Ministry of Health and Long-Term Care

Infectious Diseases Protocol

Appendix B: Provincial Case Definitions for Diseases of Public Health Significance

Disease: Lyme Disease

Effective: February 2019

Ontario

Lyme Disease

1.0 Provincial Reporting

Confirmed and probable cases of disease

2.0 Type of Surveillance

Case-by-case

3.0 Case Classification

3.1 Confirmed Case

- Clinician-confirmed erythema migrans (EM) greater than five cm in diameter with a history of residence in, or visit to, a Lyme disease endemic area or risk area (See Section 7.0, Comments #1, #4 and #5);

  OR

- Clinical evidence of Lyme disease (See Section 7.0, Comment #2) with laboratory confirmation by polymerase chain reaction (PCR) or culture (See Section 7.0, Comment #3);

  OR

- Clinical evidence of Lyme disease with laboratory support by serological methods (See Section 7.0, Comment #3), and a history of residence in, or visit to, an endemic area or risk area (See Section 7.0, Comments #4 and #5).

3.2 Probable Case

- Clinical evidence of Lyme disease with laboratory support by serological methods (See Section 7.0, Comment #3), with no history of residence in, or visit to an endemic area or risk area (See Section 7.0, Comments #4 and #5);

  OR

- Clinician-confirmed erythema migrans (EM) greater than five cm in diameter with no history of residence in, or visit to an endemic area or risk area (See Section 7.0, Comments #1, #4 and #5).

4.0 Laboratory Evidence

4.1 Laboratory Confirmation

Any of the following will constitute a confirmed case of Lyme disease:

- Isolation of *Borrelia burgdorferi* (*B. burgdorferi*) from an appropriate clinical specimen;
- Positive nucleic acid amplification test (NAAT) for *B. burgdorferi*; and
- Serological evidence using the two-tier enzyme-linked immuno-sorbent assay (ELISA) and western blot testing using CPHLN/CDC based interpretation criteria.

4.2 Approved/Validated Tests

- Standard culture for *B. burgdorferi*;
- Commercial *B. burgdorferi* Immunoglobulin M (IgM) and Immunoglobulin G (IgG) tests (ELISA and western blot); and
- NAAT for *B. burgdorferi*.

4.3 Indications and Limitations

- Only serum samples are acceptable for serology.
- Initial negative serological tests in patients with skin lesions suggestive of EM should have testing repeated after two to four weeks, however if patients are treated during this time, subsequent testing may be negative.
- Sera that are screened negative for antibodies using an enzyme immunoassay (EIA) should not be subjected to western blot testing.
- The possibility of false-positive western blot results (particularly only IgM western blot reactivity) should not be ignored.
- When patients are treated very early in the course of illness, antibodies may not develop.

5.0 Clinical Evidence

- A systemic, tick-borne disease with protean manifestations, including dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The best clinical marker for the disease is EM, the initial skin lesion that occurs in 70 to 80% of patients. Skin lesions may also be atypical, and not have a classic “bull’s-eye” appearance. Secondary lesions may also occur.
- For most patients, the expanding EM lesion is accompanied by other acute symptoms, particularly fatigue, fever, headache, mildly stiff neck, arthralgia, or myalgia. These symptoms are typically intermittent. The diagnosis of EM must be made by a physician. Laboratory confirmation is recommended for persons with no known exposure.
- For purposes of surveillance, late manifestations include any of the following when an alternate explanation is not found:
    - Nervous system: lymphocytic meningitis; cranial neuritis, particularly facial palsy (may be bilateral); radiculoneuropathy; or, rarely, encephalomyelitis. Headache, fatigue, paresthesia, or mildly stiff neck alone, are not criteria for neurologic involvement.
    - Musculoskeletal system: Recurrent, brief attacks (weeks or months) of objective joint swelling in one or a few joints, sometimes followed by chronic

arthritis in one or a few joints. Manifestations not considered as criteria for diagnosis include chronic progressive arthritis not preceded by brief attacks and chronic symmetrical polyarthritis. Additionally, arthralgia, myalgia, or fibromyalgia syndromes alone are not criteria for musculoskeletal involvement.

- Cardiovascular system: Acute onset of high-grade (second or third degree) atrioventricular conduction defects that resolve in days to weeks and are sometimes associated with myocarditis. Palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for cardiovascular involvement.

6.0 ICD 10 Code(s)

A69.2 Lyme disease (Erythema chronicum migrans due to *Borrelia burgdorferi*)

7.0 Comments

1. EM is a pathognomonic sign of Lyme disease. It is defined as a skin lesion that typically begins as a red macule or papule and expands over a period of days to weeks to form a round or oval expanding erythematous area. Some lesions are homogeneously erythematous, whereas others have prominent central clearing or a distinctive target-like appearance. A single primary lesion must reach greater than or equal to five cm in size across its largest diameter. On the lower extremities, the lesion may be partially purpuric. EM represents a response to the bacterium as it spreads intradermally from the site of the infecting tick bite. It appears one to two weeks (range three to 30 days) after infection and persists for up to eight weeks, by which time the bacterium leaves the skin and disseminates haematogenously. An erythematous skin lesion that presents while a tick vector is still attached or which has developed within 48 hours of detachment is most likely a tick bite hypersensitivity reaction (i.e., a non-infectious process), rather than EM. Tick bite hypersensitivity reactions are usually less than five cm in largest diameter, sometimes have an urticarial appearance, and typically begin to disappear within 24 to 48 hours. Signs of acute or chronic inflammation are not prominent. There is usually little pain, itching, swelling, scaling, exudation or crusting, erosion or ulceration, except that some inflammation associated with the tick bite itself may be present at the very centre of the lesion.
2. Clinical evidence of Lyme disease are those symptoms described in the 2006 clinical practice guidelines of the Infectious Diseases Society of America and listed on the Public Health Agency of Canada's Lyme disease webpage (https://www.canada.ca/en/public-health/services/diseases/lyme-disease/health-professionals-lyme-disease.html#a2). Other symptoms that are, or have been suggested to be associated with Lyme disease are considered too non-specific to define cases for surveillance purposes, whether or not they may be caused by *B. burgdorferi* infection.
3. PCR and serological methods on cerebrospinal fluid (CSF) are investigational only. PCR (or more appropriately NAAT) testing should be limited to CSF, joint

fluid, or tissue samples as there is limited data to support its use on blood and/or urine samples. Culturing for *B. burgdorferi* is a low-yield procedure and is not encouraged; if performed, it should be done only on biopsies from EM lesions and synovial or spinal fluid.

4. An endemic area is defined here as a census subdivision in which a reproducing population of *Ixodes scapularis* or *Ixodes pacificus* tick vectors is known to occur, which has been demonstrated by molecular methods to support transmission of *B. burgdorferi* at that site.
5. A risk area is defined here as a location where one blacklegged tick was found during three person-hours of drag sampling at a location, between May and October.

8.0 Sources

Canadian Public Health Laboratory Network. The laboratory diagnosis of Lyme borreliosis: guidelines from the Canadian Public Health Laboratory Network. Canadian Journal of Infectious Diseases and Medical Microbiology. 2007;18(2):145-8.

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Ogden N, Koffi J, Lindsay L. Lyme disease: Assessment of a screening test to identify Lyme disease risk. Canada Communicable Disease Report. 2014;40(5):83.

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2006;43(9):1089-134.

9.0 Document History

Table 1: History of Revisions

Revision Date	Document Section	Description of Revisions
March 2017	7.0 Comments	Add "...and listed on the Public Health Agency of Canada's Lyme disease webpage"
March 2017	Sources	Add "Public Health Agency of Canada. For Health Professionals: Lyme disease. [cited 5 October 2016]. Available from: http://www.healthycanadians.gc.ca/diseases-conditions-maladies-affections/disease-maladie/lyme/professionals-professionnels/index-eng.php#a2"
March 2017	Document History	Updated
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance.


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