Legionella Disease: A Growing Challenge in Long-Term Care

Dawn Murr-Davidson, RN, BSN
Executive Director of Clinical Education and Quality Initiatives,
Guardian Elder Care
Previously--Director of Quality Initiatives and Clinical Affairs, PHCA
Objectives

• Provide an overview of Legionella Disease and the reasons for the increased number of cases in long-term care.
• Discuss how health care providers can assess the risk of Legionella Disease for their buildings and steps to implement to decrease the risks associated with Legionella Disease.
• Outline recommendations and requirements from the Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid on Legionella in Long-Term Care.
LD on the Rise

Approximately 9% of the reported cases result in fatality.

1 in 4 of those who acquire Legionnaire’s Disease in a health care facility dies.

LD in Long-Term Care

- According to CMS (2017), recent review of LD statistics revealed that 19% of outbreaks were associated with long-term care facilities from 2000-2014.

- Outbreaks have also been documented in Senior Living Communities.
During the months of May and June 2017, West Virginia experienced more cases than expected of Legionnaire's Disease (*Legionella pneumonia*).
Impact to Providers

- Media
- Legal
- Quality of Care
- Quality of Life
- Regulatory
- Financial
Headlines Across the Health Care Continuum
Legionella Outbreak in Pittsburgh Hospital--2016

- “The water system at Pittsburgh's Allegheny General Hospital is contaminated with Legionella, the bacteria that can cause the deadly Legionnaires' disease, officials said…”
- “No illnesses have been reported”
- National News---USA Today

Scenario: Confirmed Presence of Legionella, No harm
Florida Assisted Living Scenario—June 2017

• “Duval County Department of Health confirmed a case of Legionnaires’ disease at a local assisted-living facility in Jacksonville Wednesday afternoon, but cautioned the situation is not an outbreak.”

• “Watercrest Senior Living off San Jose Boulevard is reacting to the situation as if the case of Legionnaires’ disease originated at the facility, said Susie Wiles, a spokeswoman for the company.”


• Scenario: Confirmed case, but origin may occur outside the health care community
Nursing Home

• Preliminary testing at a South Strabane Township long-term care facility came back negative for Legionnaires’ disease after a former resident tested positive for the rare respiratory infection. –June 20, 2017

• April Hutcheson, a Health Department spokeswoman, said single cases of Legionnaires’ can’t be confirmed by the agency because of Health Insurance Portability and Accountability Act privacy laws.

A former resident of the long-term health care facility in South Strabane Township in Washington, Pennsylvania has been diagnosed with Legionnaires’ disease. It is reported that the former resident was “in and out of a number of facilities,” and preliminary testing of the facility at 90 Humbert Lane was negative for Legionella bacteria.

As a precaution, the residents, staff, and visitors to the facility are being provided bottled water and bagged ice, and shower use is restricted. The final testing results are expected to be in by the end of the week.

If you believe you or someone you know has been diagnosed with this disease, Contact us to see what we can do to help.

Jules Zacher is an attorney in Philadelphia who has tried Legionnaires’ disease cases across the U.S. Please visit LegionnaireLawyer.com again for updates.


Still on website as of August 20, 2017
AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE.

~Benjamin Franklin
Prevention of the First Case is Key to Success

- Understand the risk this includes being aware of external factors
- Establish a Water Management Program
- Educate Staff
- Monitor and Evaluate Water Management Program

4 in 5 cases could be prevented with an effective Water Management Program
What is Legionella?

- Legionella is a bacteria that can cause a serious type of pneumonia known as Legionnaire's Disease (LD).
  - Named in 1976 following a serious outbreak of pulmonary infection during a convention of the American Legion in Philadelphia, when 29 out of 182 affected individuals died.
  - The causative organism was *Legionella pneumophila*, a bacterium which is only found in aquatic systems where it exists symbiotically with some amoebae; the term Legionellosis is also sometimes used.
  - Pontiac fever is an acute, nonfatal respiratory disease caused by various species of Gram-negative bacteria in the genus Legionella. It causes a mild upper respiratory infection that resembles acute influenza and was named after an outbreak caused by the legionella organizations, but did not affect the lungs in Pontiac, Michigan in 1968.
High Risk Resident Populations

- Advanced age
- Impaired immune system
- Recent surgery
- End-stage chronic kidney disease.
- Chronic obstructive pulmonary disease (COPD).
- Malignancy (particularly lung cancer and hematological malignancy).
- Smokers
- AIDS
- Alcohol abuse

(*This is not an exhaustive list)
Signs and Symptoms

• Signs and symptoms may present like common illnesses
  o Cough
  o Muscle aches
  o Fever
  o Shortness of breath
  o Headache

• Differential diagnosis
  o Other causes of pneumonia especially mycoplasma or viral.
  o Left ventricular failure.
  o Severe acute respiratory syndrome (SARS)

Even with a high degree of watchfulness it is thought that up to 90% of cases are missed.
# Useful investigations to diagnose atypical pneumonias

<table>
<thead>
<tr>
<th>Cause of pneumonia:</th>
<th><em>Mycoplasma pneumoniae</em></th>
<th><em>Legionella pneumophila</em></th>
<th><em>Chlamydophila pneumoniae</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood tests</strong></td>
<td>There may be raised WCC or (rarely) evidence of haemolytic anaemia. ESR may be elevated. Serology titres and complement fixation tests/ELISA can help to confirm the diagnosis.</td>
<td>FBC may show left shift. Severe cases may have DIC evident on FBC/INR. Hyponatraemia may occur due to syndrome of inappropriate ADH secretion. Urea/creatinine can be raised if complicated by acute kidney failure or dehydration. LFTs often nonspecifically deranged. CK may be elevated in rhabdomyolysis. Serological tests on blood or urine may be used to confirm diagnosis.</td>
<td>Usually nonspecific and unhelpful. Serology titres or polymerase chain reaction tests may be used to confirm the diagnosis.</td>
</tr>
<tr>
<td><strong>CXR</strong></td>
<td>Usually single lower-lobe bronchopneumonia pattern with lobar consolidation rare. Other possible patterns include atelectasis, nodular infiltration akin to tuberculosis/sarcoidosis, hilar adenopathy and (rarely) pleural effusion.</td>
<td>50% have pleural effusion. Patchy alveolar infiltrates may be seen. CXR can take up to four months to return to normal and may initially progress despite therapy.</td>
<td>Usually lower-lobe single subsegmental infiltrate. Pleural effusion found in up to a quarter of cases. Can progress to acute respiratory distress syndrome. CXR changes may take up to three months to resolve.</td>
</tr>
</tbody>
</table>

Source: [https://patient.info/doctor/legionnaires-disease-pro](https://patient.info/doctor/legionnaires-disease-pro)
Treatment and Complications

• Pneumonia is confirmed by chest x-ray, but typically two preferred types of tests to see if a patient’s pneumonia is caused by *Legionella*:
  o The most used diagnostic method is the *Legionella* urinary antigen assay.
  o Laboratory test that involves taking a sample of sputum or washing from the lung
• LD requires treatment with antibiotics and most cases of this illness can be treated successfully. Healthy people usually get better after being sick with Legionnaires’ disease, but they often need care in the hospital.
• Possible complications of Legionnaires’ disease include
  o Lung failure
  o Death
Why Do Outbreaks Occur?

- The Legionella bacteria grows best in building water systems that are not well maintained with some buildings being at higher risk than others.
- Outbreaks are generally associated with environmental reservoirs in large or complex water systems (such as those found in long-term care and senior living communities).
- Transmission from the water systems to human require aerosol generation and can occur from showerheads, cooling towers, hot tubs and decorative fountains.
- In manmade water systems, Legionella can grow and spread in parts of the water system in a building that are constantly wet and certain devices can spread contaminated droplets via aerosolization.
Two Main Reasons

• The chlorine levels coming from the municipality are low and or the municipality has not killed off the bacterial prior to entering the water systems
• The water that is already in the building is stagnant and not moving and the bacterial grows inside the pipes.
Examples of System Components and Devices Include

- Hot and cold water storage tanks
- Water heaters
- Water-hammer arrestors
- Pipes, valves and fittings
- Expansion tanks
- Water filters
- Electronic and manual faucets
- Aerators
- Cooling towers
- Medical devices such as CPAP machines, hydrotherapy equipment, bronchoscopes, heater-cooler units
- Faucet flow restrictors
- Showerheads and hoses
- Centrally-installed misters, atomizer, air washers and humidifiers
- Nonsteam aerosol-generating humidifiers
- Eyewash stations
- Ice machines
- Hot tubs/saunas
- Decorative fountains
Contributing Factors to Legionella Outbreaks

Internal

- Biofilm (slime) protects Legionella from heat and disinfect (provides shelter and food)
- Scale and Sediment uses up disinfectant and creates a home-like environment
- Water pressure changes can dislodge the biofilm
- pH: Disinfectants are most effective in a narrow range
- Inadequate disinfectants: Does not kill or inactivate Legionella
- Water Stagnation: Encourages biofilm growth and reduces temperature and levels or disinfectant

External

- Construction: Vibrations and changes in water pressure can dislodge biofilm and free Legionella into the water entering your building
- Water main breaks: Similar to construction, but in addition dirt and other materials can be introduced into the water and free up disinfectant
- Changes to municipal water quality: Changes in water quality can increase sediment, lower disinfectant levels, increase turbidity or cause pH to be outside recommended ranges.
  - Changes in disinfectant type can impact how you should monitor your program
Water Temperature and Legionella

• Legionella which grows best in 77-108 degree Fahrenheit

• Factors influencing water temperatures:
  - Low settings on water heaters
  - Heat loss as water travels through long pipes away from heat source
  - Mixing cold and hot water within the plumbing system
  - Heat transfer (when cold and hot water pipes are too close together)
  - Heat loss due to water stagnation
  - In hot weather, cold water in pipes can heat up into the range favorable for Legionella growth
Determining Risk

**Action Step:** Survey your building (or property) to determine if you need a water management program to reduce the risk of Legionella growth and spread. If you answer YES to any of questions 1 through 4, you should have a water management program for that building’s hot and cold water distribution system.

**Survey is for Healthcare Facilities**

Yes _____ No _____ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems† or weakened immune systems?

Yes _____ No _____ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?

Yes _____ No _____ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?

Yes _____ No _____ 4. Does your building have more than 10 stories (including basement levels)? Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for that device.
Determining Risk—Continued

Yes ____ No ____ 5. Does your building have a cooling tower*?
Yes ____ No ____ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?
Yes ____ No ____ 7. Does your building have a decorative fountain?
Yes ____ No ____ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?

If you answer NO to questions 1 through 8, you should still maintain water systems according to manufacturer recommendations. On properties with multiple buildings, prioritize buildings that house or treat people who are at increased risk for Legionnaires’ disease (see Appendix A to learn who is at increased risk)

*Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings (2017), CDC.
CDC Worksheet

- Link to CDC Worksheet that provides results:

- Results are provided:
  - ✓ You need a water management program for your building’s
    ✓ hot and cold water distribution system
    ✓ hot tub
    ✓ decorative fountain
  - ✓ On properties with multiple buildings, prioritize buildings that house or treat [people who are at increased risk](https://www.cdc.gov/legionella/maintenance/wmp-risk.html) for Legionnaires’ disease.
Steps of a Water Management Program

1. Establish a water management team
2. Describe the buildings water system
3. Identify areas where Legionella could grow and spread
4. Decide where control measures should be applied and how to monitor them
5. Establish ways to intervene when control limits are not met
6. Make sure the program is running as designed and is effective
7. Document and communicate the activities

Utilize a Team Approach
Step 1—Establish a Water Management Program

• Establish a Focus Group or Team
  o Consider who internal and external to your building can provide the skills and knowledge necessary to complete the assessment and to establish the program
  o Potential team members may include:
    • Building Owner
    • Administrator
    • Maintenance
    • Water system expert (May be a community expert or contractor)
    • Infection Preventionist
    • Safety Officer
    • Risk Management
    • Quality Management
Step 1—Establish a Water Management Program

- Determine Risk
- Review the Elements of the Program at least annually, but also when any of the following events occur:
  - Data shows control measures are persistently outside of control limits
  - One or more cases of disease are thought to be associated with your system(s)
  - Changes occur in applicable regulations, laws, standards or guidelines
  - A major maintenance or water service change occurs:
    - New construction
    - Equipment changes (new hot tub chlorinator pump)
    - Changes in treatment products (disinfectants)
    - Changes in water usage
    - Changes in the municipal water supply
Step 1—Establish a Water Management Program

• If an event triggers a review and update to the program remember to:
  o Update the written description of your building water systems
    • As part of the program description a written process flow diagram is recommended
  o Train staff responsible for implementation and monitoring of the program
Step 2—Describe Your Water Building System

• Recommended to describe the water system in two ways
  o Text (Narrative)
    • Components
      o Water enters: Problems with water entering are usually beyond building manager’s control; however, an essential part of a water management program is monitoring water and responding to changes coming in from the municipal water line
      o Cold water is distributed
      o Cold water is heated
      o Hot water is distributed
      o Hot, cold and tempered waste water is discarded
  o Diagram: Develop a process flow diagram
Step 2: Sample Process Flow Diagram

- Establish a Designated Team
- Develop Water Flow Diagrams
- Identify Areas, Equipment & Systems at Risk
- Identify Strategies to Mitigate Risk
- Determine the Patient Populations at Risk
- Establish Program to Monitor Strategies
- Determine Response Actions
- Review Program Periodically to Confirm Effectiveness

Document all program activities throughout the process.
Step 3: Identify and Control

- Once you have developed your process flow diagram, identify where potentially hazardous conditions could occur in your building water systems.
- Each potentially hazardous condition should be addressed individually with a control point, measure, and limit.
- Healthcare Facilities should think about:
  - Areas where medical procedures may expose patients to water droplets (such as hydrotherapy)
  - Areas where patients are more vulnerable to infections
Step 4—Applying Control Measures

- Control Measures and Limits should be established for each control point
- Control Measures may include
  - Adding disinfectant
  - Changing Water Temperatures; however follow regulations for water temperatures
  - Implementing a monitoring program
    - Monitoring Water Quality
    - Maintaining Water Tanks at Appropriate Temperatures
    - Decorative Fountains should be well maintained (no debris, no visible biofilm)
    - Disinfectants and other chemicals for equipment such as hot tubs and cooling towers should be monitored
Additional Considerations

- Prior history of Legionnaires’ disease associated with the building’s water system
- Having difficulty maintaining water management system
Step 4: Applying Control Measures

• Pro-actively prepare for increasing monitoring with:
  o A system start up
  o A system shut down
  o Regularly scheduled maintenance
  o Renovations, construction, and installation of new equipment
  o Equipment failure
  o Water main break or other service interruptions
  o External environmental changes
Step 4: Applying Control Measures

Intervene When Control Measures are not met:

• Water systems can change due to internal and external factors
• When monitoring results fall outside of the normal range a corrective action needs to be taken
• Examples outlined in the CDC Tool Kit
  o Biofilm on a decorative fountain
  o Unoccupied floor secondary
  o Debris in cooling tower
Step 5: Contingency Response

- A contingency response is required when a case of Legionnaire's disease has been initiated with a building and also appropriate in other situations
  - Water Main Break
  - Broken chlorinator in the hot tub
Step 6: Monitor Effectiveness of Program

- Verification: Are we doing what we said we would do?
- Validation: Is the program working?
Step 7: Document and Communicate

• A written program should include:
  o Program Team Including titles, contact information and roles
  o Building description, including age, uses and occupants/visitors
  o Water system description including a general summary, uses of water, aerosol-generating devices
  o Control measures including points in the system where critical limits can be monitored and where control can be applied
  o Control measures which include where limits can be monitored and where controls have been applied
  o Confirmation that the water management program is being followed (verified) and that the program is working or has been modified (validation)
Regulatory Requirements and Expectations

**Nursing Facilities:**

- 42 CFR §483.80: The facility must establish and maintain an infection prevention and control program designed to provide a safe, sanitary and comfortable environment and to help prevent the development and transmission of communicable diseases and infections.
CMS Expectations for Healthcare Facilities and Surveyors

• CMS Survey and Cert Memo June 2, 2017 outlines the expectations for healthcare facilities to have Water Management Policies and Procedures to reduce the risk of growth and spread of Legionella and other opportunistic pathogens.

• Healthcare facilities are expected to comply with the CMS requirements to protect the health and safety of its patients.
  o Facilities not able to demonstrate measures to minimize the risk of LD are at risk of citation for non-compliance.
  o Effective immediately.
CMS Expectations for Healthcare Facilities and Surveyors

- Surveyors will review:
  - Policies and procedures, as well as reports documenting water management implementation results to verify that facilities have
  - Conducted a facility risk assessment to identify where Legionella and other opportunistic waterborne pathogens (e.g. Pseudomonas, Acinetobacter, Burkholderia, Strentrophomonas, nontuberculous mycobacteria and fungi) could grow and spread in facility water system
  - Implement a water management program that considers the 2015 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and the CDC Toolkit AND includes control measures such as physical controls, temperature management, disinfectant level control and visual inspections and environmental testing for pathogens
  - Specify testing protocols and acceptable ranges for control measures and document the results of testing and corrective actions taken when control limits are not maintained.
Excerpt:

• Take a risk management approach to environmental monitoring and control of Legionella.
• Implement routine water system operation and maintenance best practices.
• Implement appropriate treatment methods to prevent Legionella growth or when otherwise warranted.
• Call the department of health and/or environmental protection with any further questions.
HEALTH ADVISORY 137 Legionnaire’s Disease in West Virginia

While the information contained in this news article was current and accurate when we posted it, it may not necessarily represent current WVOEMS policy or procedure. If you have any questions, please contact our office at 304-558-3956.

Posted: Monday, July 17, 2017 7:36 AM

HEALTH ADVISORY #137 Legionnaire's Disease in West Virginia

TO: West Virginia Healthcare Providers, Hospitals and other Healthcare Facilities

FROM: Rahul Gupta, MD, MPH, FACP

Commissioner and State Health Officer
The Bottom Line

• Determine Risk
• Apply control measures to reduce the conditions whenever possible to prevent the growth and spread of Legionella
  o Water Management Program
• Evaluate on a regular basis that the program is running as designed and is effective

An ounce of prevention is worth a pound of cure
- Ben Franklin
Resources

• American Health Care Association

• Allegheny County Health Department (2014)
  o Updated Guidelines for the Control of Legionella in Western Pennsylvania

• Centers for Disease Control and Prevention
  o ASHRAE 188: Legionellosis: Risk Management for Building Water Systems
    https://www.cdc.gov/legionella/health-depts/ashrae-faqs.html

• West Virginia: