Fever, chills, headache, stiff neck, fatigue, decreased appetite, muscle and joint aches, swollen lymph nodes (see Box 2)

Was the tick removed within the past 72 hours?

- NO
- YES

Tick bite but asymptomatic

- NO
- YES

Is or was the tick attached?

- NO
- YES

Safety remove the tick, if attached (see Box 3)

Risk of Lyme disease is low

- NO
- YES

Is it a blacklegged tick? (see Box 3)

- NO
- YES

Attached for > 24 hours?

- NO
- YES

Tick acquired in risk or endemic area with a prevalence of infected ticks > 20%? (see Box 4)

- NO
- YES

Was the tick removed within the past 72 hours?

- NO
- YES

No risk of Lyme disease

- NO
- YES

Advise patient to monitor for signs and symptoms for 30 days

Clinical case of Lyme disease

- NO
- YES

Treat for early localized Lyme disease (see Box 8)

Lyme disease serology not indicated

If symptoms persist, refer patient to appropriate specialist

Possible case of Lyme disease

- NO
- YES

Routine management of patient’s symptoms

Order Lyme disease serology (see Box 6)

Consider treating for early localized Lyme disease (see Box 8)

If symptoms persist, consider an alternative diagnosis. Consult Public Health to understand the local epidemiology. Refer patient to an appropriate specialist, as needed

Low risk of Lyme disease, but do not rule it out

- NO
- YES

Consider alternative causes of symptoms

Consider Lyme disease serology, if clinically indicated (see Box 6)

Consider other less common tick-borne diseases such as anaplasmosis, babesiosis, or Powassan Virus as an infection/co-infection for more information on these conditions, please refer to Public Health Ontario’s webpage on Vector-Borne and Zoonotic Diseases and the Infectious Diseases Society of America's 2020 Lyme disease guideline on anaplasmosis and babesiosis co-infection and the 2020 IDSA guidelines on the diagnosis and management of babesiosis.
**Box 1. Clinical Manifestations of Early Localized Lyme Disease: Erythema Migrans Rashes**

Additional images of typical and atypical rashes are available on Health Canada’s website under “Clinical Manifestations,” please see “Erythema migrans rash.”

Note: People with darker skin tones may present with a bruise-like rash.

**Box 2. Prevalence of Symptoms in Patients Presenting With Possible Early Localized Lyme Disease**

- Erythema migrans rash (typical or atypical) -70%
- Headache 42%
- Fever/chills 39%
- Myalgia 44%
- Fatigue 54%
- Stiff neck 35%
- Neurological involvement 26%

*As a disease of public health significance, Lyme disease is reportable in Ontario under the Health Protection and Promotion Act, R.S.O. 1990, c. H.7.*

**Box 3. Blacklegged Ticks at Various Stages and Safe Tick Removal**

**Box 4. Areas of Risk for Lyme Disease**

- The risk of acquiring Lyme disease varies across geographical regions. Please click to see the risks in Ontario, Canada, and the United States

- In Europe, the areas of highest risk are in Central and Eastern Europe, but infected ticks have also been found in Southern Scandinavia and up to the northern Mediterranean region.

**Box 5. Post-Exposure Prophylaxis**

The risk of developing Lyme disease following a tick bite by an infected tick is between 1% and 3%. In Ontario, the prevalence of infected ticks varies by geographic region. In many instances, adopt the “wait and see” approach and treat patients if they develop symptoms compatible with Lyme disease. Counsel patients to watch for the development of early signs and symptoms for 30 days, and advise patients that other tick-borne infections may result in signs or symptoms too.

Based on the best available evidence, post-exposure prophylaxis can be considered if these four criteria are met:  
1. The tick was attached > 24 hours
2. The tick was removed within the past 72 hours
3. The tick was acquired in an area with a prevalence of ticks infected with Borrelia burgdorferi > 20% (e.g., Rouge National Urban Park and Morningside Park in the Greater Toronto Area, Brighton, Kingston and surrounding areas, Thousand Islands, Brockville, Perth-Smiths Falls and surrounding areas, Ottawa and surrounding areas, Rondeau Provincial Park and Pinery Provincial Park in Grand Bend)

4. Doxycycline is not contraindicated.
   - Doxycycline was previously contraindicated for pregnant and lactating people; however recent evidence has demonstrated that a single dose of doxycycline is safe for this population.

**Recommended treatment for post-exposure prophylaxis:**

**Adults:** 1 dose of doxycycline 200 mg, by mouth

**Children < 18 years of age:** 1 dose of doxycycline 200 mg dose or 4 mg/kg (up to a maximum dose of 200 mg), by mouth

*Note: This is not a comprehensive list of higher-risk areas in Ontario.*

**References**


**Box 6. Laboratory Testing**

- Laboratory testing is generally not indicated for asymptomatic patients

- Serological testing may not yield positive results during early localized Lyme disease, so management should not be based on serological testing results during this phase

- Antibiotic treatment in early disease may reduce seroconversion; testing should not be used to monitor treatment outcome

- Following exposure to *Borrelia burgdorferi*, immunoglobulin M (IgM) and IgG antibodies are detected within 2–4 weeks, and IgG antibodies within 4–6 weeks

- As of April 1, 2023, Public Health Ontario uses a modified two-tiered testing (MTTT) algorithm to maximize sensitivity and specificity (see Box 7)

- For serological testing, please complete the requisition fully and submit it, along with samples, to a public health laboratory for testing

- If European Lyme disease is suspected based on the patient’s travel history, please order serology testing specific to European Lyme disease

**References**


**Box 7. Sensitivity of Serological (Modified Two-Tier Test) Testing in Patients With Lyme Disease**

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyme disease</td>
<td>58%</td>
<td>76%</td>
</tr>
<tr>
<td>Early localized disease</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Arthritis (late disseminated disease)**

*The MTTT algorithm is based on serum sample initially tested using an immunoglobulin M- and immunoglobulin G-based enzyme-linked immunosorbent assay (ELISA) using a whole cell lysate (tier 1). If results of tier 1 ELISA results are reactive/indeterminate, sample is further tested using second-tier IgM/IgG ELISA assay targeting specific V5E1 and pepC0 antigens.

*For following antibiotic treatment.

**Box 8. Recommendations for Treatment of Patients With Early Localized Lyme Disease**

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dosage for Adults</th>
<th>Dosage for Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Doxycycline</strong>*</td>
<td>100 mg twice a day for 10–21 days</td>
<td>For children &lt; 18 years of age: 4 mg/kg, orally divided into 2 doses (maximum 200 mg/day) for 10–21 days</td>
</tr>
<tr>
<td><strong>Amoxicillin</strong></td>
<td>500 mg three times a day for 14–21 days</td>
<td>For children &lt; 18 years of age: 50 mg/kg/day orally, divided into 3 equal doses per day, maximum of 500 mg per dose for 14–21 days</td>
</tr>
<tr>
<td><strong>Cefuroxime</strong></td>
<td>500 mg twice per day for 14–21 days</td>
<td>For children &gt; 8 years of age: 30 mg/kg/day divided in 2 doses (maximum 500 mg/ dose) for 14–21 days</td>
</tr>
</tbody>
</table>

*For allergy or intolerance**

- **Aldrithromycin** 500 mg/day for 7–17 days
- **Clarithromycin** 500 mg twice a day for 14–21 days
- **Relatively contraindicated in pregnant people**

**References**


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ISBN 978-1-4868-6758-5 (PDF) Updated September 2023 © King’s Printer for Ontario, 2023


For more information, please refer to the Ontario Lyme Disease Map

For more images, please go to: Centers for Disease Control and Prevention

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