Evaluation of Pediatric Patients Diagnosed with Lyme Disease in the Lehigh Valley

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Background

- Lyme disease is the most common tick-borne infection in the United States with 300,000+ cases annually
- Lyme Disease can be divided into early localized, early disseminated, or late disseminated disease
- Majority of cases fall into early Lyme disease
- Confirmatory laboratory testing is not needed in those who present with localized Lyme and classic erythema migrans rash
- In 2018 the Committee on Infectious Disease changed the Red Book recommendation for treatment of early Lyme disease to doxycycline and secondly amoxicillin regardless of age
- Upon review of literature there have been no detailed collection of cases of Lyme disease in pediatric patients in Eastern PA

Problem Statement

- The objective of this study is to provide a descriptive review of Lyme disease in a community hospital setting in Northeast Pennsylvania and to examine if there has been any significant change in antibiotic prescribing patterns among pediatric providers since June 2018.

Methods

- Retrospective chart review of patients younger than 18 who received care at the Lehigh Valley Health Network (LVHN) from January 2014-September 2018 with potential diagnosis of Lyme disease based on initial query utilizing ICD-9 and ICD-10 codes.
- Exclusion Criteria: Age>18, treated outside of the LVHN network, negative ELISA test without clinical finding of erythema migrans, negative Western blot, incomplete/undocumented encounters, false positive findings documented by providers, history of past treated infection
- 867 charts were reviewed, and demographics, clinical presentation(s), and treatment data were recorded utilizing REDCap
- Demographic information summarized using frequency and percentages for categorical data
- Chi-Square test used to determine if there was a role that the June 2018 change in treatment guidelines may have played in provider prescribing patterns among children with early Lyme

Results

Table 1. Demographic Information

Demographic		Total (%)
Sex	Female	384 (44.3)
	Male	484 (55.7)
Ethnicity	White	742 (85.6)
	Hispanic/Latino	50 (5.8)
	Black/African American	10 (1.2)
	Other	65 (7.5)
Age of Presentation	Mean (SD) in years	8.9 (4.3)
	<5	180 (20.8)
	5 to <9	296 (34.1)
	9-18	391 (45.1)
Month of diagnosis	January-April	73 (8.4)
	May-August	608 (70.1)
	September-December	186 (21.5)
Reported Tick Bite (n=216)	Early localized	172 (79.6)
	Early disseminated	29 (13.4)

Figure 1. Geographic frequency of patients seen at LVHN facilities

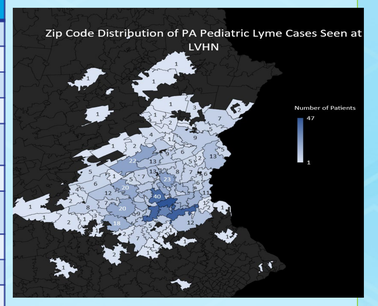


Figure 2. Breakdown of location of initial presentation

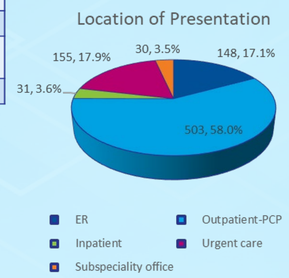


Figure 3. Clinical Presentation of Patients

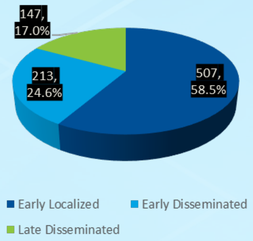
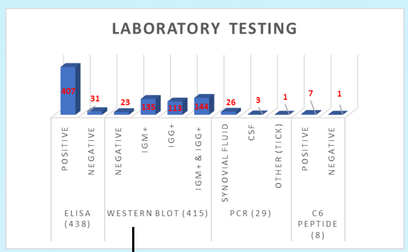
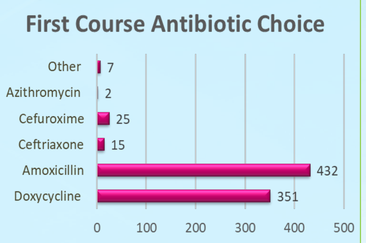


Figure 4. Breakdown of Laboratory Testing



Western Blot	Early Localized	Early Disseminated	Late Disseminated
Negative	18	4	1
IgM+	57	73	5
IgG+	20	26	67
IgM+ & IgG+	15	57	72

Figure 5. Treatment



Results (Continued)

Table 2. Prescribing Patterns among Providers for Patients Younger <8 years with Early Lyme Disease Before Change in Treatment Guidelines in June 2018

	Before 6/1/18 (n=276)	After 6/1/18 (n=75)	p-value
Doxycycline	14.3 (5.8)	17.1 (7.2)	0.91
Amoxicillin	18.3 (4.5)	15.7 (3.4)	<0.001
Cefuroxime	18.4 (4.8)	17.5 (4.0)	0.774
Ceftriaxone	24.5 (4.9)		
Azithromycin	10.5 (4.9)		

Table 3. Prescribing Patterns among Providers for Patients Younger <8 years with Early Lyme Disease Before Change in Treatment Guidelines in June 2018

	Before 6/1/18 (n=276)	After 6/1/18 (n=75)	p-value
Doxycycline	9 (3.3%)	12 (16%)	< 0.001
Amoxicillin	241 (87.3%)	59 (78.7%)	0.061
Cefuroxime	20 (7.2%)	4 (5.3%)	0.56
Ceftriaxone	2 (0.7%)	0 (0%)	0.47
Azithromycin	2 (0.7%)	0 (0%)	0.47

Discussion

- Demographics representative of overall current Lyme disease trends in the United States
- Laboratory testing among early localized Lyme disease identified as area of potential health care savings
  - Early localized infection, sensitivity reported to be less than 40%
  - 24.8% of patients with early localized disease (n=131/507) had an ELISA completed which costs ~$127
  - potential reduction in cost of up to $16,000
- Prescribing patterns among providers indicated a statistically significant difference prior to and after 2018 treatment guidelines changed in early children under 8 years old diagnosed with Lyme disease
  - Only 4 months of data
  - Unclear if this relationship is sustained
  - Opportunity to explore providers' awareness
- Study Limitations
  - Findings limited to data made available in medical records due to its retrospective nature

Conclusions

- Provide insight into the demographics and burden of pediatric Lyme disease in a community-based hospital setting in Eastern PA
- **Health Systems**: Potential impact on a health systems level in terms of cost saving, reducing waste, limiting unnecessary testing, and saving patients and providers' time
- **Values Based Patient Centered Care**: Opportunity to enhance shared decision making based on available updated treatment options to help empower patients and their families
- Lays groundwork for future QI projects to evaluate providers' awareness regarding Lyme disease treatment and presentation(s)