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

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Introduction

- Lyme disease is the most common tick-borne infection in the US and Europe.
- Clinical manifestations
 - Early localized
 - Single erythema migrans 3-30 days following tick bite
 - Early disseminated
 - Multiple erythema migrans, cranial nerve palsy, meningitis, carditis after 1-4 weeks
 - Late disseminated
 - Weeks to months after initial infection
 - Arthritis is the most common manifestation of late Lyme disease in children
- Diagnosed by clinical presentation followed by confirmation of infection by serologic testing
- Treatment is based on age and clinical presentation
 - Regardless of age, treatment of choice for early localized disease or early disseminated disease without cerebrospinal fluid (CSF) findings is doxycycline per the 2018 edition of the RED Book
 - Intravenous Ceftriaxone is reserved for meningitis, encephalitis or severe carditis
 - Arthritis without neurologic disease can be treated with doxycycline or amoxicillin
- Upon review of literature, there has not been a detailed collection of cases of Lyme disease in pediatric patients in Eastern Pennsylvania, a Lyme endemic area.
- This retrospective study aims to produce an updated review of Lyme Disease seen in a community hospital setting in children in Eastern Pennsylvania, and to characterize the clinical presentations, treatments, and persistence or duration of the disease in childhood.

Methods

Retrospective chart review of data from patients 18 years old or younger who received care at Lehigh Valley Health Network (LVHN), including the Inpatient, Outpatient and Emergency Department settings, with a diagnosis of Lyme disease. The review consisted of data on patients who were diagnosed with Lyme from January 2014 to September 2018, encompassing charts from when our institution implemented Epic™. Lyme disease was defined as clinical symptoms in children with laboratory confirmation by C6 antibody, Western Blot, or other standardized tests, or a child identified as having early localized disease with erythema migrans.

Results

Table 1: Demographic Distribution

Demographic	Value	Frequency	(%)
Gender	Male	163	51.9
	Female	151	48.1
Ethnicity	White	266	84.7
	Hispanic/Latino	19	6.1
	Black/African American	4	1.3
	Other	25	8.0
Age	< 6	176	56.1
	≥ 6 < 14	115	36.6
	≥ 14 < 19	23	7.3

Figure 1: Clinical Presentation

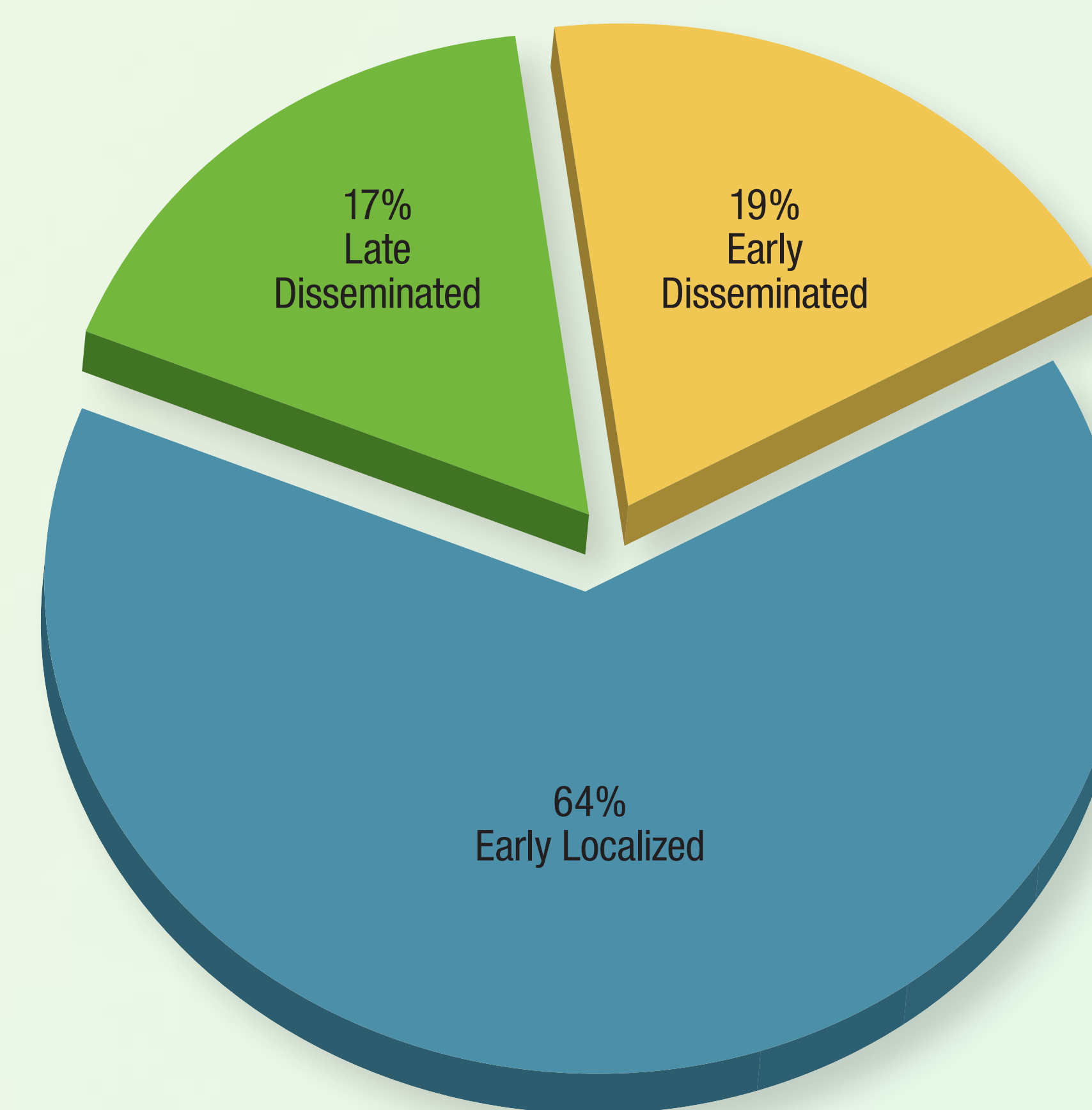
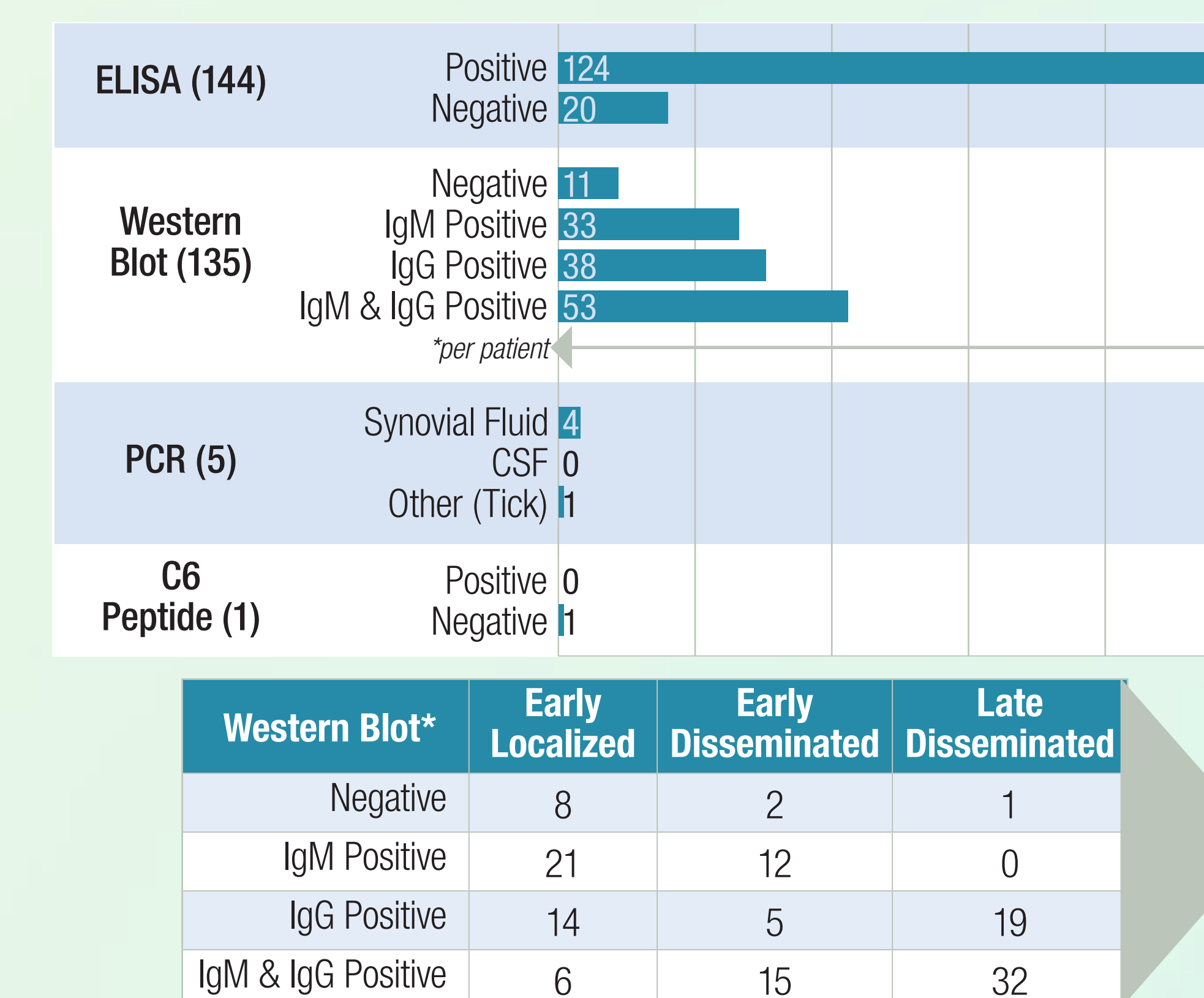


Table 2: Clinical Presentation

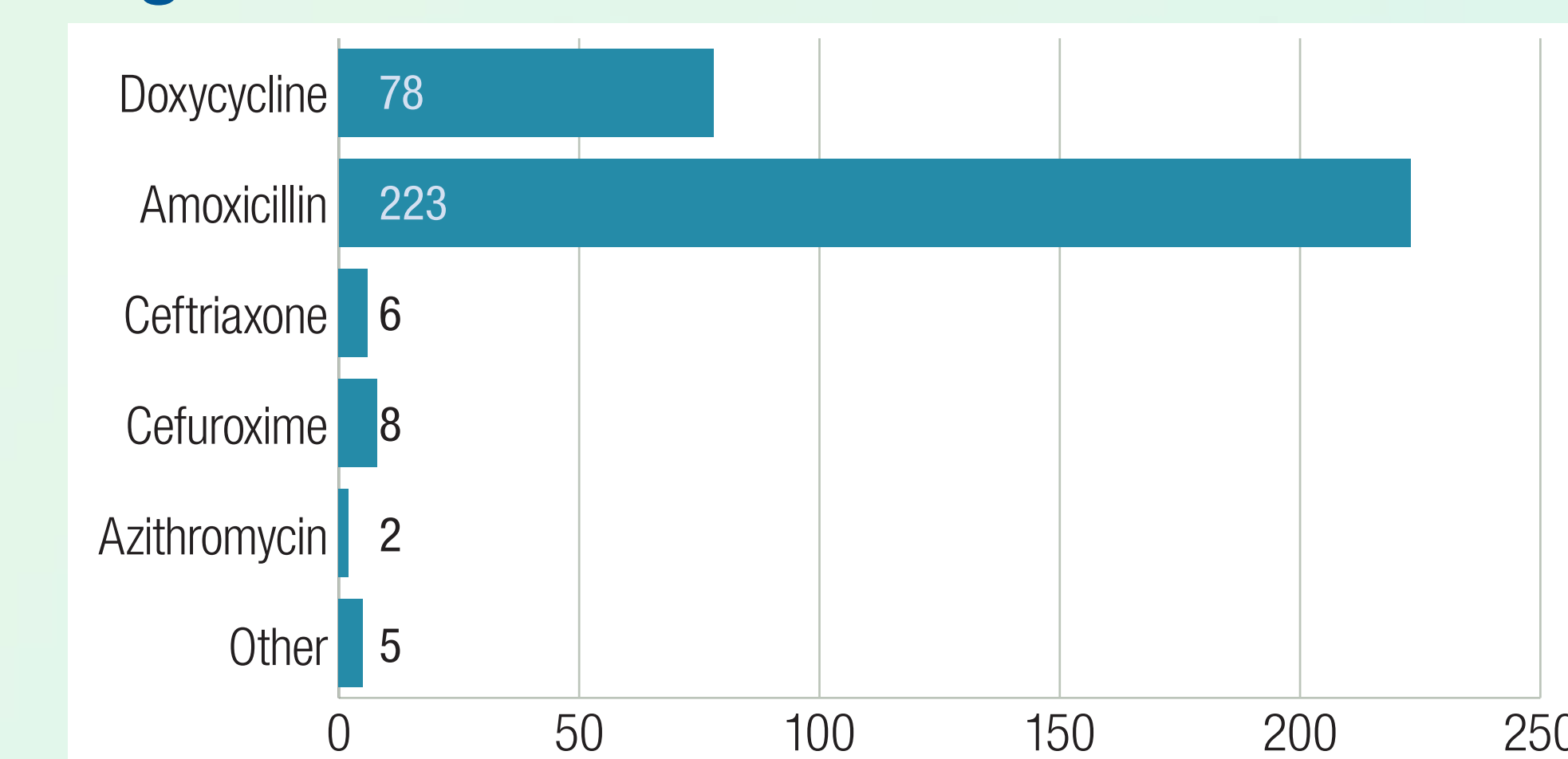
Clinical Presentation	Number of Patients	(%)
Early Localized	202	
Single Erythema Migrans	179	88.6
Early Disseminated	58	
Meningitis	1	1.7
Facial Nerve Palsy	14	24.1
Carditis	0	0
Multiple Erythema Migrans	43	74.1
Other Nervous System	8	13.8
Late Disseminated	54	
Arthritis	54	100.0

Figure 2: Laboratory Testing



Western Blot*	Early Localized	Early Disseminated	Late Disseminated
Negative	8	2	1
IgM Positive	21	12	0
IgG Positive	14	5	19
IgM & IgG Positive	6	15	32

Figure 3: First Course Antibiotic Choice



Of the 84 cases of children <8yo in 2018 and 2019, 71 were treated with Amoxicillin and 8 were treated with Doxycycline. Of the 135 cases of children <8yo prior to 2018, 119 were treated with Amoxicillin and 5 were treated with Doxycycline. For all years, of the 219 cases of children <8yo, 190 were treated with Amoxicillin and 13 were treated with Doxycycline.

Discussion

- Clinical Presentations (Figure 1, Table 2)
 - Almost 2/3 of cases were early localized disease
 - Only 179 had documented erythema migrans
 - Parents solely reporting rash v. poor documentation
 - Early disseminated disease
 - Multiple Erythema migrans most common presentation
 - Late disseminated disease least common
- Testing (Figure 2)
 - ELISA with confirmatory Western Blot most common
 - PCR mainly done on synovial fluid, not appropriate test for blood
- Treatment (Figure 3)
 - Amoxicillin most common treatment, followed by Doxycycline

Conclusion

Thus far this study focused on characterizing the clinical presentations, treatments, and outcomes of Lyme disease in children in the Lehigh Valley. Further research will be performed to not only compile additional retrospective data, but also to achieve a secondary objective of determining if there is a significant relationship between clinical presentation of Lyme disease and the results of diagnostic testing, age, time to resolution/cure, or reported tick bite.