Hard Tick Relapsing Fever (HTRF) /*Borrelia miyamotoi* Surveillance in New Jersey, 2017-2022

Background

Borrelia miyamotoi was first identified in ticks in Japan in 1995, and subsequently in the United States in 2001. In the northeast United States, *B. miyamotoi* is transmitted by *Ixodes scapularis* (blacklegged or deer tick), which is the same tick that transmits Lyme disease and is also known as Hard Tick Relapsing Fever (HTRF). B. miyamotoi was initially identified in a New Jersey resident in 2012[1]. Unlike Lyme disease, which is most commonly reported in June and July, *B. miyamotoi* infection occurs most commonly in July and August and may be spread by larval blacklegged ticks.

The incubation period for HTRF is unknown but may range from days to weeks. Symptoms can present similar to flu-like illness but can also include more severe manifestations such as meningoencephalitis. Commonly reported symptoms include fever (which may be relapsing), chills, fatigue, severe headache, and arthralgia/myalgia. Less common symptoms include dizziness, confusion, vertigo, rash, dyspnea, nausea, abdominal pain, diarrhea, and anorexia. General laboratory findings include leukopenia, thrombocytopenia, proteinuria, and elevated hepatic transaminase values.

HTRF surveillance in New Jersey

B. miyamotoi is an emerging tickborne pathogen and is not nationally notifiable. The New Jersey Department of Health (NJDOH), in consultation with CDC and neighboring states, has developed a working case definition to help characterize the define the spectrum of illness associated with HTRF. NJDOH requested voluntary reporting of *B. miyamotoi* infections by healthcare and laboratory partners starting in 2017 and received the first reports in 2018.

HTRF / *B. miyamotoi* Surveillance Summary – 2018-2022

From 2018-2022, NJDOH received 162 reports of B. *miyamotoi* in residents from 14 counties. Local health departments investigated these reports and determined if they met the working public health surveillance case definition (Table 1). While the number of reports has dropped significantly between 2019-2022, the percentage of reports meeting the surveillance case definition has increased (Figure 1). An increase in positive PCR results was seen in 2020-2022 with 100% of cases with PCR test results meeting confirmed case definition.

Table 1. *B. miyamotoi* Reports Received and Case Status

	2017	2018	2019	2020	2021	2022	Total
Reports Received	1	29	93	16	17	6	**162**
	Case Status						
Confirmed	0	2	3	8	17	**6**	**36**
Probable	0	7	13	1	0	**0**	**21**
Total Cases	**0**	**9**	**16**	**9**	**17**	**6**	**57**

[1] Gugliotta JL, Goethert HK, Berardi VP, Telford SR. Meningoencephalitis from Borrelia miyamotoi in an immunocompromised patient. N Engl J Med. 2013:368(3):240–245. https://doi.org/10.1056/NEJMoa1209039

After investigation, 57 out of 162 reports (35%) met the surveillance case definition for a *B. miyamotoi* case. Cases occurred in half of New Jersey counties (11 out of 21) and were distributed predominantly in the northern and western parts of the state, with the largest number of cases reported in Hunterdon County (Figure 1).

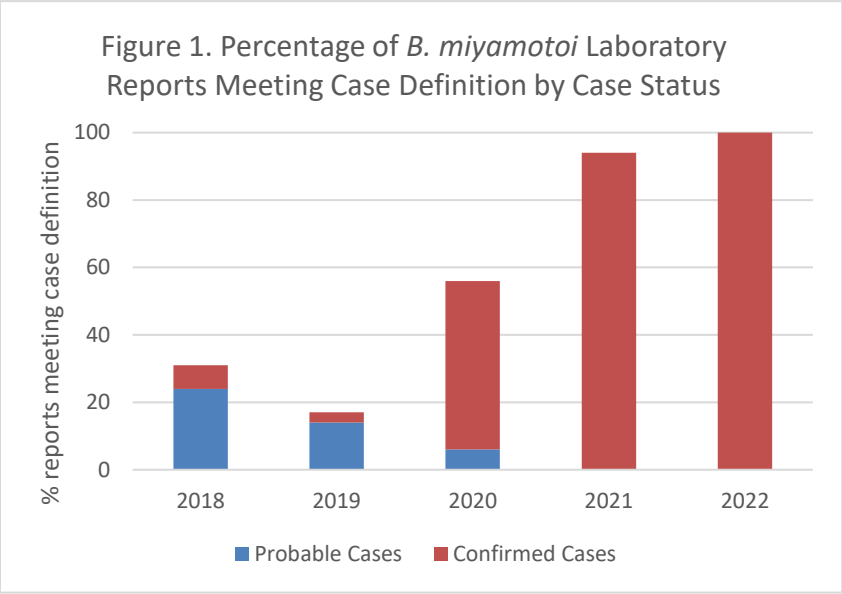
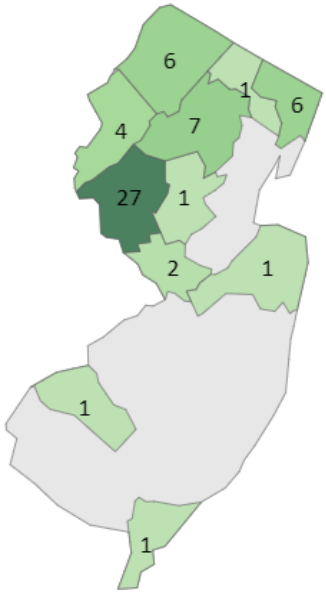


Figure 2. *B. miyamotoi* cases by county, 2018-2022



Case Characteristics: 2018-2022

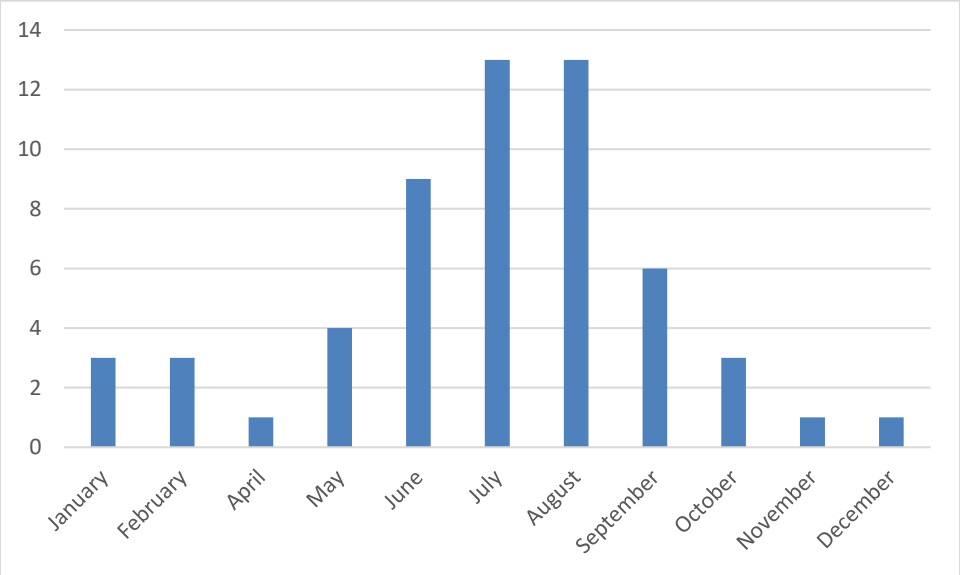
The working case definition requires clinical evidence of infection and must include the presence of fever or chills. The most typical reason for why reports did not meet the surveillance case definition was due to a lack of fever or chills. Symptoms reported in at least half of cases include fever, fatigue/malaise, chills, myalgia, joint pain, headache, and sweats.

Commonly Reported Symptoms, n=57	
Fever	91%
Fatigue/Malaise	88%
Chills	82%
Myalgia	77%
Joint Pain	70%
Headache	67%
Sweats	60%

Other reported symptoms were nausea, dizziness, abdominal pain, anorexia, rash, vomiting, diarrhea, confusion, and photophobia. Relapsing fever was seen in only 18% of cases. Other clinical findings included leukopenia, thrombocytopenia, and elevated liver enzymes. The majority of NJ cases (61%) noted an illness onset in the months of June, July and August (Figure 3). Treatment with doxycycline was documented for 44 out of 57 cases (77%)[2]. Nine cases were hospitalized (16%) with an average length of stay of 4 days and no deaths were reported.

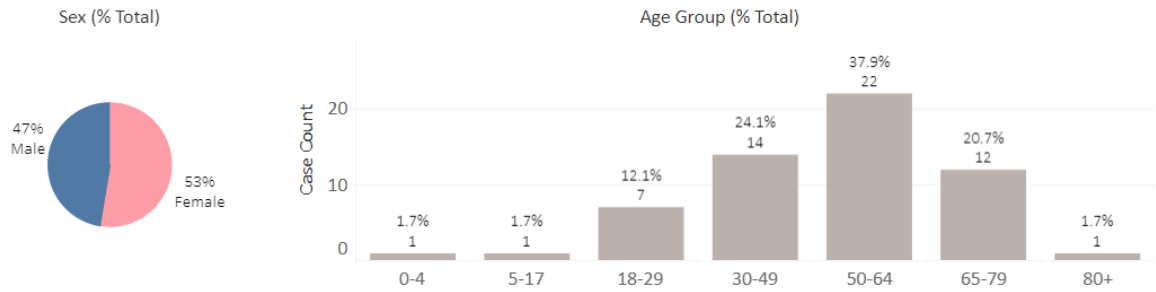
[2] Treatment information is obtained through what is reported from CDRSS. Incomplete investigations can result in missing information

Figure 3. *B. miyamotoi* Cases by month of illness onset, 2018-2022



The median age was 55 years with a range of 2-80 years indicating *B. miyamotoi* is present among both younger and older adult age groups and 52% of cases were female (Figure 4).

Figure 4. *B. miyamotoi* Cases by Sex and Age Group, 2018-2022



Resources:

- NJDOH: Vector-borne Illness
- NJDOH New Jersey Vector-borne Diseases interactive dashboard
- CDC: Tick-Borne Diseases of the United States
- CDC: Diseases transmitted by ticks