemolytic anemia who have received blood components or transplanted organs in the preceding three months. Because these patients often have co-morbidities, and the potential exists for infection with other pathogens, consideration of babesiosis as a possible etiology may be delayed.

NYC Tick Surveillance Data

Information on tick populations in NYC is limited. Tick surveillance is conducted by the Health Department in select parks. In 2018, monthly tick surveillance will occur in 17 parks in NYC. Another 15 sites will be surveyed during high tick activity season from May to July.

- ***Ixodes scapularis*** (blacklegged tick or deer tick) has become widely established in Staten Island, and focal areas of the Bronx including Pelham Bay Park and Hunter Island. It is not established in other areas of NYC.
 - In 2016, ticks collected from parks in the Bronx (47%) and Staten Island (19%) tested positive for *Borrelia burgdorferi*. While 2017 tick testing results are not yet available, the density of blacklegged ticks doubled from 2016 to 2017 in areas of Staten Island (0.86 to 1.57 ticks/100m²) and the Bronx (4.13 to 9.37 ticks/100m²).
 - A much smaller number of ticks in the Bronx and Staten Island tested positive for *Anaplasma phagocytophilum* (0.06-10%), *Babesia microti* (0-6%) and the emerging pathogen, *Borrelia miyamotoi* (2%).
 - Significant numbers of *I. scapularis* ticks are found in counties and states surrounding NYC. Testing of ticks collected in the Hudson Valley by the New York State Department of Health (NYSDOH) found infection rates as high as 40-50% for *Borrelia burgdorferi*, 1-3% for *Babesia microti* and 7-15% for *Anaplasma phagocytophilum*.
 - One tick collected in the Bronx tested positive for Powassan virus in 2016, the first year Powassan viral testing was performed; however no human infections have been identified among NYC residents. In NY State, approximately 1 to 3 human cases are reported annually.
- ***Dermacentor variabilis*** (American dog tick) has been detected in all boroughs of NYC.
- ***Amblyomma americanum*** (lone star tick) has become widely established in Staten Island and in focal areas of the Bronx.

Clinical Guidelines

Detailed guidance on how to identify, diagnose and treat tickborne diseases can be found online in reference manuals for health care providers from the NYC Health Department, the Centers for Disease Control and Prevention (CDC), and the Infectious Diseases Society of America (IDSA) (see links below). Blood smear and polymerase chain reaction (PCR)

should be used to diagnose babesiosis. Anaplasmosis and ehrlichiosis are best diagnosed using PCR during the first week of illness as antibodies may not be detectable for up to 10 days after illness onset. Paired serology demonstrating a four-fold change in IgG by immunofluorescence assay (IFA) can be used to diagnose anaplasmosis, ehrlichiosis, and RMSF. A clinical diagnosis of Lyme disease can be made in patients who present with an erythema migrans (EM) rash, which is often present before antibodies are detectable. Serologic testing for Lyme disease should adhere to the CDC recommended two-step process, in which an enzyme immunoassay (EIA) that is positive or equivocal is followed by a Western blot test (if Western blot is negative, no further testing is needed).

Tick Bite Management and Lyme Disease Prophylaxis

Attached ticks should be removed promptly with fine-tipped tweezers, ensuring that mouthparts have not been left in the skin. Guidelines developed by the IDSA support limited use of a single dose of doxycycline for adults and children ≥ 8 years old* as prophylaxis for Lyme disease when all of the following conditions are met:

- Patient has traveled to a Lyme-endemic region
- Tick has been attached for ≥ 36 hours, based on engorgement or history
- Prophylaxis can be started within 72 hours of tick removal
- Tick can be reliably identified as *I. scapularis***
- Patient does not have any contraindications to treatment with doxycycline

*Currently there is no guidance for excluded age groups.

**Doctors in endemic areas often learn to recognize deer ticks. For visual reference providers can refer to the DOHMH website.

Resources on the DOHMH and other websites

DOHMH – <http://www1.nyc.gov/site/doh/health/health-topics/zoonotic-and-vectorborne-diseases.page>
<http://www1.nyc.gov/site/doh/health/health-topics/ticks.page>

Includes links to:

- *Tickborne Diseases in the NYC Area: A Physician's Reference Manual, 3rd edition*. Call 311 to order copies.
- *All About Ticks: A Workbook for Kids and Their Parents* (English and Spanish). Call 311 to order copies.
- Information on ticks, tick bite prevention and repellents

CDC – <http://www.cdc.gov/ticks/index.html>

Includes links to:

- CDC Tickborne Diseases of the United States: A Reference Manual for Health Care Providers, 4th edition (2017)
- Webinars on novel and emerging tickborne diseases
- CDC videos on Medscape

IDSA Clinical Practice Guidelines - <https://academic.oup.com/cid/article/43/9/1089/422463>

TICK ENCOUNTER RESOURCE CENTER OF THE UNIVERSITY OF RHODE ISLAND <http://www.tickencounter.org/>

NYS DOH – <https://www.health.ny.gov/diseases/communicable/lyme/>

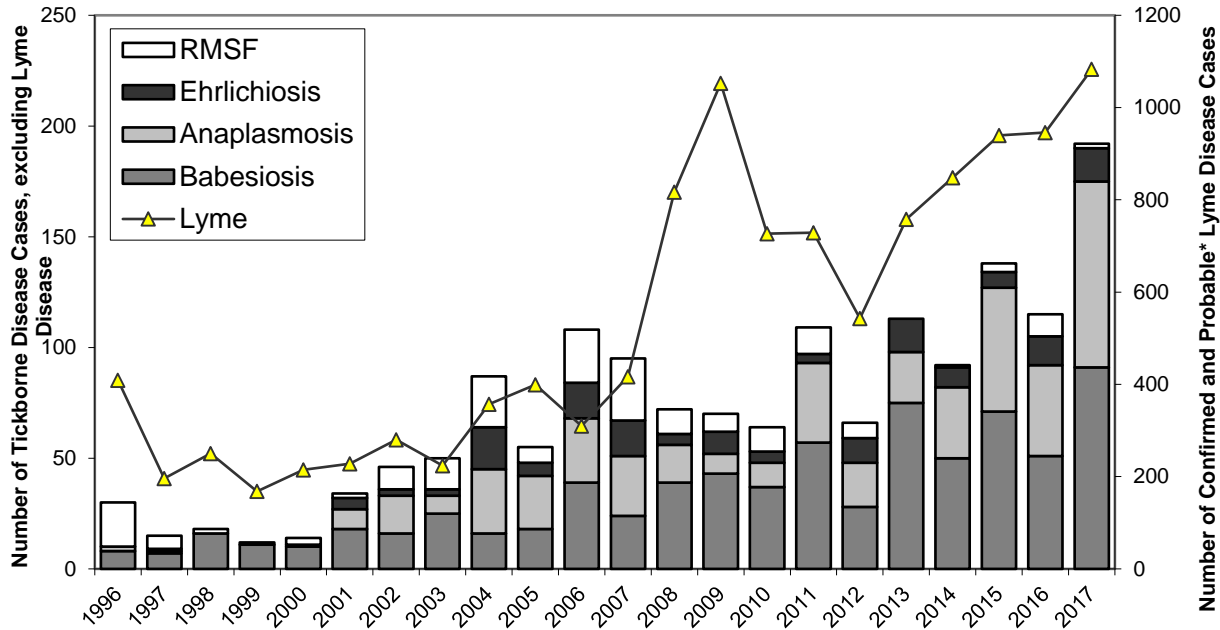
- Tick removal video

Reporting Cases

Clinicians and laboratories must report all cases of Lyme disease, babesiosis, RMSF, ehrlichiosis, anaplasmosis, and Powassan disease to the NYC Health Department. Cases of transfusion-associated tickborne diseases must also be reported to the NYSDOH Blood and Tissue Resources Program at 518-485-5341 and your hospital's transfusion service.

Report cases to DOHMH by logging into **Reporting Central** via [NYCMED, or complete the Universal Reporting Form](#) and mail or fax to 347-396-2632, or call the Provider Access Line at 1-866-692-3641. If a provider does not already have a NYCMED account, register at the NYCMED link above. Once logged in, Reporting Central can be found in the 'My Applications' section. See the [Reporting Central New User Guide](#) (PDF).

FIGURE. Tickborne Diseases in New York City Residents by Year of Diagnosis



*Probable added to Lyme disease case definition in 2008: Physician diagnosis with positive lab results and no erythema migrans or late manifestations

TABLES 1-5. Number of NYC Confirmed and Probable Tickborne Disease Cases by Borough and Year

1. Anaplasmosis

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Bronx | 1 | 0 | 0 | 1 | 2 | 0 | 1 | 4 |
| Brooklyn | 0 | 6 | 6 | 2 | 7 | 9 | 5 | 14 |
| Manhattan | 9 | 28 | 12 | 19 | 19 | 43 | 29 | 62 |
| Queens | 1 | 2 | 0 | 1 | 4 | 4 | 6 | 2 |
| Staten Island | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| Total | 11 | 36 | 19 | 23 | 32 | 56 | 41 | 84 |

2. Babesiosis

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Bronx | 1 | 4 | 1 | 12 | 7 | 4 | 5 | 12 |
| Brooklyn | 5 | 10 | 5 | 5 | 6 | 9 | 9 | 19 |
| Manhattan | 21 | 28 | 16 | 45 | 24 | 40 | 23 | 41 |
| Queens | 9 | 14 | 6 | 12 | 12 | 16 | 11 | 11 |
| Staten Island | 1 | 1 | 0 | 1 | 1 | 2 | 3 | 8 |
| Total | 37 | 57 | 28 | 75 | 50 | 71 | 51 | 91 |

3. Ehrlichiosis

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------|------|------|------|------|------|------|------|------|
| Bronx | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Brooklyn | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 0 |
| Manhattan | 4 | 3 | 9 | 13 | 7 | 4 | 10 | 11 |
| Queens | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 2 |
| Staten Island | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Total | 5 | 4 | 11 | 15 | 9 | 7 | 13 | 15 |

4. Lyme Disease*

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------|------|------|------|------|------|------|------|------|
| Bronx | 57 | 40 | 33 | 48 | 49 | 46 | 51 | 47 |
| Brooklyn | 157 | 181 | 125 | 253 | 285 | 335 | 322 | 381 |
| Manhattan | 364 | 352 | 264 | 313 | 338 | 327 | 322 | 383 |
| Queens | 119 | 117 | 89 | 107 | 104 | 116 | 128 | 149 |
| Staten Island | 34 | 45 | 34 | 41 | 76 | 121 | 123 | 123 |
| Total | 731 | 735 | 545 | 762 | 852 | 945 | 946 | 1083 |

*Minor variations in data presented here and that presented elsewhere (including other publications of the NYC Department of Health and Mental Hygiene) may be due to several factors, including reporting delays, census data availability, corrections, and data-processing refinements (for example, the removal of duplicate reports)

4a. Lyme disease erythema migrans study: Cases by travel history**

| | 2012 | | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---------------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|-----------|--------|
| | No travel | Travel | No travel | Travel | No travel | Travel | No travel | Travel | No travel | Travel | No travel | Travel |
| Bronx | 3 | 6 | 2 | 16 | 0 | 9 | 5 | 12 | 0 | 6 | 1 | 9 |
| Brooklyn | 0 | 28 | 1 | 70 | 9 | 72 | 5 | 98 | 3 | 79 | 0 | 101 |
| Queens | 4 | 23 | 2 | 38 | 2 | 32 | 2 | 34 | 3 | 24 | 3 | 31 |
| Staten Island | 5 | 11 | 3 | 9 | 11 | 13 | 24 | 15 | 25 | 21 | 13 | 15 |
| Total | 12 | 68 | 8 | 133 | 22 | 126 | 36 | 159 | 31 | 130 | 17 | 156 |

**Residents of outer boroughs diagnosed with erythema migrans Apr. 1-Oct. 31 interviewed about travel during 3-30 day incubation period prior to onset. Manhattan residents excluded because previous study showed 97% traveled and borough has fewer potential blacklegged tick habitats.

5. Rocky Mountain spotted fever

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---------------|------|------|------|------|------|------|------|------|
| Bronx | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1 |
| Brooklyn | 6 | 3 | 3 | 0 | 1 | 3 | 2 | 0 |
| Manhattan | 2 | 4 | 2 | 0 | 0 | 1 | 5 | 1 |
| Queens | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Staten Island | 0 | 1 | 2 | 0 | 0 | 0 | 3 | 0 |
| Total | 11 | 12 | 7 | 0 | 1 | 4 | 10 | 2 |