Legionellosis

Legionellosis is a respiratory infection which can result in severe pneumonia and death. Most cases are sporadic but it is an important public health issue because outbreaks can occur in hotels, communities, healthcare facilities, and the workplace.

Legionnaires’ disease was first recognized in 1976 when an outbreak affected more than 200 people and caused more than 30 deaths, mainly among attendees of a Legionnaires’ convention at a Philadelphia hotel.

Public Health Discussion Points

Here are three discussion points related to legionellosis. The answers are contained in the text, or you may refer to the answers at the end of the article.

1. Who should be tested for legionellosis?
2. What testing is recommended to confirm the diagnosis of legionellosis?
3. Why is reporting legionellosis important?

Legionellosis: The Disease

Legionellosis is caused by the bacteria Legionella, with the species L. pneumophila accounting for 80-90% of cases. There are two clinically distinct syndromes: Pontiac fever, a self-limited flu-like illness without pneumonia and Legionnaires’ disease, a potentially fatal pneumonia with initial symptoms of fever, cough, myalgias, malaise, and sometimes diarrhea. Of people who develop Legionnaires’ disease 5-40% will die.
Only about one out of 20 people who get infected develop pneumonia. Health conditions that increase the risk of pneumonia include:

- Age (>50 years old)
- Renal failure
- Diabetes
- Systemic malignancy
- COPD and/or smoking
- Immune system disorders

**Exposure to Legionella**

Exposure is almost always through inhaling aerosolized water contaminated with *Legionella* bacteria. Although the bacteria are commonly found in natural or artificial freshwater environments, there are rarely sufficient quantities of *Legionella* to cause infection. Factors which allow the bacteria to amplify to higher concentrations that can cause disease include warm temperatures (77-108°F), stagnation, sediments, biofilms, and the presence of amoebae.

Outbreaks are commonly associated with potable water systems, whirlpool spas, and cooling towers because these sources promote both amplification and aerosolization of contaminated water. Hotels, hospitals, long-term care facilities, and cruise ships have also been sites of outbreaks. Epidemiologic risk factors for legionellosis include recent travel with an overnight stay outside of the home, exposure to whirlpool spas, and recent repairs or maintenance work on domestic plumbing.
Diagnosing and Treating Legionnaires’ Disease

Clinical suspicion and proper diagnostic testing are necessary to identify and treat patients appropriately. Subsequent investigation of cases may lead to identification of environmental sources of Legionella where other susceptible persons are at risk of exposure. Healthcare providers should suspect Legionella and order Legionella-specific testing on patients with:

- Community-acquired pneumonia resulting in hospitalization with no other etiologic agent strongly suspected (‘enigmatic pneumonia’)
- Enigmatic pneumonia requiring intensive care
- Pneumonia in an immunocompromised host
- Pneumonia in the setting of a legionellosis outbreak
- Pneumonia not responding to treatment with beta-lactam antibiotics (including cephalosporins)
- Pneumonia within two weeks of travel away from home
- Suspected healthcare-acquired pneumonia with unknown etiology

Both urine antigen assay AND culture of respiratory secretions on special media are the preferred diagnostic tests for Legionnaires’ disease (Table). Urine antigen tests are rapid immunoassays with good sensitivity for detecting L. pneumophila serogroup 1 antigen but very poor sensitivity for detecting other serogroups and other Legionella species. Legionella can be isolated from lower respiratory tract secretions. Although less timely than urine antigen tests, cultures detect all Legionella species and allow comparison between patient and environmental specimens during outbreak investigations. Paired serology or direct fluorescent antibody stain alone are not recommended due to poor timeliness and poor sensitivity, respectively.

### Table: Advantages and Disadvantages of Legionella-specific Diagnostic Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>Culture</td>
<td>~ 80% sensitive</td>
<td>Technically difficult</td>
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<tr>
<td></td>
<td>Clinical &amp; environmental isolates can be compared</td>
<td>Slow (&gt;5 days to grow)</td>
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<tr>
<td></td>
<td>Detects all species &amp; serogroups</td>
<td>Sensitivity dependent on technical skill</td>
</tr>
<tr>
<td>Urine antigen</td>
<td>60-80% sensitive, &gt;99% specific (L. pneumophila serogroup 1 only)</td>
<td>Detects only L. pneumophila serogroup 1 antigen</td>
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<tr>
<td></td>
<td>Rapid (same day)</td>
<td>Limited utility for comparing clinical &amp; environmental isolates</td>
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<tr>
<td>Serology</td>
<td>70-80% sensitive, &gt;90% specific</td>
<td>Requires paired sera over 2-3 weeks</td>
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<td></td>
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<td>5-10% of people have titer &gt;1:256</td>
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<tr>
<td>DFA</td>
<td>95% specific</td>
<td>25-75% sensitive</td>
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<tr>
<td></td>
<td>Can be done on pathology samples</td>
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</table>

Patients with suspected or confirmed Legionnaires’ disease should receive an antibiotic regimen that includes a macrolide (e.g., azithromycin) or a fluoroquinolone (e.g., ciprofloxacin or levofloxacin). The Infectious Disease Society of America and the American Thoracic Society
published guidelines on the management of community-acquired and hospital-acquired pneumonias in adults including those due to *Legionella*.\(^1,2\) *Legionella*-specific information is also available from the Centers for Disease Control and Prevention (CDC) at [http://www.cdc.gov/legionella/top10.htm](http://www.cdc.gov/legionella/top10.htm).

**Reporting Legionnaires’ Disease**

Each year an estimated 8,000-18,000 people are hospitalized with legionellosis in the United State (3) but only about 3,000 cases are reported to CDC. The difference is likely due to under-utilization of diagnostic testing and under-reporting of cases.

Legionellosis is nationally notifiable. In Washington, healthcare providers, healthcare facilities, and laboratories must report patients with legionellosis within 24 hours of diagnosis to the local health jurisdiction where the patient resides. (Contact information for local health jurisdictions in Washington is available at [http://www.doh.wa.gov/LHJMap/LHJMap.htm](http://www.doh.wa.gov/LHJMap/LHJMap.htm).) In addition, laboratories must submit *Legionella* isolates to the Washington State Public Health Laboratories within two business days. By rapidly identifying cluster of cases, public health agencies can recognize and stop outbreaks of legionellosis.

**Answer to Public Health Discussion Points**

1. Healthcare providers should order *Legionella*-specific testing on patients hospitalized during the two weeks before onset of pneumonia and on patients with community-acquired pneumonia who traveled with two weeks of onset, have severe illness or are immuno-compromised.
2. Testing for Legionnaires’ disease should include BOTH *Legionella* urine antigen AND *Legionella*-specific culture of respiratory specimens.
3. Identifying multiple cases with a common exposure (“cluster”) can lead to identifying a contaminated source that is exposing many people. Even a small number of reported cases may reflect widespread exposure and risk, particularly among susceptible persons. Reporting and investigation of single cases of legionellosis may allow local, state, and federal public health authorities to identify a common exposure among multiple patients that may not be apparent to individual healthcare practitioners.

**Resources**