

# Lessons Learned from a Rhode Island Academic Out-Patient Lyme and Tick-Borne Disease Clinic

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## ABSTRACT

Although the prevalence of Lyme and tick-borne diseases (TBDs) continues to rise, there is conflicting information regarding the best approach to management. The Lifespan Lyme Disease Clinic (LDC) is an academic out-patient clinic for Lyme and other TBDs. A chart review of 218 new patients between March and November 2018 was conducted. Symptoms most commonly reported included fatigue (66.5%), joint pain (58.2%), cognitive difficulty (32.1%), and headaches (27.9%). Most (87.1%) patients had received TBD-directed antibiotic treatment prior to their first appointment. Of the 136 patients who had experienced more than 6 months of symptoms attributed to Lyme, 55.1% had positive two-tiered serologies. Many patients characterized themselves as having “chronic Lyme” or had a diagnosis of “post-treatment Lyme disease syndrome,” a condition for which there is no clear consensus on pathophysiology or treatment. Outlined here are some lessons learned and practical approaches used by LDC physicians in caring for this patient population.

**KEYWORDS:** Lyme disease, tick-borne disease, post-treatment Lyme disease, patient-centered care

## INTRODUCTION

Lyme and other tick-borne diseases (TBDs) are on the rise in Rhode Island and throughout the United States.<sup>1</sup> Conflicting information on how to diagnose and treat TBD has created a great deal of confusion for patients and medical providers alike, and there remains a high need in the community for healthcare services for Lyme and other TBD.<sup>2</sup>

In 2016, a group of board-certified Infectious Disease physicians at The Miriam Hospital established the Lyme Disease Center (LDC). Patients (18 years or older) are seen at this out-patient clinic for a wide variety of TBDs, including Lyme disease, Anaplasmosis, Babesiosis and *Borrelia miyamotoi* infection. New patient appointments last one hour, and follow-up appointments are scheduled in 20-minute blocks. Due to high demand and limited capacity, services for acute needs (e.g. urgent appointment for tick bite, erythema migrans, etc.) are not currently available. In this study, a retrospective chart review was conducted to

characterize the types of patients seen at the LDC and highlight the unique aspects of providing care for this patient population. The authors hope that this paper will provide practical information on approaches and strategies for caring for patients with Lyme and other TBDs.

## METHODS

A retrospective chart review was conducted of all new patients visiting the LDC between March and November 2018. This study period was chosen as it encompasses the months associated with the highest number of new TBD infections each year.<sup>1</sup> The time frame of this study period also allowed for follow-up among new patients to be assessed. Data abstracted from the electronic health records included demographic characteristics, laboratory data, and clinical information.

## RESULTS

A total of 228 new patients visited the LDC between March and November 2018. Data from 218 records were abstracted through March 2020 (10 records were excluded due to restricted access). As shown in **Table 1**, 59% of patients were female and 41% were male. More than half of the patients were 50 years of age or older (121, 55.5%).

While patients can be seen for any TBD, the majority (173, 79.4%) of patients primarily sought care for symptoms attributed to Lyme disease. 17 (7.8%) of patients sought care for a combination of TBDs (i.e. coinfection or two separate TBDs) and 28 (12.8%) sought care only for a TBD other than Lyme. (**Table 1**)

Symptoms most commonly reported by patients included fatigue (66.5%), joint pain/swelling (58.2%), cognitive difficulty (32.1%), headaches (27.9%) and sleep disturbance (27.5%). 43 (19.7%) had a history of erythema migrans (i.e., “bulls-eye rash”) reported in the chart. A history of Bell’s palsy was reported in the chart for 10 patients (4.6%). Over half of the patients (133, 62.4%) reported having experienced symptoms for greater than 6 months at the time of their first appointment, with 76 (34.4%) of all patients reporting symptoms for 2 years or more. Most patients (87.1%) had already received antibiotic treatment directed toward TBD prior to their first visit. (**Table 1**)

**Table 1.** General characteristics of New Patients at LDC seen between March and November 2018.

Patient characteristics	N	%
<b>Sex</b>		
Male	90	41.2%
Female	128	58.7%
<b>Age</b>		
18–29	27	12.4%
30–50	70	32.1%
> 50	121	55.5%
<b>Reason for consult</b>		
Lyme	173	79.4%
Combination (Lyme + other TBD)	17	7.8%
Other TBD alone	28	12.8%
<b>Types of symptoms reported</b>		
Fatigue	145	66.5%
Joint pain/swelling	127	58.2%
Cognitive difficulty/ “brain fog”	70	32.1%
Headache	61	27.9%
Sleep disturbance	60	27.5%
History of EM rash	43	19.7%
Back pain	33	15.1%
Night sweats	10	4.6%
History of Bell’s palsy	10	4.6%
Dizziness/vertigo	7	3.2%
Vision problems	4	1.8%
<b>Duration of symptoms reported</b>		
< 6 months	80	37.5%
6 months–2 years	57	26.8%
>2 years	76	35.7%
<b>Follow-up care</b>		
Seen for follow-up appointment	67	30.7%
Scheduled for follow-up, but did not attend	71	32.6%
No follow-up scheduled	80	36.7%
<b>Received TBD-directed antibiotic treatment prior to New Patient appointment?</b>		
Yes	190	87.1%
No	28	12.9%

Among all new patients during the study period, 97 (46.6%) had negative Lyme serological testing while 111 (50.9%) had positive serological testing according to CDC two-tiered testing criteria. Among those with positive testing, 33 (15.9%) had only IgM positive Western Blots and 78 (37.5%) had IgG positive Western Blots. Among all patients who reported having a history of Lyme disease and symptoms attributed to Lyme disease for more than 6 months, 61 (44.8%) had negative Lyme testing while 75 (55.1%) had positive testing (25, 18.4% had only IgM positive Western Blots and 50, 36.8% had IgG positive Western Blots). (Table 2)

While more than half (138, 63.3%) of patients were scheduled for follow-up visits after their first appointment, only 67 (30.7%) of these patients were seen again in clinic as of March 2020. (Table 1)

## DISCUSSION

Providers at LDC usually begin with a patient-centered approach to hear the patient’s illness narrative. Particular attention is paid toward other illnesses that may mimic TBDs. Additional testing is often done for endocrine and autoimmune diseases (e.g., thyroid conditions) as well as routine screening for other infectious diseases (e.g., Hepatitis C) utilizing approved guidelines.<sup>3</sup> Results from any testing for tick-borne diseases are reviewed in detail, including any changes in serologies over time. Prior antibiotic treatment is also reviewed carefully. Attention is focused toward therapeutic approaches that have provided symptom relief and improved function for patients, particularly non-antibiotic treatments, including unconventional therapies such as the herbal creams, acupuncture, and other supportive therapies. (Table 3)

Patients come to LDC with a variety of symptoms, ranging from well-documented Lyme disease with positive serological testing and a well-described clinical syndrome to non-specific symptoms that are ascribed to Lyme with little or no documentation. A majority of patients (62.5%) reported

**Table 2.** CDC criteria for standard two-tiered serological testing and number of patients seen at LDC with corresponding results on record.

Two-tiered testing method for Lyme includes an initial enzyme or immunofluorescence assay (“Reflex”), with a subsequent IgM/IgG Western Blot assay if positive/equivocal.

Lyme testing result	CDC two-tiered Lyme testing criteria	All patients seen with testing for Lyme available in chart <sup>1</sup> N=208	Patients with history of Lyme and symptoms > 6 months <sup>2</sup> N=136
Negative	Negative reflex OR Positive reflex + Negative western blot (IgG and IgM)	97 (46.6%)	61 (44.8%)
Positive IgM Western Blot only	Positive Reflex + minimum of 2/3 IgM bands present on Western blot	33 (15.9%)	25 (18.4%)
Positive IgG Western Blot (+/- Positive IgM)	Positive Reflex + minimum of 5/10 IgG bands present on Western blot	78 (37.5%)	50 (36.8%)

<sup>1</sup> Includes those seen for other tick-borne disease but also had Lyme testing recorded in the chart.

<sup>2</sup> Includes patients with positive serologies and/or a history of symptoms attributed to Lyme for at least 6 months.

**Table 3.** Clinical services offered at LDC.

Review and interpretation of testing and serologies for Lyme and other TBDs.
Evaluation for need of additional testing for Lyme or co-infection with other TBDs.
Evaluation for testing and/or screening for non-Lyme and non-TBD etiologies. <sup>1</sup>
Evaluation for the need for antibiotic treatment for Lyme disease or other TBDs.
Discussion of inflammation associated with Lyme infection and the use of non-steroidal anti-inflammatory medication and creams and other over-the-counter anti-inflammatories.
Education and discussion on Post-Treatment Lyme Disease Syndrome and methods to address fatigue, sleep, exercise, smoking cessation to reduce inflammation.
Referral to other care providers, such as physical therapy, mental health support, etc.
Counseling on tick safety and prevention of TBD with tick repellants, frequent tick checks, etc.

<sup>1</sup>Other causes include routine testing for infectious diseases and endocrine/autoimmune conditions.

symptoms for 6 months or longer at the time of their first appointment. Almost all patients (87%) had received antibiotic treatment directed towards Lyme or another TBDs prior to their first appointment. The overall predominance of female patients in this chart review (59%) is similar to what has been described in other reports of Post-Treatment Lyme Disease Syndrome.<sup>4</sup> The following section outlines various lessons learned and information about practical approaches used by LDC providers in clinical practice in their approach to care for these patients.

### Serological testing for Lyme disease

Testing for Lyme disease is a significant source of confusion for patients. The serological testing results of patients seen at LDC by CDC criteria are outlined in **Table 2**.<sup>5</sup> As serological testing can only confirm exposure rather than disease activity, testing can be difficult to interpret, especially in the context of ongoing Lyme-related symptoms. It is important to acknowledge the confusion caused by Lyme testing with the patient, and in this section, the authors have highlighted some important points to consider.

Immunoglobulin G (IgG) and M (IgM) antibodies seen on Western Blots (WB) can remain reactive for up to 20 years after resolution of infection.<sup>6</sup> This is frequently misinterpreted as ongoing infection. For this reason, repeating Lyme testing in patients who already have fully positive results is generally discouraged. However, when evaluating relatively recent illness (within the last 6 months) and the initial IgM and/or IgG WB is negative, repeating serological testing can

be helpful to see if serology has evolved (i.e. from IgM to IgG positive).

In addition, a positive IgM WB (in the absence of a positive IgG WB result) can be a confusing result in the context of ongoing Lyme-related symptoms. As shown in **Table 2**, about 30% of all patients who have any positive Lyme testing have only a positive IgM WB. A positive IgM WB can represent a false positive result.<sup>7</sup> However, antibiotic treatment can prevent the evolution of a fully positive IgG WB even in the presence of acute Lyme disease, so a positive IgM WB can also be the result of a true Lyme infection following appropriate antibiotic treatment.<sup>8</sup>

Another validated testing option is the single-step C6 peptide ELISA. This serodiagnostic test recognizes a different antigenic variant than that used in standard two-tiered Lyme testing and has been shown to be more sensitive in early Lyme disease.<sup>9</sup> This can be a helpful tool to reassure patients with ongoing symptoms but negative Lyme testing that they do not in fact have *B. burgdorferi* infection.

Patients should be discouraged from seeking alternative unvalidated Lyme testing that is not CLIA-approved. Examples of unvalidated tests that have been developed for Lyme include quantitative CD57 lymphocyte assays, capture assays for antigens in urine, and “Reverse Western Blots.”<sup>10</sup>

### Management of long-term, non-specific symptoms associated with Lyme disease

It is important to educate patients that the majority of people who contract Lyme disease recover fully after treatment within six months. However, 10–20% of these patients experience ongoing symptoms for 6 months following appropriate antibiotic treatment.<sup>11</sup> There is no clear consensus on the pathophysiology or treatment for this condition, often referred to as “Post-treatment Lyme Disease Syndrome” (PTLDS).<sup>11</sup> A simple Google search reveals many stories of life-altering chronic illness attributed to Lyme disease and conflicting information about best practices for treating and managing persistent symptoms.

More than half of new patients at LDC report having symptoms for more than six months after targeted antibiotic therapy. It is important to have tools and treatment options to address this condition. Due to the controversy surrounding PTLDS within the medical community, many patients come to the LDC to have questions answered because their care providers want to avoid care of these conditions or because they continue to suffer without relief. Many patients have had antagonistic interactions with the healthcare system and are resentful that their symptoms have not been validated by the medical community.<sup>12</sup> Many of our patients describe what has been reported in the literature including confronting “dismissive” and “condescending” attitudes towards their condition by other providers.<sup>12</sup> Therefore, acknowledging the impact of their illness while practicing empathetic and patient-centered care can be an

important first step when approaching the patient.

It is not uncommon for patients to ask if they need an additional course of antibiotic treatment in the context of ongoing symptoms. If there is concern that they did not complete the course of treatment or that their treatment course occurred at a sub-therapeutic dose (i.e. it was taken simultaneously with Calcium or Magnesium which can bind to doxycycline), a repeat course of antibiotic treatment can be prescribed.

The risks and the ever-diminishing benefit of each additional course of antibiotics are often reviewed with the patient. Several clinical trials have shown that additional courses of antibiotics to treat this condition does not significantly improve outcomes related to quality of life among patients with ongoing symptoms attributed to Lyme disease.<sup>13,14</sup> In the absence of validation by the mainstream medical community, many patients seek out unconventional treatment methods offered by other providers, including long-term courses of combination antibiotic therapy, chelation therapy, or others.<sup>15</sup> LDC clinicians often have difficulty providing guidance regarding these unconventional or complementary medicinal therapies. These therapies are discouraged if there are concerns regarding toxicity or prohibitive cost. Providers generally follow CDC guidelines on antibiotic prescribing. However, many patients insist on a repeat course of antibiotic therapy. Many patients are knowledgeable of the literature from the CDC as well as from alternative Lyme providers. The risks and benefits of repeating antibiotic therapy are described in detail with the patient. A shared decision-making approach can be utilized to navigate treatments and ongoing care for these patients.<sup>16</sup> An additional short-term antibiotic course may be preferable to many months of combination therapy that is typically recommended by some providers who specialize in Lyme disease.<sup>17</sup>

Patients at LDC report fatigue symptoms that are worse than had been reported among patients with cancer and chronic pain.<sup>18</sup> As with chronic fatigue syndrome (CFS), initial qualitative narratives from LDC patients (unpublished data) suggest that there may be a complex relationship between physical activity and fatigue.<sup>19</sup> For example, when patients resume their level of exercise prior to their “Chronic Lyme,” they often report “hitting the wall” and experiencing increased symptoms of fatigue. Patients are therefore counseled to resume exercise and physical activity in a slow graded fashion. A better understanding of the relationship between physical activity and fatigue overtime will be critical to future research and patient care.

LDC providers have therefore adopted an alternative multidisciplinary approach to caring for these patients. LDC providers generally offer interventions to alleviate commonly reported symptoms, including fatigue, joint pain and cognitive difficulties. Some of these interventions have proven helpful for similar clinical syndromes, including chronic

fatigue syndrome and fibromyalgia.<sup>20</sup> These approaches include sleep hygiene counseling, encouraging healthy physical activity, modifying diet or nutritional intake, referral to physical therapy, mental health support, over-the-counter anti-inflammatory medicines and creams as well as other herbal or natural medicines. The informational pamphlet developed by the authors summarizing these recommendations can be found at [this link](#).

Patients are often understandably frustrated that they cannot return right away to their previous levels of wellness and functioning. It is important to reassure patients that recovery, particularly if the illness is extended, can take time. Improving function and meaningful activity even while symptoms persist is often the primary goal. Articulating functional goals such as walking a certain distance daily or participating in meaningful activities may be more helpful than focusing on more subjective goals such as having more energy or feeling “totally well again.”

As shown in **Table 1**, only about half of patients who schedule a follow-up appointment come into clinic again. It is unclear whether this is because the treatment modalities offered helped and patients felt another visit was unnecessary, or because they did not help sufficiently, and patients continued to seek care elsewhere. An evaluation of patient satisfaction at LDC is ongoing to answer this question.

## LIMITATIONS

This study seeks to describe the patient population seen at an out-patient clinic for Lyme and other TBDs and offer some practical approaches for caring for these patients. There are some limitations to report. Due to the retrospective nature of this chart review, some information was difficult to ascertain, and data abstraction relied on what was reported by patients and recorded by physicians in the chart. In addition, although the approaches described here represent the consensus of clinicians at LDC as a whole, it is important to note that each clinician can vary their approach with each individual patient.

## CONCLUSIONS

As the prevalence of Lyme and other TBDs continues to rise, the demand for high-quality and accessible care for TBDs will also continue to increase. In the midst of conflicting information and controversy in best practices for the treatment and management of Lyme disease, it is important for patients to have access to reliable information and treatment options for acute and ongoing symptoms. Meanwhile, the Lyme-treating community should continue to learn from ongoing experience. Prospective evaluation of standardized approaches is needed to determine which therapeutic interventions provide the most functional benefit for patients.

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