



2020 Health Advisory #22: 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 (TBD) are associated primarily with travel outside of New York City, with the exception of endemic spotted fever group rickettsial diseases (e.g., Rocky Mountain spotted fever (RMSF) and rickettsialpox, which is endemic to NYC and transmitted by the mouse mite, not ticks).
- 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 overall number of cases of anaplasmosis remains low but has been increasing in recent years with a 45% increase from 2018 to 2019 in NYC. This increasing trend is also seen in states endemic for TBDs.
- 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.

July 15, 2020

Dear Colleagues,

New York City clinicians should be on the alert for patients with tick-borne diseases (TBDs) as people may be spending more time outdoors than usual in tick habitats. This advisory presents key epidemiologic findings and updates on reportable TBDs in NYC. Please refer to the [Reference Manual for Physicians on Tick-borne Diseases in the New York City Area](#) for guidance on diagnosis, treatment and prevention or call **311** to order copies. Medical care for TBDs should **not** be delayed due to the COVID-19 pandemic as this may lead to more severe infection.

Recent travel to upstate NY, Long Island, and other parts of the northeast, mid-Atlantic and upper Midwest should prompt consideration of TBDs in people with a compatible clinical presentation. 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	<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 found in Staten Island and northern Bronx
Spotted fever group rickettsioses* (SFGR)	Several <i>Rickettsia</i> species, primarily <i>R. rickettsii</i>	<i>Dermacentor variabilis</i> (American dog tick) for <i>R. rickettsii</i> in NYC. Varies for other SFGR.	Throughout US	American dog tick found in all 5 boroughs
Powassan virus disease	Powassan or deer tick virus	<i>Ixodes scapularis</i> or <i>Ixodes cookei</i> (groundhog tick)	Cases reported from MN, WI, MA, NY, NJ, PA, ME, CT, NH, RI, NC, VA, ND, & IN	Blacklegged tick (see above); 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.

NYC Tick-borne Disease Epidemiology

The number of people in NYC diagnosed each year with a TBD had been trending upward since 2000, with fluctuations from year to year. The number of cases of Lyme disease and babesiosis in 2019 was similar to 2018 and down compared to 2017. The number of cases of anaplasmosis in 2019 compared to 2018 increased 45% from 65 to 94 cases, the highest number reported in NYC to date. Anaplasmosis has also been increasing in recent years in endemic states. The number of cases of ehrlichiosis and RMSF in 2019 decreased compared to 2018 ([Figure](#) and [Tables 1-5](#)).

The number of cases of TBDs are highest in residents of Manhattan (and Brooklyn for Lyme disease) compared with other boroughs. However, from 2015-2018, Staten Island had the highest incidence rate of Lyme disease in NYC, most likely due to the increase in the number of locally acquired cases. In 2019, the incidence rate of Lyme disease in Staten Island decreased to the lowest rate since 2014.

Two methods are used to assess local transmission of TBDs in NYC: tick surveillance where ticks are collected and tested for several pathogens that cause TBDs and human surveillance where cases of TBDs are interviewed and asked about travel and other risk factors. For Lyme disease, a subset of cases with a physician-reported erythema migrans (EM) diagnosed between April 1 and October 31 is interviewed. Most people reported a history of travel outside NYC during the incubation period, commonly to upstate New York, Long Island, Connecticut, Pennsylvania, New Jersey, and Massachusetts. However, in Staten Island, 67% of interviewed Lyme disease patients reported no history of travel during the incubation period, similar to 2018 ([Table 4a](#)). There were 5 people with a confirmed diagnosis of babesiosis who reported no travel (3 from Staten Island and 1 each from Brooklyn and Queens) and 1 person from Staten Island with a confirmed diagnosis of anaplasmosis who reported no travel. Fewer blacklegged ticks were collected in the Bronx and Staten Island in 2019 compared to 2017-2018. Ticks collected from Staten Island and the Bronx have tested positive for *Borrelia burgdorferi*, *Babesia microti*, and *Anaplasma phagocytophilum* (see tick surveillance below).

Babesia microti and *Anaplasma phagocytophilum* have been transmitted via blood transfusion. In 2019, there was one transfusion-associated babesiosis case. Tests for screening the blood supply for babesiosis were first approved by the Food and Drug Administration (FDA) in 2018. In May 2019, the FDA issued guidance for testing all blood donations in endemic states, to be implemented as of May 2020.

Locally acquired cases of spotted fever group rickettsioses including rickettsialpox and RMSF, 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. rickettsii* 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 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 select parks. In 2019, tick drags were conducted in 24 parks in Staten Island monthly and periodically in parks in the other boroughs. In 2020, due to the COVID-19 pandemic, tick surveillance will be limited to 3 parks in Staten Island.

- ***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 continued to decline from 2018 to 2019 in areas of Staten Island (from 0.61 to 0.14 ticks/100m²) and the Bronx (from 2.44 to 0.58 ticks/100m²).
 - Ticks collected in 2017 tested positive for *Borrelia burgdorferi* from parks in the Bronx (21.3%) and Staten Island (19.8%). A much smaller number of ticks in the Bronx and Staten Island tested positive for *Anaplasma phagocytophilum* (0.8%), *Babesia microti* (0-2.8%), and the emerging pathogen *Borrelia miyamotoi* (2%). Tick testing results from 2018-2019 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. Population density remained low relative to other tick species and decreased slightly from 2018 to 2019 in Staten Island (0.02 to 0.01 ticks/100m²) and the Bronx (0.06 to 0.02 ticks/100m²).
- ***Amblyomma americanum*** (lone star tick) has become widely established in Staten Island and in focal areas of the Bronx. Population density remained the same in 2018 and 2019 in Staten Island (0.21 ticks/100m²) and the Bronx (0.01 ticks/100m²).
- ***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 human TBD pathogens in the US. Density in Staten Island continued to increase from 0.7 to 1.2 ticks/100m² from 2018 to 2019, suggesting competition among tick species may be driving the decrease in blacklegged ticks.

Clinical and Testing Guidelines

Detailed guidance on how to identify, diagnose and treat TBDs is available 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 recent anaplasmosis, ehrlichiosis, and RMSF. Antibodies may persist for several years, and if detected, may not be indicative of current illness. False-positive serologic results may occur with RMSF. Antibodies to spotted fever group rickettsioses (SFGR) other than RMSF may reflect past exposures to a wide variety of SFGR species, including *R. akari*, and do not reflect incident cases of RMSF. *R. akari* testing is available at the CDC. 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. CDC recommends a two-step process for Lyme disease serological testing, in which an enzyme immunoassay (EIA) that is positive or equivocal is followed by a Western blot test. In July 2019, new serologic assays were approved by the FDA to use a second EIA in place of a Western blot.

Testing ticks for pathogens is generally not recommended because results may be unreliable as laboratories that test ticks are not required to meet the same quality standards as clinical laboratories. A positive test does not mean that the tick was attached long enough to transmit the pathogen, and a negative test might provide a false sense of security as a patient might have unknowingly been bitten by a different tick.

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 receiving doxycycline

*Currently there is no guidance for excluded age groups.

**Doctors in endemic areas often learn to recognize deer ticks. For visual reference, refer to the [NYC Health Department website](#).

Resources on the NYC Health Department website and other websites

[City Health Information: Preventing, Diagnosing, and Managing Tick-borne Diseases \(June 2020\)](#)

[NYC Health Department: Zoonotic and Vector-borne Provider Information](#)

[NYC Health Department: Ticks](#)

Download or call **311** to order copies:

- [Tickborne Diseases in the NYC Area: A Physician's Reference Manual, 3rd edition \(2017\)](#)
- [NYC Tick ID and Removal Wallet Card](#) (also in [Spanish](#), [Russian](#), [Italian](#))
- [Ticks taking over? Take back your yard](#) (also in [Spanish](#))
- [All About Ticks: A Workbook for Kids and Their Parents](#) (also in [Spanish](#))

[CDC Ticks](#) Includes links to:

- [CDC Tickborne Diseases of the United States: A Reference Manual for Health Care Providers, 5th edition \(2018\)](#)
- 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](#)

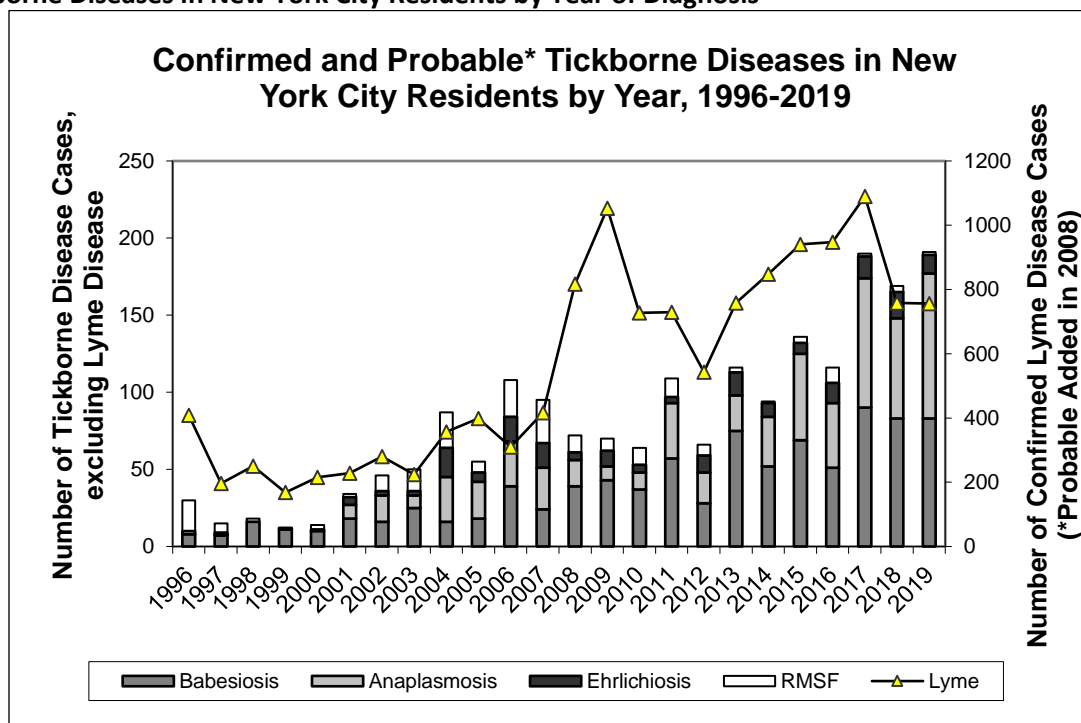
- Tick removal video

[Reporting Cases](#)

Commercial and hospital laboratories report all positive laboratory results for diagnostic assays for Lyme disease, babesiosis, RMSF, ehrlichiosis, anaplasmosis, and Powassan virus to the NYC Health Department. Providers are reminded to report suspect cases based on clinical suspicion for Lyme disease in patients with an erythema migrans lesion and for rickettsialpox. 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 NYC Health Department 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	2018	2019
Bronx	1	0	0	1	2	0	1	4	2	6
Brooklyn	0	6	6	2	7	9	5	14	12	20
Manhattan	9	28	12	19	19	43	29	62	40	61
Queens	1	2	0	1	4	4	6	2	8	5
Staten Island	0	0	1	0	0	0	0	2	3	2
Total	11	36	19	23	32	56	41	84	65	94

2. Babesiosis

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bronx	1	4	1	12	7	4	5	12	10	7
Brooklyn	5	10	5	5	6	9	9	19	11	13
Manhattan	21	28	16	45	24	40	23	41	38	41
Queens	9	14	6	12	12	16	11	10	11	14
Staten Island	1	1	0	1	1	2	3	8	13	8
Total	37	57	28	75	50	71	51	90	83	83

3. Ehrlichiosis

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bronx	0	0	0	0	0	0	0	1	0	0
Brooklyn	0	0	1	1	1	2	2	0	5	3
Manhattan	4	3	9	13	7	4	10	11	9	6
Queens	0	1	1	1	1	0	1	1	2	2
Staten Island	1	0	0	0	0	1	0	1	1	0
Total	5	4	11	15	9	7	13	14	17	11

4. Lyme Disease*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bronx	57	40	33	48	49	46	51	47	34	25
Brooklyn	157	181	125	253	285	335	322	384	283	281
Manhattan	364	352	264	313	338	327	322	385	267	287
Queens	119	117	89	107	104	116	128	150	87	110
Staten Island	34	45	34	41	76	121	123	124	87	53
Total	731	735	545	762	852	945	946	1090	758	756

*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**

	2013		2014		2015		2016		2017		2018		2019	
	No travel	Travel	No travel	Travel	No travel	Travel	No travel	Travel	No travel	Travel	No travel	Travel	No travel	Travel
Bronx	2	16	0	9	5	12	0	6	1	9	2	5	1	1
Brooklyn	1	70	9	72	5	98	3	79	0	101	1	45	2	60
Queens	2	38	2	32	2	34	3	24	3	31	0	11	4	25
Staten Island	3	9	11	13	24	15	25	21	13	15	9	5	8	4
Total	8	133	22	126	36	159	31	130	17	156	12	66	15	90

**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	2019
Bronx	2	3	0	0	0	0	0	1	1	1
Brooklyn	6	3	3	0	1	3	2	0	0	1
Manhattan	2	4	2	0	0	1	5	1	3	1
Queens	1	1	0	0	0	0	0	0	0	0
Staten Island	0	1	2	0	0	0	3	0	0	0
Total	11	12	7	0	1	4	10	2	4	3

6. Rickettsialpox

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Bronx	7	12	3	9	4	5	5	3	3	0
Brooklyn	1	1	4	1	0	1	1	0	1	0
Manhattan	11	6	4	5	1	4	1	5	2	0
Queens	0	0	2	0	0	1	1	1	1	1
Staten Island	1	0	0	0	0	0	0	0	0	0
Total	20	19	13	15	5	11	8	9	7	1