Legionellosis Guidance for Clinicians and Laboratories

In the past three years, over 100 cases of Legionellosis have been reported from health-care providers in Genesee County, Michigan. Public health investigations are ongoing to determine possible common sources of exposure. The Michigan Department of Health and Human Services (MDHHS) and Genesee County Health Department (GCHD) are asking that the clinical community assist in case findings through accurate identification, testing and reporting of all suspected cases of Legionellosis.

Epidemiologic Risk Factors for Legionellosis

- Recent inpatient or outpatient healthcare exposure (up to 10 days prior to symptom onset)
- Chronic lung disease
- Current or former smoker
- Congestive Heart Failure
- Immune system suppression (e.g., organ transplant recipients, immunosuppressive medication usage)
- Chronic renal or liver disease including end-stage organ disease
- Solid organ or hematologic malignancy
- Diabetes
- Recent travel with an overnight stay away from home (up to 10 days prior to symptom onset)
- Exposure to hot tubs (e.g., whirlpool spas) including either direct use, walking or sitting near a spa
- Recent repairs or maintenance work on domestic (i.e., household) plumbing
- Age ≥ 50 years

Diagnosing Legionellosis

Characteristic	Legionnaires' Disease	Pontiac Fever
Clinical features	Pneumonia (fever, cough, chills, dyspnea), neurologic abnormalities, myalgia or arthralgia, diarrhea, chest pain, headache (e.g., obtundation, seizures and focal neurological findings) and nausea/vomiting may also be present	Flu-like illness (fever, chills, malaise) without pneumonia
Radiographic	Yes	No
Incubation period	2 to 10 days after exposure	24 to 72 hours after exposure
Etiologic agent	*Legionella* species	*Legionella* species
Attack rate	< 5%	> 90%
Isolation of organism	Possible	Never
Outcome	Hospitalization common Case-fatality rate: 5- 30%	Hospitalization uncommon Case-fatality rate: 0%

Source: http://www.cdc.gov/legionella/clinicians.html

Who to Test for Legionnaires' Disease

Clinicians should use the following guidance to determine which patients to test for Legionnaires' disease. Additionally, infection control practitioners can use these guidelines to determine which respiratory specimens may be eligible for further testing.

- Any patients with suspected healthcare-associated pneumonia (including patients who are diagnosed with pneumonia during their hospital stay)
- Patients with severe pneumonia, in particular those requiring intensive care
- Patients with immune suppressing/compromising conditions
- Patients who have failed outpatient antibiotic therapy for pneumonia
- Patients with a history of travel within two weeks of the onset of illness

NOTE: Review of clinical presentations of Genesee County residents diagnosed with Legionnaires' disease during 2014-2016 demonstrates that respiratory symptoms (e.g., shortness of breath, cough) may be subtle or even absent initially and that a subset of patients may present with mental status changes and gastrointestinal symptoms (e.g., diarrhea, vomiting) in addition to or prior to the onset of pneumonia. While diagnosis of suspected pneumonia is still a necessary threshold for Legionnaires' disease testing, it is also important for healthcare providers to maintain a high index of suspicion for Legionnaires' disease, particularly in patients with multiple risk factors.

The majority of patients diagnosed during the 2014-2016 period experienced chronic lung disease, congestive heart failure and/or were current or former smokers.

Patients have resided across Genesee County.

Testing for Legionnaires' Disease

Isolation of Legionella from respiratory secretions, lung tissue, or pleural fluid is still an important method for diagnosis, despite the convenience and specificity of urinary antigen testing. Investigations of outbreaks of Legionnaires' disease rely on detection of *Legionella* bacteria in both clinical and environmental samples. Clinical and environmental isolates can be compared using monoclonal antibody and nucleic acid-based typing tests. Because *Legionella* species are commonly found in the environment (including residential water systems), bacterial isolates from case-patients are necessary to trace back to possible sources of exposure and to interpret the findings of an environmental investigation in order to prevent disease from that source. Further, because Legionnaires' disease may require targeted antimicrobial therapy beyond the usual community-acquired or hospital-acquired pneumonias, swift diagnosis is important.

- The *Legionella* urinary antigen test **AND** culture of lower respiratory tract secretions on selective media are the recommended diagnostic tests for Legionnaires' disease (Please note that the *Legionella* urinary antigen test detects serotype 1 of *Legionella pneumophila*; other *L. pneumophila* serotypes and other *Legionella* species may not be detected by the urinary antigen test).

- **If a provider obtains a *Legionella* urinary antigen test on a patient with suspected Legionellosis, a lower respiratory tract specimen should be collected for *Legionella* culture at the same time, preferably before the administration of antibiotics.**

- A tracheal aspirate or bronchoalveolar lavage may be collected in patients who are intubated or undergoing bronchoscopy.
- Sputum sample collection should be attempted in patients who are not intubated or not undergoing bronchoscopy.
- Oropharyngeal or nasopharyngeal swabs are **not** acceptable clinical specimens for *Legionella* culturing.

- Culture for *Legionella* should specifically be requested so that specimens are plated on the correct growth media. Any clinical specimen remaining from the respiratory culture **should be immediately frozen** and stored by the hospital laboratory. If hospital laboratory capacity is limited, then sputum samples can be transported and stored at the MDHHS Bureau of Laboratories (BOL) **free-of-charge**.

Note: For new onset community-acquired pneumonia or health-care associated pneumonia, testing by a *Legionella* urinary antigen test and respiratory secretion culture is recommended within 24 hours of patient presentation to a healthcare provider. This diagnostic approach is recommended to facilitate early identification of patients with Legionellosis and help guide early appropriate treatment which can reduce mortality. This activity will also help identify increases of illness in Flint and Genesee County as well as institute targeted Legionellosis prevention measures.

Respiratory samples from patients whose urinary antigen test is positive should be sent with specific request to have the specimen cultured for *Legionella* at the MDHHS Bureau of Laboratories (BOL). Any hospital laboratory experiencing concerns can communicate those concerns to GCHD or MDHHS and we will provide assistance.

Any positive *Legionella* culture isolate identified in hospital laboratories should be preserved and shipped to the BOL for confirmatory testing.

Clinical Isolates or Specimen Shipping

The MDHHS Bureau of Laboratories will test clinical specimens or respiratory specimens submitted to the BOL for *Legionella* bacteria. **Please note: There is no fee for specimen shipping or testing**. Please avoid repeated freezing and thawing of isolates/specimens. Contact the MDHHS BOL with any questions about isolate/specimen submission or shipment at: (517) 335-8067.

Treatment

Adults

Recommended treatment for Legionellosis in most patients includes either a fluoroquinolone (e.g., levofloxacin, 750 mg once daily or moxifloxacin, 400 mg once daily) or a macrolide (e.g., azithromycin, one gram on day one, followed by 500 mg once daily) for a total treatment duration of 10 to 14 days. Because macrolides may interfere with drugs metabolized by cytochrome P450 (CYP) 3A4 isoenzyme (e.g., cyclosporine), the quinolones mentioned above are suitable alternatives to treat Legionnaires' disease in patients taking cyclosporine or other CYP3A4 substrates.

Children

Azithromycin is the drug of choice for children with suspected or confirmed Legionellosis. The initial course should be intravenously administered. After a good clinical response is observed, azithromycin can be switched to the oral route. The recommended duration of therapy is 5 to 10 days for azithromycin and 14 to 21 days for other drugs. Longer courses of therapy are recommended for patients who are immunocompromised or who have severe disease (American Academy of Pediatrics Red Book 2015, 30th Edition).

Reporting

By law, Legionellosis is a reportable disease in Michigan. Health care professionals should report both Legionnaires' disease and Pontiac Fever cases via the Michigan Disease Surveillance System (MDSS) or directly to the Genesee County Health Department. Physicians are requested to collect and record illness onset dates as part of the patient record. An accurate illness onset date is extremely important to determine the patient's potential environmental exposures and is vital to the investigation of an outbreak. In patients with chronic respiratory conditions, the first appearance of fever may be a useful indicator of Legionellosis onset date.

Legionellosis Prevention Measures

- Smoking increases the risk of Legionnaires' disease. This is an opportunity to promote smoking cessation.
- The mode of transmission includes inhalation of vapor or aspiration.
- Be sure to ask about travel history including cruise ship related travel.
- This is also an opportunity to promote use of pneumococcal and flu vaccines.
- Recommend use of bottled water for drinking/cooking/brushing teeth for vulnerable populations: immunocompromised/suppressed, diabetics, cancer, leukemia, lymphoma, COPD, CHF and the frail/elderly/infants and those with long-term corticosteroid use, and including those with swallowing difficulties.
- Also, recommend tub baths for these vulnerable populations unless there is a risk for falls.
- While public health experts believe the risk of getting Legionnaires' disease from a home water system is much smaller than the risk from large water systems, home owners may be able to reduce the risk further by maintaining their water systems.
- Showers: Because they remain damp, shower heads could hold *Legionella* bacteria. Removing the shower head, manually cleaning it to remove scale and sediment, and soaking it in a mixture of 1 tablespoon of household bleach to 1 gallon of water for about 2 hours will disinfect the shower head.
- Humidifiers: Some homes have whole house humidifiers. You should clean and disinfect humidifiers regularly according to manufacturer's directions. Always unplug the humidifier first. Clean the inside

of the humidifier per the manufacturer's instructions, using a mixture such as 1 tablespoon of household bleach to 1 gallon of water, and dry. Thoroughly clean the outside of the humidifier before and after storage.

- CPAP machines and nebulizers should also be cleaned per manufacturer's recommendations. Sterile or distilled water should be used. If the manufacturer's instructions cannot be located, the healthcare equipment supplier can provide them.

- Water Heaters: In some cases, *Legionella* bacteria have been found inside residential water heaters. *Legionella* bacteria have more often been found in electric water heaters than in gas water heaters. Performing regular maintenance of home water heaters per manufacturer's instructions is recommended to help reduce the risk of *Legionella* bacteria growing. Most manufacturers recommend that water heaters be flushed on an annual basis. If you cannot locate the manufacturer's instructions, seek the advice of a licensed plumber.

- Water scientists, public health officials, and healthcare experts are currently discussing the risks and benefits of increasing the recommended water heater temperature from 120°F to 130°F which may reduce the risk of *Legionella* bacteria growing. However, because of the **risk of scalding,** increasing the water heater temperature from 120°F to 130°F is not currently being recommended. Updated guidelines regarding water heater management for risk prevention will be provided should recommendations change.

For additional information, please contact:
Genesee County Health Department: (810) 257-1017 or (810) 257-3815 or

MDHHS Communicable Disease Division: (517) 335-8165.