

# THE CHALLENGES OF LEGIONELLA

LIBBY YOUSE, BGS, LNHA  
LONG-TERM CARE LEADERSHIP COACH



  
Sinclair School of Nursing  
University of Missouri Health Care

## SO WHAT IS IT???

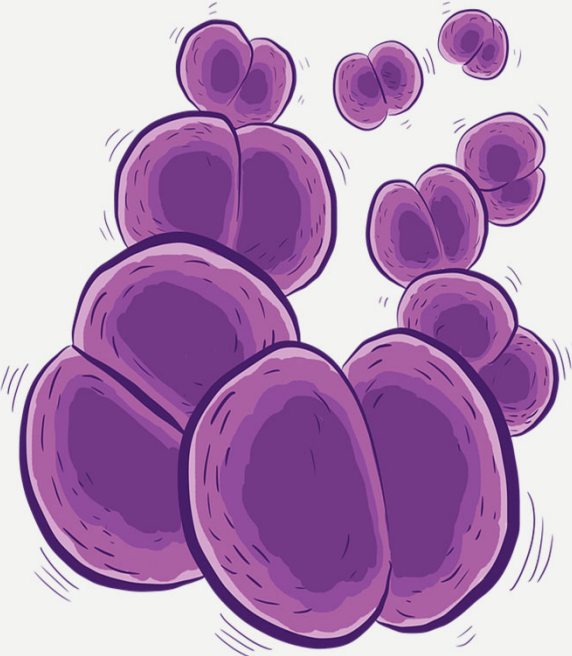
The bacterium *L. pneumophila* was first identified in 1977, as the cause of an outbreak of severe pneumonia in a convention center in the USA in 1976.

The most common form of transmission of Legionella is inhalation of contaminated aerosols produced in conjunction with water sprays, jets or mists. Infection can also occur by aspiration of contaminated water or ice, particularly in susceptible hospital patients.

Legionnaires' disease has an incubation period of 2 to 10 days (but up to 16 days has been recorded in some outbreaks).

Death occurs through progressive pneumonia with respiratory failure and/or shock and multi-organ failure.

Untreated Legionnaires' disease usually worsens during the first week.



## LOTS OF FACTORS

Severity of illness can be from a mild feverish illness to a serious and sometimes fatal form of pneumonia. The cause is exposure to Legionella species found in water, and potting mixes.


The species of Legionella depends on the type of exposure:

- Community
- Travel
- Hospital
- Worldwide

## WHERE DOES IT COME FROM??

**PLACES:**  
**Bodies of Water**

- ❖ Lakes
- ❖ Rivers
- ❖ Creeks
- ❖ Hot Springs



## OTHER EXPOSURES:

- ✓ Potting mixes
- ✓ Poorly maintained artificial water systems
- ✓ Cooling Towers
- ✓ Evaporative Condensers
- ✓ Hot and cold water systems in public and private buildings
- ✓ This might be the spray from a shower, faucet or whirlpool, or water dispersed through the ventilation system in a large building
- ✓ Hot tubs and whirlpool spas
- ✓ Misters – sometimes you see them in grocery stores over the fresh vegetables
- ✓ Decorative Fountains
- ✓ Physical therapy equipment

## TRANSMISSION

The most common form of transmission of Legionella is inhalation of contaminated sources of aerosols and this has been linked with transmission coming through air conditioning cooling towers, hot and cold water systems, humidifiers and whirlpool spas. Infection can also occur by aspiration of contaminated water or ice. There is no direct human-to-human transmission.

### Science Lesson –

- **An aerosol is a suspension of fine solid particles or liquid droplets, in air or another gas. Aerosols can be natural or anthropogenic. Examples of natural aerosols are fog, dust, forest exudates and geyser steam. Examples of anthropogenic aerosols are haze, particulate air pollutants and smoke.**
- **Aerosol - Wikipedia:** <https://en.wikipedia.org/wiki/Aerosol>

## OTHER FACTORS

Although legionella bacteria primarily spread through aerosolized water droplets, the infection can be transmitted in other ways, including:

- **ASPIRATION.** This occurs when liquids accidentally enter your lungs, usually because you cough or choke while drinking. If you aspirate water containing legionella bacteria, you may develop legionnaires' disease.
- **SOIL.** A few people have contracted legionnaires' disease after working in the garden or using contaminated potting soil.

## MORE FACTORS

**The illness somewhat depends on long or short exposure:**

- How susceptible is the individual
- Age and Pre-existing health conditions
- The concentration of the Legionella in the water source
- The production and dissemination of aerosols
- The viability of the strain



## EXTENT OF THE DISEASE

IN THE USA THERE ARE ABOUT 10–15 CASES DETECTED PER MILLION POPULATION PER YEAR

COMMUNITY-ACQUIRED AND TRAVEL-ASSOCIATED

### Risk factors include:

- smoking
- heavy drinking
- pulmonary-related illness
- a reduction in the efficacy of the immune system
- chronic respiratory
- renal illnesses

## THE IDENTIFIED INCIDENCE OF LEGIONNAIRES' DISEASE VARIES WIDELY

**NOT EVERYONE EXPOSED TO LEGIONELLA BACTERIA BECOMES SICK.**

- **SMOKE.** Smoking damages the lungs, making you more susceptible to all types of lung infections.
- Have a **WEAKENED IMMUNE SYSTEM** as a result of HIV/AIDS or certain medications, especially corticosteroids and drugs taken to prevent organ rejection after a transplant.
- Have a **CHRONIC LUNG DISEASE** such as emphysema or another serious condition such as diabetes, kidney disease or cancer.
- Are **50 YEARS OF AGE** or older.
- Unfortunately, **HEALTH CARE FACILITIES**, including long-term care homes and hospitals, where people are already susceptible and germs may spread easily.

## **COMMON PROBLEMATICS**

- Delay in diagnosis
- Wrong antibiotic administered
- Age
- Presence of co-existing diseases

## **NON-PNEUMONIC FORM PONTIAC DISEASE**

- Acute
- Fever, chills, headaches and muscle aches, influenza-like symptoms
- Symptoms usually clear within 2–5 days
- Incubation period is from a few hours up to 48 hours
- Causes discomfort
- Muscle pain
- No deaths are associated with this type of infection
- Does not effect the lungs
- Can cause infections in wounds or other parts of the body

## **PNEUMONIC FORM**

- Incubation period of 2 to 10 days
- Fever, loss of appetite, headache, a general feeling of discomfort and lethargy
- Muscle pain, diarrhea and confusion
- Some have a mild cough, but others have a productive cough
- Blood-streaked phlegm may occur
- The severity of disease ranges from a mild cough to a rapidly fatal pneumonia
- Confusion or other mental changes
- Death may occur through progressive pneumonia with respiratory failure
- Death may occur as a result of shock and multi-organ failure

## **UNTREATED LEGIONNAIRES' DISEASE**

- ❖ Pneumonic - Recovery always requires antibiotic treatment and can take weeks to months.
- ❖ Non-pneumonic - Does not require medical interventions, including antibiotic treatment.
- ❖ There is no vaccine currently available for Legionnaires' disease.

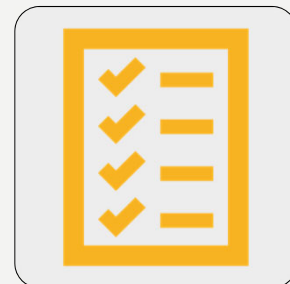
## So WHAT Do WE Do?



#1 - Regularly monitor control measures against identified risks (including Legionella)

## BECAUSE COMPLICATIONS COME...

- ❖ Respiratory failure
- ❖ Septic shock
- ❖ Acute kidney failure
- ❖ When not treated effectively and promptly, legionnaires' disease may be fatal, especially if your immune system is weakened by disease or medications





## So WHAT DO WE DO?

#2 - Develop water safety plans specific for your building



## PREVENTION

- Prevention - means applying control measures to minimize the growth of Legionella and distribution of the aerosols

## PREVENTION IN COOLING TOWERS

- Good maintenance
- Regular cleaning and disinfection
- Applying other physical (temperature) or chemical measures (biocide) to minimize growth
- Installation of drift eliminators to reduce broadcasting of aerosols from cooling towers

## PREVENTION IN SPA - POOLS - HOT TUBS

- Maintain an adequate level of a biocide such as chlorine with a complete drain and clean of the whole system at least weekly
- Keep hot and cold water systems clean and either keeping the hot water above 50 °C (which requires water leaving the heating unit to be at or above 60 °C) and the cold below 25 °C and ideally below 20 °C or alternatively treating them with a suitable biocide to limit growth, particularly in hospitals and other health care settings, and aged-care facilities
- Reducing stagnation by flushing unused taps in buildings on a weekly basis



## **PREVENTION ON WATER AND ICE MACHINES**

- Take extra precautions on ice machines

### *ACCORDING TO MAYO*

- Outbreaks of legionnaires' disease are preventable, but prevention requires meticulous cleaning and disinfection of water systems, pools and spas

## **PREVENTION**

- Prevention measures must be accompanied by proper awareness by our staff, general practitioners, and community health services for the detection of cases.

## **WATER SAFETY**

- Although it is not always possible to eradicate the source of infection, it is possible to reduce the risks substantially
- The risk of disease outbreak is increasing
- We all have to become more aware
- The buildings, water uses, the different people and how vulnerable they are for are so varied
- The public needs to be made aware
- Life is not going to change - people need a clean water supply, water to cook with, water to drink, shower, swim, recreation and air conditioning; and many people like ice

## **CDC**

### **Guidance for Legionnaires' disease for a response to "possible" cases in a healthcare facility**

- Test for Legionella in patients diagnosed with pneumonia; the preferred diagnostic tests for Legionnaire's disease are both culture of lower respiratory secretions and the Legionella urinary antigen test
- Consult with the Medical Director about increasing testing and surveillance for Legionellosis in facility's residents

## **CDC RECOMMENDS**

- Full investigation if a single “definite” case or two “possible” cases occur in a twelve month period
- The investigation may include:
  - Additional epidemiological review
  - Environmental sampling
  - Further facility assessment



## **PUBLIC HEALTH CONTROL MEASURES**

- Notifying residents
- Notification of the public
- Facility restrictions
- Closure of rooms or features
- Water restrictions

## STEPS FOR WATER MANAGEMENT PROGRAM

- 1) Definitely have your policy and procedure *in place*
- 2) Choose your Risk Management Team and know who they are and why were they appointed
- 3) Describe the water systems
  - 1) Hot water heaters
  - 2) Whirlpool tub
- 4) Describe where your water supply comes from. Who tests it your maintenance man or the city?
- 5) Know your water source coming into your building and the quality of it – Don't forget the emergency supply
- 6) DRAW WATER FLOW CHARTS
- 7) Identify areas or devices in your building where Legionella might grow or spread (any hazards)
- 8) Your building is your building and it is not exactly like any other.



## WATER MANAGEMENT

1. Get a diagram of your building starting with the municipal water that comes in your building (then it goes to where...sinks, faucets, hot water heaters, tubs, dishwashers, clothes washer, cooling tower, water fountains) Draw a flow chart
2. Control measures including critical levels (is all water kept at appropriate temperatures)
3. Perform risk assessment and how much risk is there
4. List what uses there are for water in your building – bathing, drinking, ...
5. Who uses the water and what do they use it for and are they at a high risk or low risk.
 

Examples:

  1. Dietary is handwashing, washing food, included in cooking...
  2. Nursing is ADL, med pass, showers...
6. Have verification steps to show that the program is being followed. Put it in writing and be able to show validation that your program is effective
7. Document collection and transport to the labs that will be performing any environmental testing

## FLOW CHART



## WATER MANAGERMENTS

### GET YOUR DETAIL ON:

- Incoming water is supplied to a water heater of 100 gallon capacity, set at 112 degrees C
- Water within the system is treated using ??? (e.g. copper silver ionization)
- Heated water is supplied to outlets throughout the building.
  - Heater #1 goes to Laundry
  - Heater #2 goes to Dietary

## FIX THE PROBLEMS AND MONITOR

- Fix the temperatures
- Disinfect
- Clear debris and visible biofilm
- Check after water main breaks
- Check after renovations
- When equipment fails



## IT GETS EXTENSIVE IT'S NOT BLACK AND WHITE

Note: Water in direct hot and cold water pipes can pose multiple hazardous conditions. First, the process of heating the water can reduce disinfectant levels. Second, if hot water is allowed to sit in the pipes (stagnation), it might reach a temperature where Legionella can grow and could encourage sediment to accumulate or biofilm to form. With recirculating hot water pipes, the greatest risk is that returning water with reduced or no disinfectant cools to a temperature where Legionella can grow. If this happens, Legionella in the return line can travel to central distribution points and contaminate the entire plumbing system of the building.

*Copied from: DEVELOPING A LEGIONELLA WATER MANAGEMENT PROGRAM. Reference:ASHRAE 188: Legionellosis: Risk Management for Building Water Systems, June 26, 2015. ASHRAE:Atlanta. [www.ashrae.org](http://www.ashrae.org)*



## CLINICIANS



- Clinicians should test patients with healthcare-associated pneumonia (pneumonia with onset  $\geq 48$  hours after admission) for Legionnaires' disease.
- This is especially important among patients at increased risk for developing Legionnaires' disease among patients with severe pneumonia (particularly those requiring intensive care), or if any of the following are identified in your facility:
  - Other patients with healthcare-associated Legionnaires' disease diagnosed in the past 12 months
  - Positive environmental tests for Legionella in the past 2 months
  - Current changes in water quality that may lead to Legionella growth (such as low chlorine levels)

## REPORTING - MAKE THE CALL

Inform the County Health Department and  
Department of Health and Senior Services

DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7800 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1890



Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C I7-30-Hospitals/CAHs/NHs  
REVISED 06.09.2017

**DATE:** June 02, 2017  
**TO:** State Survey Agency Directors  
**FROM:** Director  
Survey and Certification Group  
**SUBJECT:** Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)  
\*\*\*Revised to Clarify Provider Types Affected\*\*\*

**Memorandum Summary**

- **Legionella Infections:** The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.
- **Facility Requirements to Prevent Legionella Infections:** Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *legionella* and other opportunistic pathogens in water.
- **This policy memorandum applies to Hospitals, Critical Access Hospitals (CAHs) and Long-Term Care (LTC). However, this policy memorandum is also intended to provide general awareness for all healthcare organizations.**

**Background**

LD, a severe sometimes fatal pneumonia, can occur in persons who inhale aerosolized droplets of water contaminated with the bacterium *Legionella*. In a recent review of LD outbreaks in the United States occurring in 2000–2014, 19% of outbreaks were associated with long-term care facilities and 15% with hospitals. The rate of reported cases of legionellosis, which comprises both LD and Pontiac fever (a milder, self-limited, influenza-like illness) has increased 286% in the US during 2000–2014, with approximately 5,000 cases reported to the Centers for Disease Control and Prevention (CDC) in 2014. Approximately 9% of reported legionellosis cases are fatal.

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An industry standard<sup>1</sup> calling for the development and implementation of water management programs in large or complex building water systems to reduce the risk of legionellosis was published in 2015 by American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). In 2016, the CDC and its partners developed a toolkit to facilitate implementation of the ASHRAE Standard<sup>2</sup>. Environmental, clinical, and epidemiologic considerations for healthcare facilities are described in this toolkit and may include control measures such as physical controls, temperature management, disinfectant levels, visual inspections, and environmental testing for pathogens.

In a recent review of LD outbreaks occurring from 2000–2014 in the U.S., 19% were associated with long-term care facilities and 15% with hospitals. There have been multiple recent LD outbreaks in hospitals and long-term care facilities as reported by the CDC, state and local health departments, or investigated by State Survey Agencies (SA). Below is information about these outbreaks for provider informational purposes.

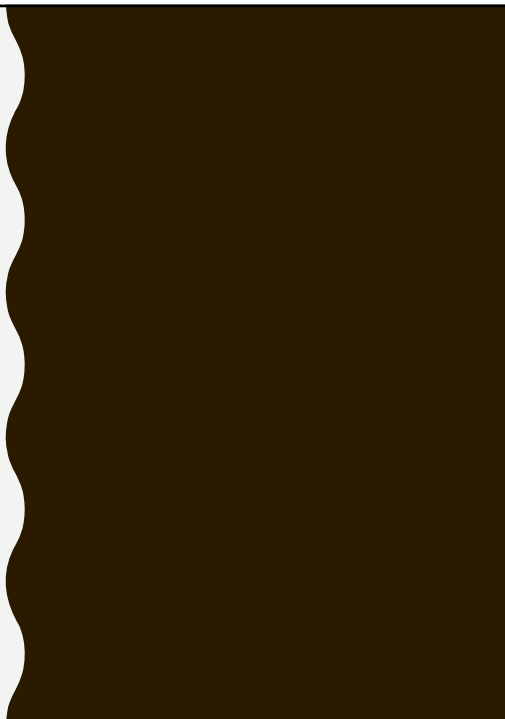
Outbreaks generally are linked to environmental reservoirs in large or complex water systems, including those found in healthcare facilities such as hospitals and long-term care facilities. Transmission from these water systems to humans requires aerosol generation, as can occur from showerheads, cooling towers, hot tubs, and decorative fountains. *Legionella* is less commonly spread by aspiration of drinking water or ice. Only one case of possible person-to-person transmission has been reported.

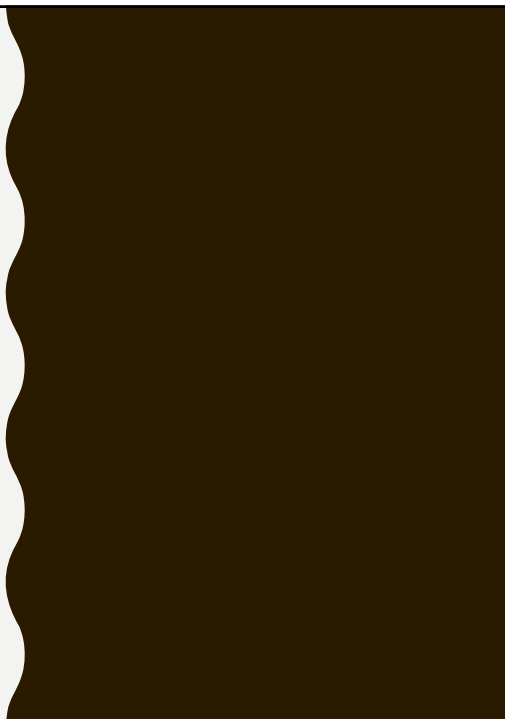
In manmade water systems, *Legionella* can grow and spread to susceptible hosts, such as persons who are at least 50 years old, smokers, and those with underlying medical conditions such as chronic lung disease or immunosuppression. *Legionella* can grow in parts of building water systems that are continually wet, and certain devices can spread contaminated water droplets via aerosolization. Examples of these 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

<sup>1</sup> ASHRAE Standard 188-2015: *Legionellosis: Risk Management for Building Water Systems* June 26, 2015. ASHRAE: Atlanta. [www.ashrae.org](http://www.ashrae.org)

<sup>2</sup> "Legionella (Legionnaires' Disease and Pontiac Fever)," Centers for Disease Control and Prevention, September 14, 2017. [www.cdc.gov/legionella/maintenance/wmp-toolkit.html](http://www.cdc.gov/legionella/maintenance/wmp-toolkit.html)

<ul style="list-style-type: none"> <li>• Faucet flow restrictors</li> <li>• Showerheads and hoses</li> <li>• Centrally-installed misters, atomizers, air washers, and humidifiers</li> <li>• Nonsteam aerosol-generating humidifiers</li> <li>• Eyewash stations</li> <li>• Ice machines</li> <li>• Hot tubs/saunas</li> <li>• Decorative fountains</li> <li>• Cooling towers</li> <li>• Medical devices (such as CPAP machines, hydrotherapy equipment, bronchoscopes, heater-cooler units)</li> </ul> <p><b>CMS Regulatory Authorities</b> Pertinent regulations include, but are not limited to, the following:</p> <p>42 CFR §482.42 for hospitals: “The hospital must provide a sanitary environment to avoid sources and transmission of infections and communicable diseases. There must be an active program for the prevention, control, and investigation of infections and communicable diseases.”</p> <p>42 CFR §483.80 for skilled nursing facilities and nursing facilities: “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.”</p> <p>42 CFR §485.635(a)(3)(vi) for critical access hospitals (CAHs): CAH policies must include: “A system for identifying, reporting, investigating and controlling infections and communicable diseases of patients and personnel.”</p> <p><b>Expectations for Healthcare Facilities</b></p> <p>CMS expects Medicare and Medicare/Medicaid certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of <i>Legionella</i> and other opportunistic pathogens in building water systems.</p> <p><i>Facilities must have water management plans and documentation that, at a minimum, ensure each facility:</i></p> <ul style="list-style-type: none"> <li>• Conducts a facility risk assessment to identify where <i>Legionella</i> and other opportunistic waterborne pathogens (e.g. <i>Pseudomonas</i>, <i>Acinetobacter</i>, <i>Burkholderia</i>, <i>Stenotrophomonas</i>, nontuberculous mycobacteria, and fungi) could grow and spread in the facility water system.</li> <li>• Develops and implements a water management program that considers the ASHRAE industry standard and the CDC toolkit.</li> </ul> <p>Page 4— State Survey Agency Directors</p>	
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<p>Page 4— State Survey Agency Directors</p> <ul style="list-style-type: none"> <li>• Specifies testing protocols and acceptable ranges for control measures, and document the results of testing and corrective actions taken when control limits are not maintained.</li> <li>• <i>Maintains compliance with other applicable Federal, State and local requirements.</i></li> </ul> <p><i>Note: CMS does not require water cultures for Legionella or other opportunistic water borne pathogens. Testing protocols are at the discretion of the provider.</i></p> <p>Healthcare facilities are expected to comply with CMS requirements and conditions of participation to protect the health and safety of its patients. Those facilities unable to demonstrate measures to minimize the risk of LD are at risk of citation for non-compliance.</p> <p><b>Expectations for Surveyors and Accrediting Organizations</b></p> <p><i>LTC surveyors will expect that a water management plan (which includes a facility risk assessment and testing protocols) is available for review but will not cite the facility based on the specific risk assessment or testing protocols in use. Further LTC surveyor guidance and process will be communicated in an upcoming survey process computer software update. Until that occurs, please use this paragraph as guiding instructions.</i></p> <p><b>Contact:</b> For questions or concerns regarding this policy memorandum, please contact <i>the following for each facility type:</i></p> <p><i>Hospitals: <a href="mailto:HospitalSCG@cms.hhs.gov">HospitalSCG@cms.hhs.gov</a>.</i></p> <p><i>Critical Access Hospitals: <a href="mailto:CAHSCG@cms.hhs.gov">CAHSCG@cms.hhs.gov</a>.</i></p> <p><i>Long-Term Care: <a href="mailto:NHSurveyDevelopment@cms.hhs.gov">NHSurveyDevelopment@cms.hhs.gov</a>.</i></p> <p><b>Effective Date:</b> Immediately. This policy should be communicated with all survey and certification staff, their managers and the State/Regional Office training coordinators within 30 days of this memorandum.</p> <p style="text-align: center;">/s/ David R. Wright</p> <p>cc: Survey and Certification Regional Office Management</p>	
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## SUGGESTION

- Check on having your building professionally water tested
- Have them check and train your staff members to do the least invasive to your budget
- They are much more reasonable than expected
- Your Grandma said it: “An ounce of prevention is worth a pound of cure!”

## STATEMENT OF DEFICIENCY

**Failed to provide a program for the prevention of the growth of the Legionella bacteria.**

# QUESTIONS?



# RESOURCES

- <https://www.cdc.gov/legionella/about>
- <https://www.cdc.gov/legionella/downloads/toolkit.pdf>
- <http://legionella.org/>
- <https://www.mayoclinic.org/diseases>
- <https://www.who.int/news-room/fact-sheet>
- <https://www.ashrae.org/professional-development/educator-resources>

# RESOURCES

- [www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm)
- [www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5217a1.htm)
- [www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5303a1.htm)
- [www.va.gov/vhapublications/ViewPublication.asp?pub\\_ID=3033](http://www.va.gov/vhapublications/ViewPublication.asp?pub_ID=3033)
- QIPMO Team: [www.nursinghomehelp.org](http://www.nursinghomehelp.org)

# RESOURCES

## QUALITY IMPROVEMENT PROGRAM FOR MISSOURI (QIPMO)

[www.nursinghomehelp.org](http://www.nursinghomehelp.org)

(573) 882-0241

### LIBBY YOUSE

Long Term Care Leadership Coach

[youseme@missouri.edu](mailto:youseme@missouri.edu)

(660) 651-3778

