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LYME DISEASE: EMERGENCY DEPARTMENT CONSIDERATIONS

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☐ Abstract—Background: Lyme disease (LD) is the most common vector-borne illness in North America. Reported cases of LD have increased from approximately 10,000 cases annually in 1991 to >25,000 cases in 2014. Greater recognition, enhanced surveillance, and public education have contributed to the increased prevalence, as have geographic expansion and the number of infected ticks. Cases are reported primarily in the Northeastern United States, Wisconsin, and Minnesota, with children having the highest incidence of LD among all age groups. The increased incidence and prevalence of LD in the United States makes it increasingly more common for patients to present to the emergency department (ED) for tick bites and LD-related chief complaints, such as the characteristic erythema migrans skin manifestation. Objective: We sought to review the etiology of LD, describe its clinical presentations and sequela, and provide a practical classification and approach to ED management of patients with LD-related presentations. Discussion: In this review, ED considerations for LD are presented and clinical presentations and management of the disease at different stages is discussed. Delayed sequelae that have significant morbidity, including Lyme carditis and Lyme neuroborreliosis, are discussed. Diagnostic tests and management are described in detail. Conclusion: The increasing prevalence and growing geographic reach of Lyme disease makes it critically important for emergency physicians to consider the diagnosis in patients presenting with symptoms suggestive of LD and to initiate appropriate treatment to minimize the potential of delayed sequelae. Special consideration should be made for the epidemiology of LD and a high clinical suspicion should be

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present for patients in endemic areas or with known exposures to ticks. Emergency physicians can play a critical role in the recognition, diagnosis, and treatment of LD. © 2017 Elsevier Inc. All rights reserved.

☐ Keywords—*Borrelia burgdorferi*; emergency department; *Ixodes scapularis*; lyme disease

INTRODUCTION

The incidence of Lyme disease (LD) has increased significantly over the last several decades, and LD is now the most common vector-borne illness in North America (1-4). LD was originally described as a clinical entity of juvenile arthritis in the mid-1970s (4,5). Complications caused by LD can be mild to severe and involve the skin, joints, heart, nervous system, and other organs (1). According to the Centers for Disease Control and Prevention (CDC), cases of LD have increased from approximately 10,000 cases annually in 1991 to >25,000 cases in 2014 (4,6,7). Large commercial laboratory testing data suggest that the disease burden may be up to 10 times higher than CDC estimates (8). The increase is related in part to greater recognition, enhanced surveillance, and public education; it is also caused by geographic expansion and a greater number of infected ticks (4).

The increased incidence and prevalence of LD in the United States makes it increasingly more common for patients to present to the emergency department (ED) with tick bites and LD-related chief complaints, especially in those geographic areas with high numbers of cases. Emergency physicians must be able to recognize and manage

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the clinical manifestations of LD in patients presenting to the ED with chief complaints of recent tick attachment, tick bites, or complications of LD, such as lyme carditis and lyme meningitis. Prompt recognition and management can reduce the incidence of severe complications and improve care of patients presenting to the ED with suspected or confirmed exposure to tick bites with possible LD transmission. The objective of this paper is to review the etiology of LD, describe its clinical presentations and sequela, and to provide a practical classification and approach to ED management of patients with LD-related presentations.

Epidemiology

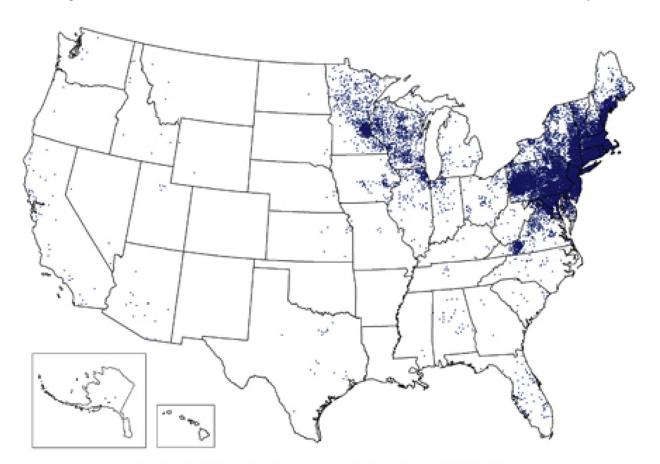
In 2001, >80% of cases occurred in eight states, primarily in the Northeastern United States, including New York, New Jersey, Connecticut, Rhode Island, Maryland, Massachusetts, Pennsylvania, and Wisconsin (9). More recently, however, increasing numbers of cases in these states and in Virginia, Vermont, Maine, Minnesota, and New Hampshire now account for 90% of cases

(Figure 1; [10]). Children have the highest incidence of LD among all age groups, with most cases occurring in children \leq 15 years of age (9,11).

Cases of LD are most common from late spring through late fall. The majority of cases occur from May through October, with >60% of reported cases in June and July (Figure 2; [6]). These months correspond to the peak abundance of nymph-stage ticks that most commonly transmit LD to humans (12). Another aid in diagnosing LD is related to the time that the patient spends outdoors with occupational or recreational activities, especially during these peak months of reported cases (6,13). When patients present with early manifestations of LD, a careful consideration of the season can aid in establishing a diagnosis.

Pathophysiology

Ticks are the primary vector for LD, specifically *Ixodes* scapularis in the eastern United States and *Ixodes* pacificus in the far western United States, commonly known as



1 dot placed randomly within county of residence for each confirmed case

Figure 1. Reported cases of Lyme disease in the United States in 2014 from the United States Centers for Disease Control and Prevention. Centers for Disease Control and Prevention Web site. http://www.cdc.gov/lyme/stats/maps.html Updated November 5, 2015. Accessed June 6, 2016.

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