NEW YORK CITY DEPARTMENT OF
HEALTH AND MENTAL HYGIENE
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Commissioner

2017 DOHMH Advisory #14: 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.

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

June 26, 2017

Dear Colleagues,
New York City (NYC) clinicians should be on the alert for patients with tick-borne diseases (TBDs). This advisory presents key epidemiologic findings regarding reportable TBDs in NYC and reminds clinicians of reporting requirements. Please refer to the revised 3rd edition of the *Reference Manual for Physicians on Tick-Borne Diseases in the New York City Area* for extensive details and guidance on identification, diagnosis, treatment and prevention: http://www1.nyc.gov/assets/doh/downloads/pdf/ehs/tick-borne-dx-physician.pdf or download the mobile app developed by CDC http://www.cdc.gov/mobile/applications/mobileframework/tickborne-diseases.html.

Recent travel to upstate NY, Long Island, and other parts of New England 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 US States	Ticks in NYC
Lyme disease	*Borrelia burgdorferi*	*Ixodes scapularis* (blacklegged or deer tick)	Northeast and mid-Atlantic esp. CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, VA, & MN, WI	Blacklegged tick found in limited numbers, mostly in Staten Island and the northern Bronx
Babesiosis	*Babesia microti*		Northeast & MN, WI	
Anaplasmosis	*Anaplasma phagocytophilum*		Northeast, esp. NY, CT, NJ, RI & MN, WI	
Ehrlichiosis	*Ehrlichia chaffeensis*	*Amblyomma americanum* (lone star tick)	Southeast and south-central	Lone star tick rare in NYC
Rocky Mountain spotted fever	*Rickettsia rickettsii*	*Dermacentor variabilis* (American dog tick)	Throughout US, esp. NC, OK, AR, TN, MO	Dog tick found in abundance in all 5 boroughs
Powassan disease	*Powassan or deer tick virus*	*Ixodes cookei (groundhog tick)* or *Ixodes scapularis*	Cases reported from CT, MN, WI, NY, ME, MA, NH, NJ, PA, & VA since 2004	Groundhog tick not identified in NYC; blacklegged tick found in limited areas

NYC Tick-borne Disease Epidemiology

The general trend in TBDs reported in NYC has been increasing since 2000. In 2016, there was an overall increase in the number of Lyme disease, ehrlichiosis and RMSF cases compared to 2015, and a decrease in babesiosis and anaplasmosis cases (Figure and Tables 1-5). Rates of TBDs are typically significantly higher in residents of Manhattan compared with other boroughs. Most cases report a history of travel outside the city during the incubation period, most commonly to upstate New York, Long Island, Connecticut, New Jersey, and Massachusetts. However, incidence rates of Lyme disease in Staten Island have been increasing since 2014, which may be partially explained by the increasing number of locally acquired cases. More than half of interviewed Lyme disease patients 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, including a fatal case. 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 have been reported from all five boroughs.

TBDs may also be transmitted via blood transfusion. One transfusion-associated babesiosis case was reported in 2016. 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. Of note, in April 2017, the first reported case of transfusion-associated anaplasmosis was identified in NYC; these cases are extremely rare.

NYC Tick Surveillance Data

Information on tick populations in NYC is limited. Tick surveillance is conducted by the Health Department in select parks.

- ***Ixodes scapularis*** (blacklegged tick or deer tick) is not widely established in NYC, but increasing numbers have been found in Staten Island in Clay Pit Ponds and High Rock Parks, and in the Bronx in Pelham Bay Park and Hunter Island. Expanded tick surveillance beginning this year will help identify the geographic range of this tick in NYC.
    - In 2016, ticks collected from parks in the Bronx (47%) and Staten Island (19%) tested positive for *Borrelia burgdorferi.*
    - 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 infections 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 cases are reported annually.
- ***Dermacentor variabilis*** (American dog tick) has been detected in great abundance in all boroughs of NYC.
- ***Amblyomma americanum*** (lone star tick) is not widely established in NYC.

Overview of Diagnosis

Detailed guidance on identifying, diagnosing and treating 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 initial 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:

- *Tick-Borne 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 Tick-borne Diseases of the United States, A Reference Manual for Health Care Providers
- Webinar on novel and emerging tick-borne diseases
- MMWR recommendations for tick-borne rickettsial diseases

Download app: **http://www.cdc.gov/mobile/applications/mobileframework/tickborne-diseases.html**

IDSA Clinical Practice Guidelines - http://cid.oxfordjournals.org/content/43/9/1089.full.pdf+html

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

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

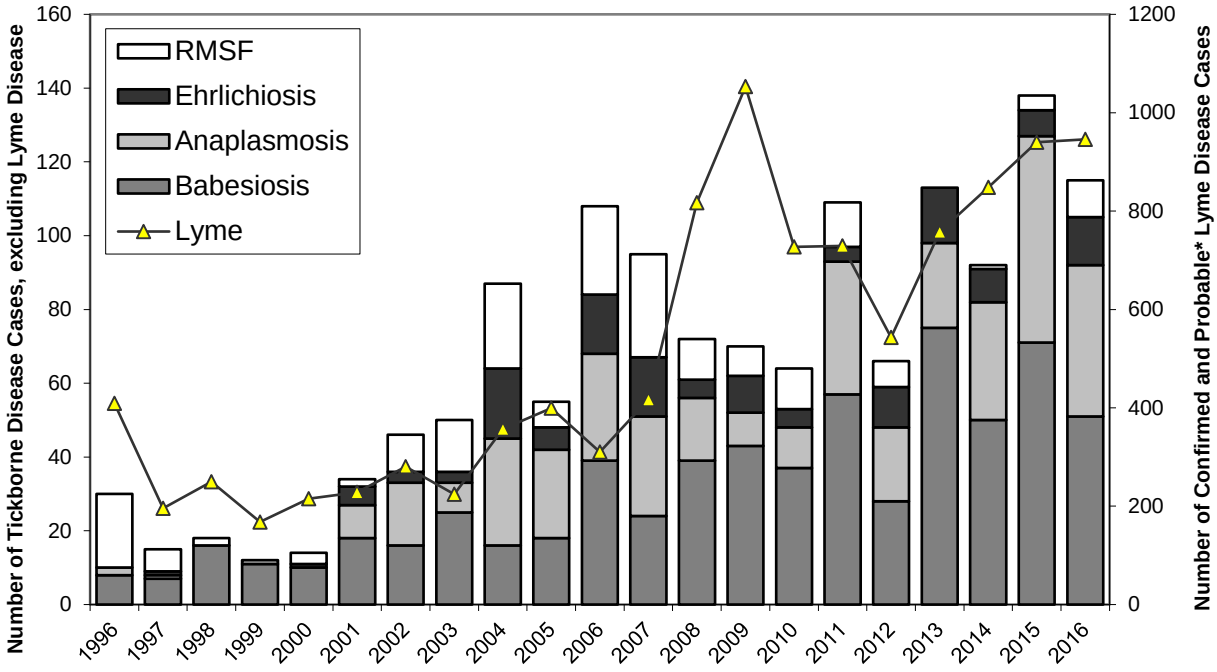
- Tick removal video

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 TBDs must also be reported to the NYSDOH Blood and Tissue Resources Program at 518-485-5341 and your hospital's transfusion service.

Cases can be reported to DOHMH by logging into **Reporting Central** via NYCMED, by mailing or faxing to 347-396-2632 the paper Universal Reporting Form, or by calling the Provider Access Line at (1-866-692-3641). If a provider does not already have a NYCMED account, he or she will need to 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. Tick-borne Diseases in New York City Residents by Year of Diagnosis



1.

*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 Tick-borne Disease Cases by Borough and Year

1. Anaplasmosis

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

2. Babesiosis

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

3. Ehrlichiosis

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

4. Lyme Disease*

	2010	2011	2012	2013	2014	2015	2016
Bronx	57	40	33	48	49	46	51
Brooklyn	157	181	125	253	285	335	322
Manhattan	364	352	264	313	338	327	322
Queens	119	117	89	107	104	116	128
Staten Island	34	45	34	41	76	121	123
Total	731	735	325	762	852	941	946

*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**

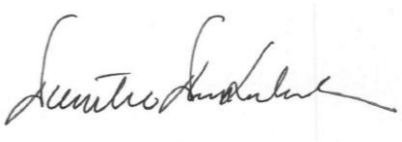
	2012		2013		2014		2015		2016	
	No Travel	Travel	No Travel	Travel	No Travel	Travel	No Travel	Travel	No Travel	Travel
Bronx	3	6	2	16	0	9	5	12	0	6
Brooklyn	0	28	1	70	9	72	5	98	3	79
Queens	4	23	2	38	2	32	2	34	3	24
Staten Island	5	11	3	9	11	13	24	15	25	21

Total	12	68	8	133	22	126	36	159	31	130

**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
Bronx	2	3	0	0	0	0	0
Brooklyn	6	3	3	0	1	3	2
Manhattan	2	4	2	0	0	1	5
Queens	1	1	0	0	0	0	0
Staten Island	0	1	2	0	0	0	3
Total	11	12	7	0	1	4	10



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