



## 2019 DOHMH Advisory #12: Tick-borne 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.

- Tick-borne diseases, with the exception of endemic spotted fever group rickettsial diseases (e.g., Rocky Mountain spotted fever {RMSF} and rickettsialpox), are associated primarily with travel outside of New York City .
- 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 tick-borne diseases are reportable in NYC: Lyme disease, RMSF, babesiosis, anaplasmosis, ehrlichiosis, and Powassan disease.
- Refer to the [Reference Manual for Physicians on Tick-borne Diseases in the New York City Area](#) for details and guidance on identification, diagnosis, treatment and prevention or call 311 to order copies.

June 3, 2019

Dear Colleagues,

New York City (NYC) clinicians should be on the alert for patients with tick-borne diseases (TBD). This advisory presents key epidemiologic findings regarding reportable TBDs in NYC and reminds clinicians of reporting requirements. Please refer to the revised 3<sup>rd</sup> edition of the [Reference Manual for Physicians on Tick-borne Diseases in the New York City Area](#) for details and guidance on identification, diagnosis, treatment and prevention or call 311 to order copies.

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

Disease	Organism	Vector	Endemic States	Ticks in NYC
Lyme disease	<i>Borrelia burgdorferi</i>	<i>Ixodes scapularis</i> (blacklegged or deer tick)	Northeast, mid-Atlantic, and Upper Midwest	Blacklegged tick found in Staten Island and northern Bronx.
Babesiosis	<i>Babesia microti</i>			
Anaplasmosis	<i>Anaplasma phagocytophilum</i>			
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
Spotted fever group Rickettsiosis (SFGR)	<i>Rickettsia rickettsii</i> , <i>parkeri</i> , <i>akari</i> *, species364D	<i>Dermacentor variabilis</i> (American dog tick) for <i>R. rickettsii</i> in NYC. Varies for other SFGR.	Throughout US	Dog tick found in all 5 boroughs
Powassan disease	<i>Powassan or deer tick virus</i>	<i>Ixodes scapularis</i> or <i>Ixodes cookei</i> (groundhog tick)	Cases reported from CT, MN, WI, NY, ME, MA, NH, NJ, PA, NC, RI, & VA	Blacklegged tick (see above); the groundhog tick not found in NYC

\**Rickettsia akari*, the causative agent of rickettsialpox, is transmitted by the mouse mite. It is not transmitted by ticks, but is part of the spotted fever rickettsia group and can cross react on serologic assays with other spotted fever group rickettsia.

Tick-borne diseases in NYC have been trending upward since 2000, with fluctuations from year to year. However, in 2018, the number of Lyme disease, anaplasmosis and babesiosis cases decreased across all boroughs from the previous year. This decrease was also seen in neighboring jurisdictions. In comparison, from 2016 to 2017, the number of Lyme disease cases increased by 15%, and anaplasmosis and babesiosis cases approximately doubled in all boroughs except Queens (Figure and Tables 1-5).

Incidence rates of TBD are typically significantly higher in residents of Manhattan (and Brooklyn for Lyme disease) 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 NYC during the incubation period, most commonly to upstate New York, Long Island, Connecticut, Pennsylvania, New Jersey, and Massachusetts. In 2018, over 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 reported in the Bronx and Staten Island and local transmission of anaplasmosis in Staten Island. Blacklegged ticks collected in the Bronx and Staten Island have tested positive for *Borrelia burgdorferi* and *Babesia microti* (see tick surveillance below).

*Babesia microti* and *Anaplasma phagocytophilum* may also be transmitted via blood transfusion. In 2018, there was one transfusion-associated babesiosis case. 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. Additionally, in rare instances *Babesia microti* may be transmitted in utero. In 2018 there was one case of transplacental transmission identified in an infant.

Locally acquired cases of spotted fever group rickettsioses including rickettsialpox and Rocky Mountain spotted fever, while rare, have been reported in the past from all five boroughs. A diagnosis of rickettsialpox, caused by *Rickettsia akari* and transmitted by the mouse mite (*Liponyssoides sanguineus*), is often made based on clinical presentation as no commercial testing is available. Because *R. akari* is closely related to *R. rickettsia* and other spotted fever group rickettsia, cross reactivity can occur with commercial serologic assays. Patients with rickettsialpox typically have an eschar at the bite site along with fever and a rash that can range from vesicular to maculopapular. There is often a history of a mice infestation at home or the worksite.

#### NYC Tick Surveillance Data

Information on tick populations in NYC is limited. Tick surveillance is conducted by the Health Department in selected parks. In 2019, monthly tick surveillance will occur in 30 parks in NYC; 24 in Staten Island, 2 in the Bronx, 1 in Brooklyn, 2 in Queens and 1 in Manhattan.

- ***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.
  - The density of blacklegged ticks declined from 2017 to 2018 in areas of Staten Island (1.77 to 0.61 ticks/100m<sup>2</sup>) and the Bronx (9.37 to 2.44 ticks/100m<sup>2</sup>). In contrast, the density doubled from 2016 to 2017 in areas of Staten Island (0.86 to 1.57 ticks/100m<sup>2</sup>) and the Bronx (4.13 to 9.37 ticks/100m<sup>2</sup>).
  - Ticks collected in 2017 tested positive for *Borrelia burgdorferi* from parks in the Bronx (47%) and Staten Island (20%). 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%), a pathogen that causes fever, headache, and fatigue, often without a rash. Tick testing results from 2018 are not yet available.
  - 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*.

- Two ticks collected in the Bronx tested positive for Powassan virus in 2017; 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.
- ***Haemaphysalis longicornis*** (Asian longhorned tick) has become widely established in Staten Island and in focal areas of the Bronx. It has not been shown to transmit TBD pathogens in the US.

### Clinical Guidelines

Detailed guidance on how to identify, diagnose and treat TBDs 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  $\geq 8$  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  $\geq 36$  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 New York City Health Department's website.

### Resources on the Health Department's and other websites

#### [DOHMH Zoonotic and Vector-borne Provider Information](#)

#### [DOHMH Ticks Page](#)

Download or call 311 to order:

- *Tickborne Diseases in the NYC Area: A Physician's Reference Manual, 3<sup>rd</sup> edition*. Call 311 to order copies.
- *All About Ticks: A Workbook for Kids and Their Parents* (English and Spanish). Call 311 to order copies.

#### [CDC Ticks Page](#) Includes links to:

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

#### [IDSA Clinical Practice Guidelines](#)

#### [Tick Encounter Resource Center of the University Of Rhode Island](#)

#### [NYS DOH](#)

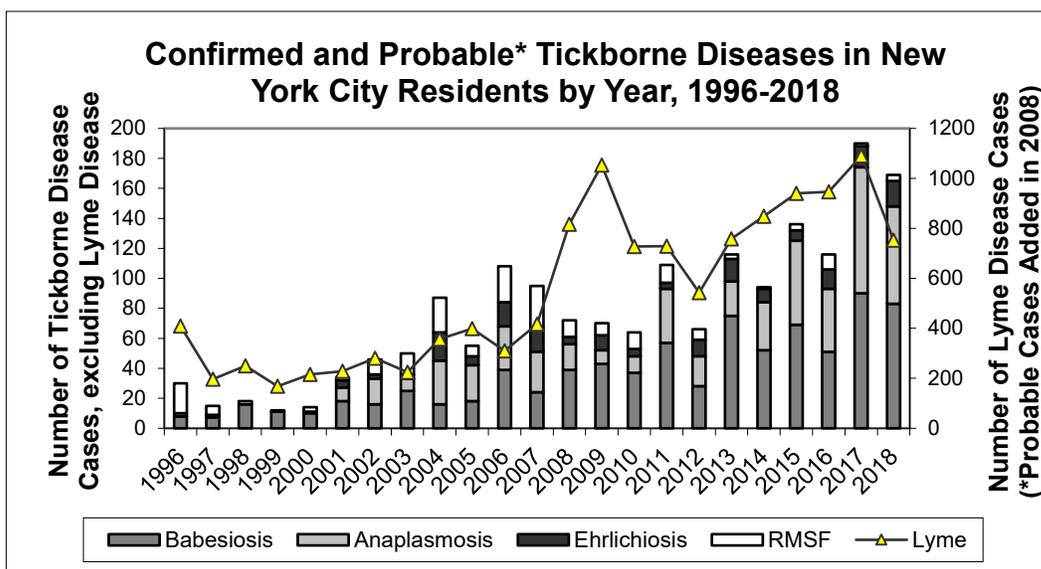
- Tick removal video

## 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 NY State DOH Blood and Tissue Resources Program at 518-485-5341 and your hospital's transfusion service.

Report cases to NYC Health Department by: logging onto **Reporting Central** via [NYCMED](#); completing the [Universal Reporting Form](#), mailing or faxing to 347-396-2632; or, calling 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	2018
Bronx	1	0	0	1	2	0	1	4	2
Brooklyn	0	6	6	2	7	9	5	14	12
Manhattan	9	28	12	19	19	43	29	62	40
Queens	1	2	0	1	4	4	6	2	8
Staten Island	0	0	1	0	0	0	0	2	3
<b>Total</b>	<b>11</b>	<b>36</b>	<b>19</b>	<b>23</b>	<b>32</b>	<b>56</b>	<b>41</b>	<b>84</b>	<b>65</b>

### 2. Babesiosis

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bronx	1	4	1	12	7	4	5	12	10
Brooklyn	5	10	5	5	6	9	9	19	11
Manhattan	21	28	16	45	24	40	23	41	38
Queens	9	14	6	12	12	16	11	10	11
Staten Island	1	1	0	1	1	2	3	8	13
<b>Total</b>	<b>37</b>	<b>57</b>	<b>28</b>	<b>75</b>	<b>50</b>	<b>71</b>	<b>51</b>	<b>90</b>	<b>83</b>

### 3. Ehrlichiosis

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bronx	0	0	0	0	0	0	0	1	0
Brooklyn	0	0	1	1	1	2	2	0	5
Manhattan	4	3	9	13	7	4	10	11	9
Queens	0	1	1	1	1	0	1	1	2
Staten Island	1	0	0	0	0	1	0	1	1
<b>Total</b>	<b>5</b>	<b>4</b>	<b>11</b>	<b>15</b>	<b>9</b>	<b>7</b>	<b>13</b>	<b>14</b>	<b>17</b>

### 4. Lyme Disease\*

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bronx	57	40	33	48	49	46	51	47	34
Brooklyn	157	181	125	253	285	335	322	384	282
Manhattan	364	352	264	313	338	327	322	385	264
Queens	119	117	89	107	104	116	128	150	85
Staten Island	34	45	34	41	76	121	123	124	88
<b>Total</b>	<b>731</b>	<b>735</b>	<b>545</b>	<b>762</b>	<b>852</b>	<b>945</b>	<b>946</b>	<b>1090</b>	<b>753</b>

\*Minor variations in data presented here, and that presented elsewhere (including other publications of the NYC DOHMH 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		2018	
	No travel	Travel	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	2	8	1	6
Brooklyn	0	28	1	70	9	72	5	98	3	79	0	101	1	47
Queens	4	23	2	38	2	32	2	34	3	24	3	31	0	11
Staten Island	5	11	3	9	11	13	24	15	25	21	13	15	9	5
<b>Total</b>	<b>12</b>	<b>68</b>	<b>8</b>	<b>133</b>	<b>22</b>	<b>126</b>	<b>36</b>	<b>159</b>	<b>31</b>	<b>130</b>	<b>18</b>	<b>155</b>	<b>11</b>	<b>69</b>

\*\*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	2018
Bronx	2	3	0	0	0	0	0	1	1
Brooklyn	6	3	3	0	1	3	2	0	0
Manhattan	2	4	2	0	0	1	5	1	3
Queens	1	1	0	0	0	0	0	0	0
Staten Island	0	1	2	0	0	0	3	0	0
<b>Total</b>	<b>11</b>	<b>12</b>	<b>7</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>10</b>	<b>2</b>	<b>4</b>

### 6. Rickettsialpox

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Bronx	7	12	3	9	4	5	5	3	3
Brooklyn	1	1	4	1	0	1	1	0	1
Manhattan	11	6	4	5	1	4	1	5	2
Queens	0	0	2	0	0	1	1	1	1
Staten Island	1	0	0	0	0	0	0	0	0
<b>Total</b>	<b>20</b>	<b>19</b>	<b>13</b>	<b>15</b>	<b>5</b>	<b>11</b>	<b>8</b>	<b>9</b>	<b>7</b>