Lyme Disease Toolkit

This toolkit can be used to facilitate Lyme disease case investigations. Items in the toolkit include:

- **Case Investigation Diagram** - details the steps involved in Lyme disease case investigations
- **Form A** - used to obtain clinical information about patients from healthcare providers
- **Form B** - used to obtain exposure information from patients with EM
- **Case Ascertainment Guides** - three different guides that can assist with case assignment (all have the same information but are displayed in a different layout)
- **Interpreting IgG and IgM Western Blots** - provides information about reading Lyme disease Western blots
- **Provider Quicksheet** - provides information about Lyme disease and Lyme disease surveillance to healthcare providers
Lyme disease Case Investigation Flow Chart

Positive lab report received at health department

Call healthcare provider, advise that a faxed request for case details is being sent*

Fax "Form A" to healthcare provider to collect relevant clinical data (include Provider Quicksheet)

*Request copies of any supplemental lab results

Call patient and use "Form B" to collect exposure information from patient

If EM is documented, attempt to contact patient

Follow up if no response after 3-4 days (repeat faxes if needed)

No EM

Attempt patient contact for 5-10 days*

Enter all data into WVEDSS and send case to regional review

Regional review is sent to state and state sends final notification to CDC

*If unable to contact patient, document attempts and move to next step
Dear Healthcare Provider:

The ______________ County Health Department has been notified of a positive laboratory report of Lyme disease for patient ______________ (DOB: ____/____/______). In order to comply with state and federal infectious disease reporting requirements, we are requesting the following clinical details about this patient’s Lyme disease (LD) symptoms, if present. Please respond to the following questions and return this completed sheet via fax to (304)____-____ within 72 hours of receipt.

A. Date of first symptom onset (month/day/year): ____ / ____ / ______

B. Was an erythema migrans measuring at least 5 cm in diameter documented for this patient?
   - YES
   - NO

C. Did patient exhibit any of the following symptoms of late-stage Lyme disease?
   I. Rheumatologic/musculoskeletal (mark one):
      - Migratory pain in joints, bone, or muscle
      - Brief arthritis attacks
      - Prolonged arthritis
      - Chronic arthritis
      - No rheumatologic/musculoskeletal symptoms associated with LD were observed

   II. Neurologic (mark all that apply):
      - Meningitis
      - Bell’s palsy
      - Cranial neuritis
      - Radiculoneuritis
      - Encephalopathy
      - Polyneuropathy
      - Leukoencephalitis
      - No neurologic symptoms associated with LD were observed

   III. Cardiovascular (mark one):
      - Myopericarditis
      - Pancarditis
      - Atroventricular block
      - No cardiac symptoms associated with LD were observed

D. Was this patient diagnosed with Lyme disease?
   - YES
   - NO

E. Why was the Lyme disease test ordered for this patient? Mark all that apply.
   - Patient had clinical evidence of infection
   - Patient requested Lyme testing
   - Patient had exposure to tick habitats
   - Other: __________________________

F. Was an antibiotic prescribed?
   - YES
   - NO
   If yes, indicate type of antibiotic and # of days: __________________________

Comments: __________________________

Thank you for your cooperation.
Optional Script

“Hello, this is (your name), a (nurse/sanitarian) from (county name) County Health Department. I am following up on a recent report our department received about (case name)’s Lyme disease illness. In order for us to better understand the risk for Lyme disease in our county, I would like to ask you a few questions about the time leading up to your illness.”

A. One what date were symptoms first noticed? (month/day/year): _____/_____/

B. Did you travel outside of your home county within 30 days of the start of your symptoms?  
☐ YES  ☐ NO  

a. If yes, report travel information:

<table>
<thead>
<tr>
<th>Destination (city, state)</th>
<th>Date of departure (month/day/year)</th>
<th>Date of return (month/day/year)</th>
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C. Did you recall finding any ticks on your body during the 30 days prior to the start of your symptoms?  
☐ YES  ☐ NO  

b. If yes, enter tick bite details:

<table>
<thead>
<tr>
<th>Patient’s location when tick found (city, state)</th>
<th>Was tick attached? (yes/no/unknown)</th>
<th>Date tick found (month/day/year)</th>
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Thank the patient, and end the call.

**CONFIRMED** SCENARIOS

- One or more “late manifestations” of Lyme disease: Musculoskeletal: Recurrent, brief attack of joint swelling, followed by chronic arthritis
- Nervous system: Meningitis, cranial neuritis, facial palsy, radiculoneuritis
- Cardiovascular: 2+ or 3+ anteroseptal or anterolateral QRS conduction defects that evolve into Q waves

**CONFIRMED**

- Physician-diagnosed EM at least 5 cm in diameter
  - Positive or equivocal EIA or IFA
    - AND
    - Positive IgM WB from serum sample taken ≤30 days from onset date
      - OR
      - Positive IgG WB from serum sample
        - OR
        - Positive culture for B. burgdorferi
          - OR
          - CSF antibody positive for B. burgdorferi by EIA/IFA when titer is higher than in serum

**PROBABLE** SCENARIO

- “Physician-diagnosed” Lyme disease lacking clinical criteria of a confirmed case

**PROBABLE**

- Positive or equivocal EIA or IFA
  - AND
  - Positive IgM WB from serum sample taken ≤30 days from onset date
    - OR
    - Positive IgG WB from serum sample
      - OR
      - Positive culture for B. burgdorferi
        - OR
        - CSF antibody positive for B. burgdorferi by EIA/IFA when titer is higher than in serum

**CONFIRMED**

- No known exposure

**SUSPECTED** SCENARIO

- No lab evidence

**SUSPECTED**

- No clinical data

**SUSPECTED**

- Positive or equivocal EIA or IFA
  - AND
  - Positive IgM WB from serum sample taken ≤30 days from onset date
    - OR
    - Positive IgG WB from serum sample
      - OR
      - Positive culture for B. burgdorferi
        - OR
        - CSF antibody positive for B. burgdorferi by EIA/IFA when titer is higher than in serum

**SUSPECTED**

- Epi

**LEGEND**

- Clinical
- Laboratory

**IMPORTANT**

Laboratory tests in this guide are the only ones appropriate for case ascertainment. Other diagnostic tests (e.g. PCR) should not be used to determine case status. CDC recommends a two-tier approach for Lyme disease testing using a serum sample (EIA/IFA with reflex to IgG and IgM Western blots). CSF and synovial fluid are not considered appropriate specimens for two-tier testing.
**Lyme Disease Case Ascertainment Guide C (2013 Version)**

- **No laboratory evidence of infection** OR **Insufficient/inappropriate laboratory testing conducted**
  - **Physician-diagnosed erythema migrans (EM) at least 5 cm with known exposure**
  - **Physician-diagnosed EM at least 5 cm with no known exposure**
  - **One of more late manifestations of disease**
    - **CONFIRMED CASE**
    - **Physician-diagnosed** Lyme disease lacking clinical criteria (EM and/or late manifestations) of a confirmed case
      - **PROBABLE CASE**
    - **No clinical information available**
      - **SUSPECTED CASE**
  - **Appropriate laboratory testing**
    - Positive or equivocal EIA or IFA AND positive IgM WB from serum sample with a collected less than or equal to 30 days from symptom onset
    - Positive IgG Western blot from serum sample collected at any point during illness
    - Positive culture for *Borrelia burgdorferi*
    - Positive CSF antibody for *B. burgdorferi* by EIA/IFA when titer is higher than in serum
      - **CONFIRMED CASE**
    - **NOT A CASE**

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1. Laboratory tests in this guide are the only ones appropriate for case ascertainment. Other diagnostic tests (e.g., PCR) should not be used to determine case status. CDC recommends a two-tier approach for Lyme disease testing using serum (EIA/IFA with reflex to Western blot). CSF and synovial fluid are not considered appropriate specimens for two-tier testing.
2. Exposure is defined as having been in a wooded, brushy, or grassy area less than 30 days before onset of EM in a county where Lyme disease is endemic (having greater than 2 confirmed cases that were acquired in the county or in which risk vectors infected with *B. burgdorferi* have been found). As of 2013, Berkeley, Hampshire, Jefferson, and Morgan Counties are considered endemic for Lyme disease.
3. Late manifestations include musculoskeletal (recurrent, brief attacks of joint swelling followed by chronic arthritis), nervous system (meningitis, cranial neuritis, facial palsy, and radiculoneuritis), and cardiovascular (2nd-3rd intraventricular conduction defects that resolve in days to weeks) signs of disease.
Interpreting IgG and IgM Western Blots

**IgM Western Blot**

An IgM immunoblot should be considered positive if **two of the following three bands** are present:
- 24 kDa (OspC) band
- 39 kDa (BmpA) band
- 41 kDa (Fla) band

**IgG Western Blot**

An IgG immunoblot should be considered positive if **five of the following ten bands** are present:
- 18 kDa band
- 21 kDa (OspC) band
- 28 kDa band
- 30 kDa band
- 39 kDa (BmpA) band
- 41 kDa (Fla) band
- 58 kDa band
- 66 kDa band
- 93 kDa band

Visit the CDC’s Lyme disease testing page for more information:
http://www.cdc.gov/lyme/diagnostictesting/index.html

Sample Western blot
IMPORTANT INFORMATION ABOUT SELECTING LABORATORY TESTS

1. CDC recommends a two-tier approach for testing serological specimens: IFA/EIA antibody screen, followed by IgM and IgG western blot if IFA/EIA is positive or equivocal.

2. Other CDC recommended diagnostic assays for Lyme disease include:
   a. A positive culture for *Borrelia burgdorferi*
   b. Single-tier IgG western blot
   c. CSF antibody positive for *B. burgdorferi* by EIA or IFA, when the titer is higher than it was in serum

*THE USE OF SINGLE-TIER IG M WESTERN BLOT TESTING IS NOT RECOMMENDED*

RESOURCES FOR PATIENTS

- CDC website has several brochures and info sheets for patients: http://www.cdc.gov/lyme/

RESOURCES FOR HEALTHCARE PROVIDERS

- CDC has a “Resources for Clinicians” page available at: http://www.cdc.gov/lyme/healthcare/clinicians.html
- Information about two-tier testing for Lyme disease is available at: http://www.cdc.gov/lyme/diagnosistesting/LabTest/TwoStep/index.html
- The Infectious Disease Society of America (IDSA) has developed a FREE online CME case study about the diagnosis and management of Lyme disease available at: http://lymecourse.idsociety.org/
- The West Virginia Department of Health and Resources provides information about the state’s Lyme disease surveillance system as well as links to useful resources available at: http://www.dhhr.wv.gov/oeps/disease/Zoonosis/Tick/Pages/Lyme.aspx