

## **Lyme Disease Patient Care: An Exploration of the Opportunity for Quality Improvement and Standardization of Healthcare Services in the Lehigh Valley Health Network.**

Sienna McNett  
*Schreyer Honors College, The Pennsylvania State University*

Jaan Naktin MD  
*University of South Florida College of Department of Medicine, Lehigh Valley Health Network,*  
Jaan.Naktin@lvhn.org

Follow this and additional works at: <https://scholarlyworks.lvhn.org/research-scholars-posters>

**Let us know how access to this document benefits you**

---

### **Published In/Presented At**

McNett, S., Natkin, J., (2017, July, 31) *Lyme Disease Patient Care: An Exploration of the Opportunity for Quality Improvement and Standardization of Healthcare Services in the Lehigh Valley Health Network.*  
Poster presented at: LVHN Research Scholar Program Poster Session, Lehigh Valley health Network, Allentown, PA.

This Poster is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact [LibraryServices@lvhn.org](mailto:LibraryServices@lvhn.org).



# Lyme Disease Patient Care: An Exploration of the Opportunity for Quality Improvement and Standardization of Healthcare Services in the Lehigh Valley Health Network

Sienna McNett; Jaan Naktin, M.D.

Lehigh Valley Health Network, Allentown, Pennsylvania

## BACKGROUND / INTRODUCTION



Fig. 1: Typical EM Lesion<sup>1</sup>

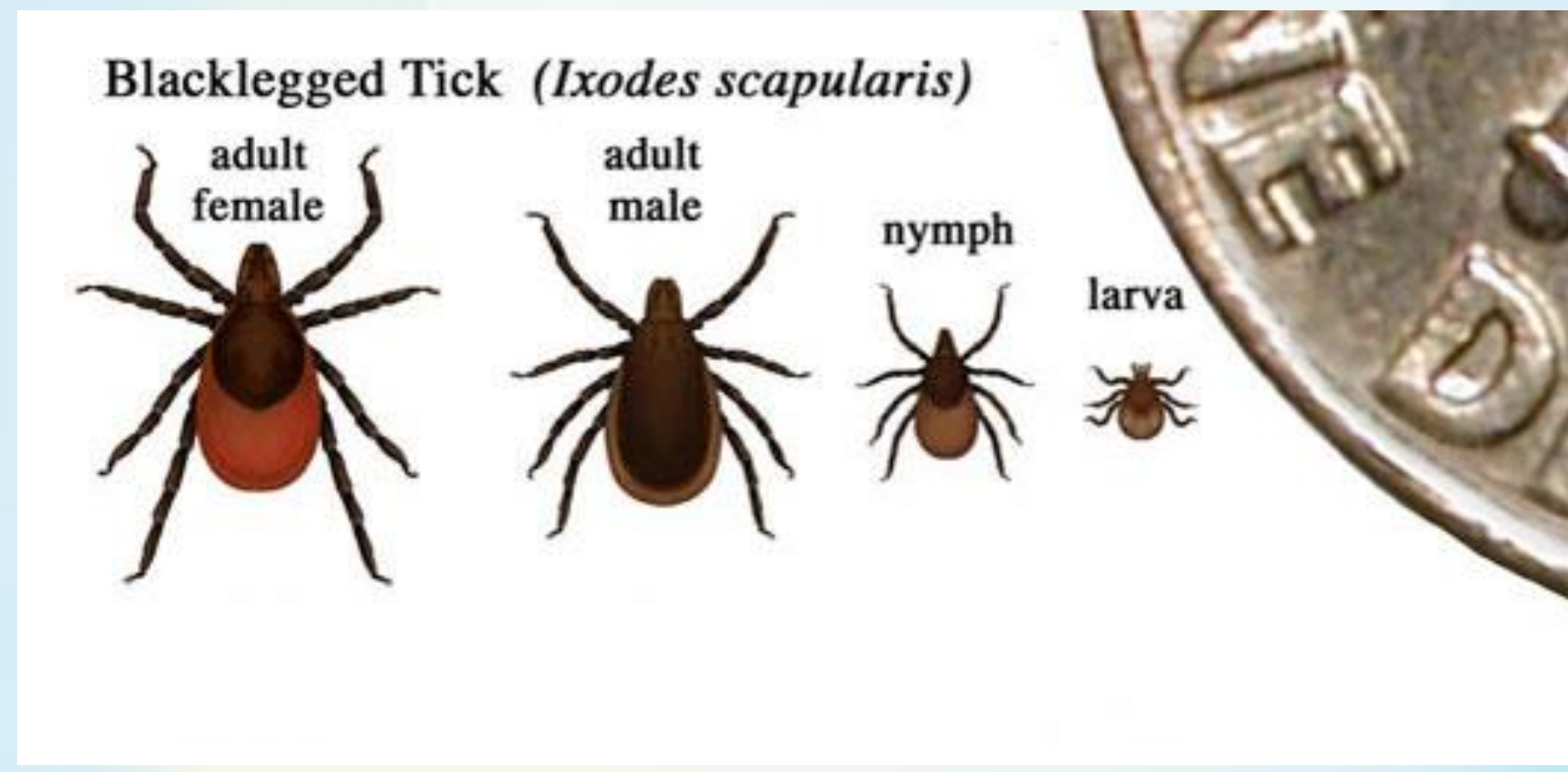


Fig. 2: Deer Tick (PA's vector for Lyme) relative size<sup>2</sup>

### What is Lyme Disease?

- Lyme disease (LD) is the most commonly reported vector borne illness in the US<sup>3</sup>
- The bacteria responsible for LD, *Borrelia burgdorferi* (Bb), is transmitted by an Ixodes scapularis tick attachment lasting 36-48 hrs<sup>4</sup>
- The characteristic Erythema Migrans (EM) Lesion (Bulls Eye or Target Rash) is present in 70% of infected individuals<sup>5</sup>
- Other symptoms can manifest days to months after a tick bite<sup>5</sup>
- Symptomology is extremely variable per case and ranges from fever and headache to neurological and cardiac manifestations<sup>5</sup>

### The Problem: Healthcare Obstacles & Growing Incidence of Lyme Disease

- Other conditions with nonspecific symptoms can mimic Lyme Disease and result in LD overdiagnosis. To ensure appropriate treatment, a firm diagnosis is needed.<sup>5</sup>
- Lyme disease can be effectively diagnosed in a case approached in a standardized, comprehensive clinical approach. The CDC and Infectious Diseases Society of America (IDSA) provide evidence based guidelines to help practitioners cut through the variability of this disease. However, these guidelines are not applied uniformly in Pennsylvania at this time.<sup>3</sup>
- PA has the highest number of reported LD cases per state; reports of Lyme increased by 110% from 2000-2015<sup>6</sup>
- It's estimated that Lyme Disease costs PA over \$74 million in lost productivity annually<sup>5</sup>
- Keeping these issues in mind, it's important to consider the opportunity for and potential benefits of intervention and standardization of Lyme Disease care within the LVHN.**

## METHODS

A. The opportunity for quality of care improvements will be assessed via exploration of patient care implications associated with current system

B. A retrospective chart review of patients referred to ID department for LD from 2015-2016 will be carried out with RedCap and Excel software, then analyzed with descriptive statistics.

## RESULTS/DISCUSSION

*As the retrospective study is still in progress, statistical results are not yet available. However, conclusions can still be explored from preliminary chart review and background research.*

**At this time, the most pertinent opportunities for standardization and improved care include:**

- Collection of Patient History and Assessment of Risk**
  - Currently Lyme patient intake and consultation notes are at unstandardized practitioner discretion
  - Studies show factors like recreational activities and symptom duration/evolution may be key considerations for a LD diagnosis, yet are not consistently recorded<sup>5,7</sup>
  - An incomplete and nonstandardized patient history may result in imprecision with diagnosis and treatment plans.
- Serological Testing**
  - The CDC recommended 2 tier testing algorithm for LD is designed to optimize sensitivity and specificity<sup>4</sup>
  - It's composed of a nonspecific Enzyme-Linked Immunosorbent Assay confirmed by a specialized Western Blot<sup>4</sup>
  - Studies reveal this system to be ~98.5% and ~90% sensitive in late and early stage LD respectively<sup>8</sup>
  - Potential errors in application of this system include:
    - performing the 2<sup>nd</sup> tier of the test and not the 1<sup>st</sup>, (doubling the likelihood of a false positive)
    - incorrect timeframe of testing
    - performing testing when not clinically indicated<sup>8</sup>
  - The FDA predicts the direct medical cost of inaccurate testing to be \$1,226 a case (accounting for visits, treatments, and testing)<sup>9</sup>**

## DISCUSSION

### 3 Treatment and Administration of Antibiotics

- Despite established professional society guidelines, treatment may be variable. Potential error includes:
  - prolonged antibiotic treatment
  - antibiotics without shown efficacy against Bb.
  - unstudied alternative treatments<sup>4</sup>

**Patients that receive unneeded antibiotic treatment:**

- face unnecessary health risks associated with the drug, from minor adverse events (ie diarrhea) to major ones (ie septic shock)<sup>10</sup>

**Patients that receive delayed antibiotic treatment:**

- are at greater risk for disease complications<sup>4</sup>
- late-stage LD direct healthcare costs are ~\$916 more compared to early-stage LD costs (average annual LD medical costs being \$2,968)<sup>11,12</sup>

<b>1248</b>	Number reported Lyme cases in the Lehigh Valley and surrounding counties in 2015, 62.3% increase since 2014 <sup>6</sup>
<b>10x</b>	CDC's prediction that actual cases of Lyme are 10x that reported, suggesting there could be as many as 12,480 annual cases in the LV <sup>5</sup>
<b>25%</b>	Percent of referrals to LVHN's Department of Infectious Diseases in 2016 that were for Lyme Disease. <sup>13</sup>

## CONCLUSION

**Considering the increasing presence of Lyme Disease in the LVHN region, as well as the financial and health risks associated with mistreatment/misdiagnosis of this disease, there is an enormous opportunity for quality improvement.**

- A retrospective chart review will allow better insight on the state of the current system**
- Potential future interventions include development of targeted LD training programs for practitioners, EPIC prompts during a consult, and enrollment questionnaires.**

© 2017 Lehigh Valley Health Network

610-402-CARE LVHN.org



Resources:  
1. Centers for Disease Control and Prevention (NIH). (2010, Sept. 27). 2 Erythema migrans (EM) or "bull's-eye" rash. [Digital image].  
2. Centers for Disease Control (CDC). (2009). Deer tick (Ixodes scapularis) [Digital image].  
3. Tick Fever on Lyme Disease and Related Tick-Borne Diseases. (2015, September). Lyme Disease in Pennsylvania.  
4. Centers for Disease Control (CDC). (2017, May 29). Lyme Disease.  
5. Babin, D. W., MD, & Evans, J. MD. (1998). Lyme Disease. Philadelphia, PA: American College of Physicians.  
6. Division of Health Information, Pennsylvania Department of Health. (2015). Lyme Cases by County.  
7. Smith, G., Wilkoy, E., Hopkins, R., Cherry, B., & Maher, J. (2001). Risk Factors for Lyme Disease in Chester County, Pennsylvania. Public Health Reports (1974-), 116, 146-156.  
8. Johnson, B. (2013). Laboratory Diagnostic Testing for Borrelia burgdorferi Infection in J. J. Halperin (Ed.), Lyme Disease: An Evidence-based Approach (pp. 79-89).  
9. Food and Drug Administration. (2016). The Public Health Evidence for FDA Oversight of Laboratory Developed Tests: 20 Case Studies.  
10. Field, M. C. (1998). The Consequences of Overdiagnosis and Overtreatment of Lyme Disease: An Observational Study. Annals of Internal Medicine, 128(5), 354.  
11. Zhang, X., Meltzer, M., Palla, C., Hopkins, A.B., Worth, L., & AD. Economic impact of Lyme Disease: Emerging Infectious Diseases. 2006;12(4).  
12. Adkins, E. R., August, J., Lurie, S. W., & Weiner, J. P. (2015). Health Care Costs, Utilization and Patterns of Care following Lyme Disease. PloS One, 10(2).  
13. Naktin, MD, Department of Infectious Diseases. (2015).