Legionnaires’ Disease Laboratory Response Plan: Are you ready?

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LDL Response Plan on the world wide web!

https://www.cdc.gov/legionella/labs/lab-toolkit.html
Legionnaires’ disease (LD) Response

- Complex
- Environmental samples
- Highly visible
Potential for LD outbreaks across US

- 4.5-fold ↑ LD incidence

- *Legionella* prevalent in US
LD laboratory responses can be complicated

- Limited clinical specimens
  - UAT
- *Legionella* is fastidious
  - Limited growth media availability
- Environmental samples
  - Collection
  - Processing/Re-reprocessing
    - So many plates!
What is a LD Laboratory (LDL) Response Plan?

- Identify, document, strengthen
  - Current capacity
  - Response Team
  - In-house Testing Plan
  - Referral Testing Plan
Which labs can benefit from an LDL Response Plan?

- **Some** LD testing capacity
  - LD Response Team
  - In-house Testing Plan
  - Referral Laboratory Plan

- **No** LD testing capacity
  - LD Response Team
  - Referral Laboratory Plan

- **Full** LD testing capacity
  - LD Response Team
  - In-house Testing Plan
## LDL Response Plan Checklist

- **Current testing capacity**
  - *Legionella* isolation
  - Isolate characterization
  - Molecular typing

<table>
<thead>
<tr>
<th>Laboratory Response Step</th>
<th>In-house</th>
<th>Referral</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legionella Isolation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Specimens</td>
<td>✅</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Samples</td>
<td>✅</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Isolate Characterization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>✅</td>
<td>✅</td>
<td><em>PCR can detect L. pneumophila, other Legionella spp. would need to be referred</em></td>
</tr>
<tr>
<td><em>L. pneumophila</em> Serogroup</td>
<td>✅</td>
<td>✅</td>
<td><em>Lp1 only, other serogroups would need to be referred</em></td>
</tr>
<tr>
<td><strong>Molecular Typing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Legionella Isolate Comparison</em></td>
<td></td>
<td>✅</td>
<td></td>
</tr>
</tbody>
</table>
LDL Response Team

Public Health Department

- Laboratory
- Epidemiology
- Environmental Health
- Communications

Contact Information

Response Considerations

Signatures
LDL In-house Testing Plan

- Testing Overview
- Specimens/Samples
- Considerations:
  - Documentation
  - Workforce capacity
  - *Legionella* culture
  - Post-response activities

In-house Overview

Specimen Requirements

In-house Considerations
LDL Referral Laboratory Plan

- Contact information
- Overview
  - Materials to be shipped
  - Tests requested
  - Cost
  - Turn-around-time
- Specimen/Samples
Example LDL Response Scenario
Example Legionnaires’ Disease Laboratory Response Scenario

After noting a significant increase in reports of Legionnaires’ disease cases confirmed by UNTI, epidemiologists from the local health department launched an initial investigation. Patient interviews revealed two common links among the majority of cases: Patients had visited Hotel A (HCF-Q) and Hotel Z, where HCF-Q patients often stay.

An epidemiologist from the Legionnaires’ disease Response Team returned to the LDLRP and notified PH-L of the scope of the outbreak so far and that a full investigation was about to begin. The epidemiology and laboratory Response Team members discussed the clinical specimens and environmental samples expected to be sent to the laboratory for Legionella testing. While clinical laboratories arranged the collection and transport of respiratory specimens, members of the Legionnaires’ disease Response Team coordinated the collection of water samples, and the PH-L laboratory referred to the LDLRP to prepare for the response.

On the first day of the laboratory response (see Example Response Workflows and Example Response Calendar), PH-L received, processed, and plated one clinical specimen specimen.

At 4°C, PH-L has a standard operating procedure for monitoring culture growth from clinical specimens for 14 days. On day 5, a second clinical specimen (specimen B) arrived and was processed and plated for culture (8 days after culturing). On day 6, suspect Legionella colonies were detected and screened for cytochrome oxidase by streaking on both B-YE and blood agar. A few days later, selected colonies from clinical specimen B were screened for cytochrome oxidase.

At 24°C, as Legionella was identified in samples from HCF-Q and Hotel Z, PH-L notified the laboratory and epidemiological health members of the Legionnaires’ disease Response Team. The state PHL performed whole genome analysis and compared the clinical specimens and water sample isolates. Results of these analyses indicated that the Legionella was isolated from both clinical specimens and water samples.

Upon completion of Legionnaires’ disease response activities, PH-L received Legionella isolates and remaining clinical specimens in long-term storage. Remaining environmental samples were discarded.

Documents and reports related to this response were compiled and archived.
Example LDL Response Workflow
Appendices: Example Workflow Documents
Appendix A: Customizable LDLRP

- One size editable to most!
  - Word document
  - Add/delete/duplicate
Appendix B: Environmental Sample Culture Worksheet

- Sample data
  - Processing/Reprocessing

- 4 samples
  - 2 culture checks

- Track colony picks
Appendix C: Clinical Specimen Culture Worksheet

- Specimen data
- Daily culture checks
  - 3 dilutions
- Track colony picks
Appendix D: Colony Testing Worksheet

- Track colony tests
- 12 colonies per page

### Legionella Colony Testing Worksheet

<table>
<thead>
<tr>
<th>Colony ID #</th>
<th>Legionella species</th>
<th>L. pneumophila serogroup 1</th>
<th>L. pneumophila serogroup 2-14</th>
<th>Result Date</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>XYZ-000-1</td>
<td>L spp</td>
<td>Lp</td>
<td>Lp</td>
<td>11/12/20</td>
<td>ABC</td>
</tr>
</tbody>
</table>

**Investigation:** PHLX-2020-1

**Results Key:**

- L spp: Legionella species
- Lp: L. pneumophila serogroup 1
- Lp2-14: L. pneumophila serogroup 2-14

**Worksheet Instructions:** Record colony numbers, results, dates, and laboratorian initials in the spaces provided.

*This text is for example purposes only.*

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Appendix E: Specimen Shipping Guidelines

- Share with outside labs:
  - Minimum requirements
  - Preparation
  - Storage before shipping
  - Shipping conditions
  - Testing available
Acknowledgements

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  - Jeff Mercante, PhD

- LDLRP Beta-testers
  - Michigan PHL
  - New Mexico PHL
  - New York City PHL
  - South Dakota PHL
  - Washington PHL

- Laboratory Leadership Service
  - Xin Liu, PhD
Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.