

Waterborne Pathogens and *Legionella* in Skilled Nursing Facilities

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Objectives

By the end of this presentation, participants should be able to:

- Discuss how water systems in skilled nursing facilities (SNFs) can contribute to illness of residents and healthcare workers
- Describe how plumbing configurations contribute to the growth of waterborne organisms
- Explain how *Legionella* can be transmitted in SNFs
- Discuss how a water management plan can reduce exposure to waterborne organisms



Implicit Bias

- Implicit bias is an automatic reaction we have towards other people
- These attitudes and stereotypes can negatively affect our understanding, actions, and decision-making
- People may discriminate unintentionally as biases are unknown to them
- For more information and to take an implicit bias test:

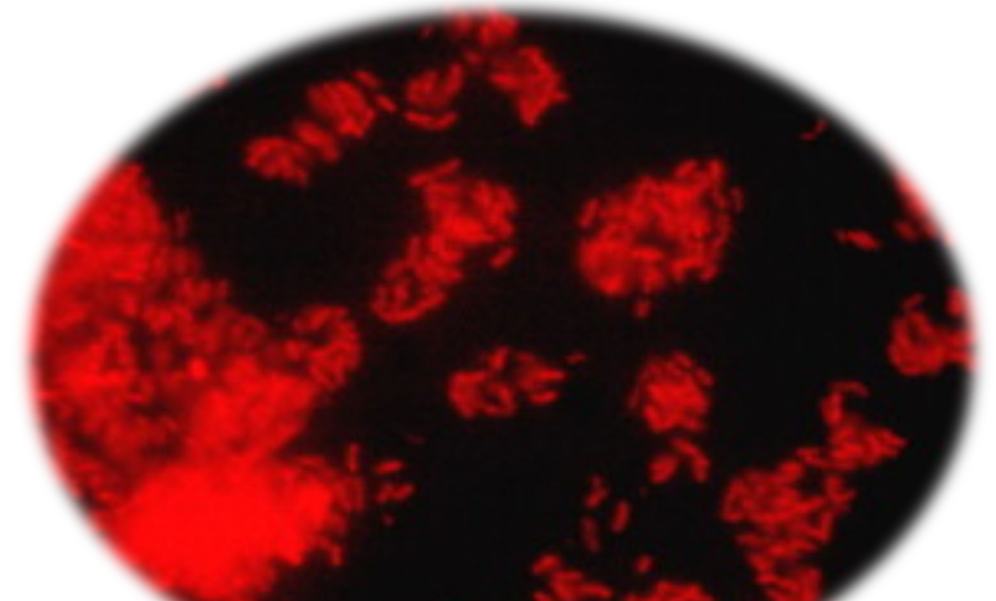
[Project Implicit](https://www.projectimplicit.net)

(<https://www.projectimplicit.net>)





Waterborne Organisms and Transmission



Electron micrograph of non-legionella biofilm in water pipes

[Electron Micrograph](#)

(www.sciencedirect.com/science/article/pii/S0944501307000742)



Organisms Found in Healthcare Facility Plumbing

Opportunistic Pathogens of Premise Plumbing

Gram negative bacteria

- *Pseudomonas aeruginosa*
- *Pseudomonas putida*-*P. fluorescens*
- *Burkholderia cepacia* complex (*B. cenocepacia*, *B. cenocepacia*, at least 8 other genera/species)
- *Cupriavidus (Ralstonia) pauculus*
- *Herbaspirillum*
- *Methylobacterium* spp
- *Ralstonia pickettii*, *Ralstonia mannitolilytica*
- *Sphingomonas paucimobilis*, *Sphingomonas subdolens*, *Sphingomonas paucimobilis*, *Sphingomonas paucimobilis*
- *Sphingomonas paucimobilis*, *Sphingomonas paucimobilis*
- *Alcaligenes xylosoxidans*, *A. faecalis*
- *Aeromonas hydrophila*, *Aeromonas* spp
- *Elizabethkingia anophelis*, *E. meningoseptica*
- *Legionella pneumophila*

Other bacteria/actinomycetes

- *Microbacterium* spp
- *Tsukamurella* spp
- *Rhodococcus equi*, *Rhodococcus* spp
- *Gordoniae* spp

Fungi

- Yeasts (eg. *Candida parapsilosis*, *C. tropicalis*)
- *Aspergillus fumigatus*, *A. niger*
- *Fusarium* spp
- *Exophiala* spp

Protozoa

- *Acanthamoeba* spp
- *Vermamoeba vermiformis*
- *Naegleria* spp

Non-fecal coliforms

- *Enterobacter cloacae*
- *Klebsiella* spp
- *Pantoea agglomerans*

Nontuberculous mycobacteria (NTM or Environmental Mycobacteria)

- *Mycobacterium abscessus* clade (*M. abscessus*, *M. boletii*, *M. massiliense*)
- *M. chelonae*
- *M. mucogenicum* clade (*M. mucogenicum*, *M. phociacum*)
- *M. fortuitum* clade (*M. fortuitum*, *M. cosmeticum*, *M. mageritense*, *M. porcinum*, *M. septicum*)
- *M. immunogenium*
- *M. smegmatis* clade (*M. goodii*, *M. wolinskyi*)
- *M. aurum*
- *M. simiae*
- *M. avium* complex (*M. avium*, *M. intracellulare*, *M. chimaera*, *M. avium* ss *hominissuis*, *M. abscessus*)
- *M. scrofulaceum*
- *M. parascrofulaceum*
- *M. xenopi*
- *M. arupense*
- *M. kansasii*
- *M. haemophilum*
- *M. nonchromogenicum* clade (*M. nonchromogenicum*, *M. triviale*, *M. terrae*)
- *M. gordonae* (only among patients with severe immune deficiency)

47 different organisms can be found in drinking water

[Reduce Risk to Patients from Plumbing](http://www.cdc.gov/hai/prevent/environment/water.html)

(www.cdc.gov/hai/prevent/environment/water.html)





Organisms in Water Include:

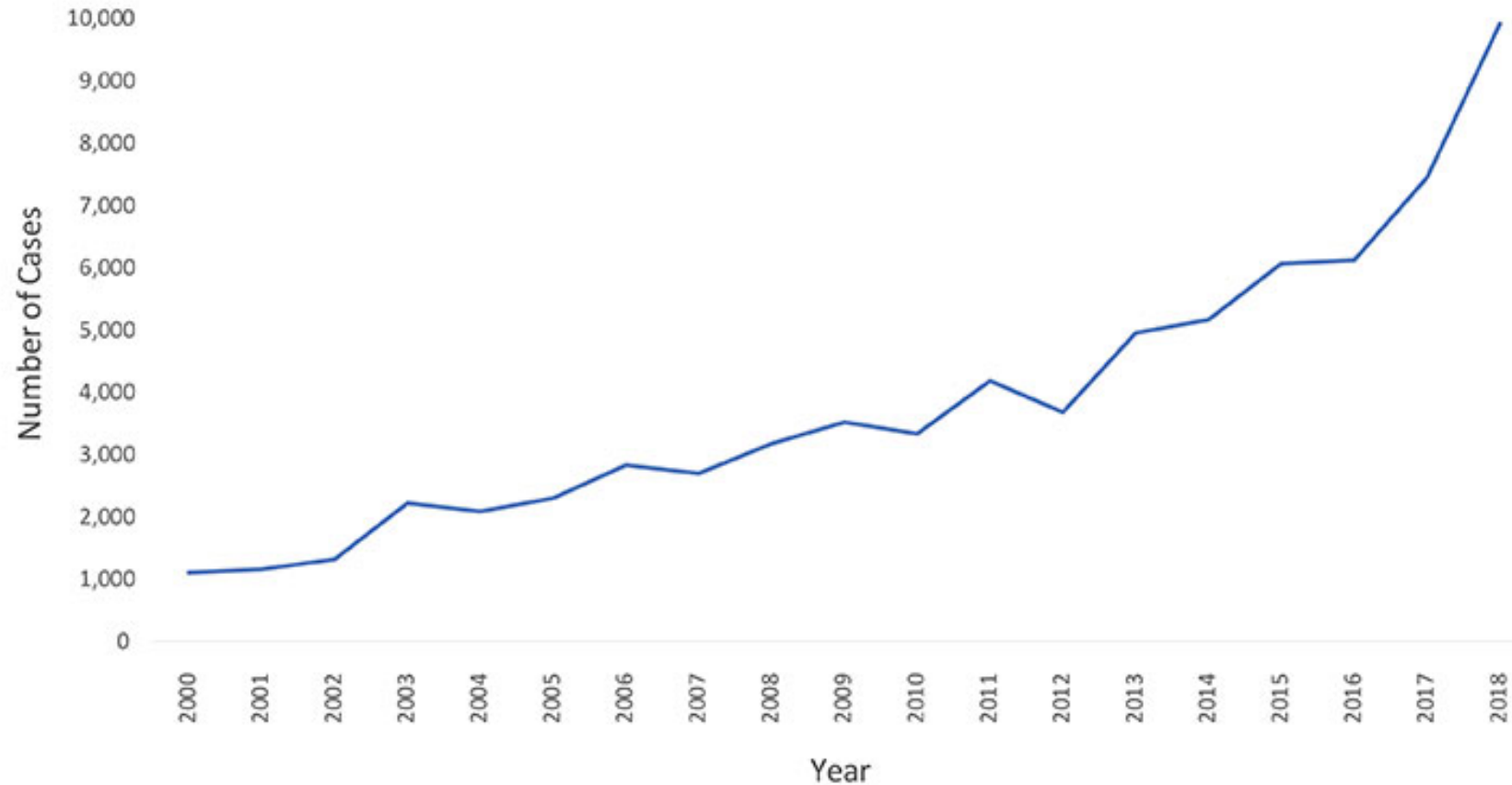
- *Stenotrophomonas maltophilia*
- *Enterobacter cloacae*
- *Burkholderia cepacia*
- *Acinetobacter baumannii* complex
- *Klebsiella pneumoniae*
- *Pseudomonas aeruginosa*
- *Legionella pneumophila*
- *Mycobacteria* – 17 different species
- *Yeasts: Candida parapsilosis, tropicalis*



Have you seen any resident cultures with any of these organisms?



Legionnaires' disease is on the rise in the United States 2000-2018



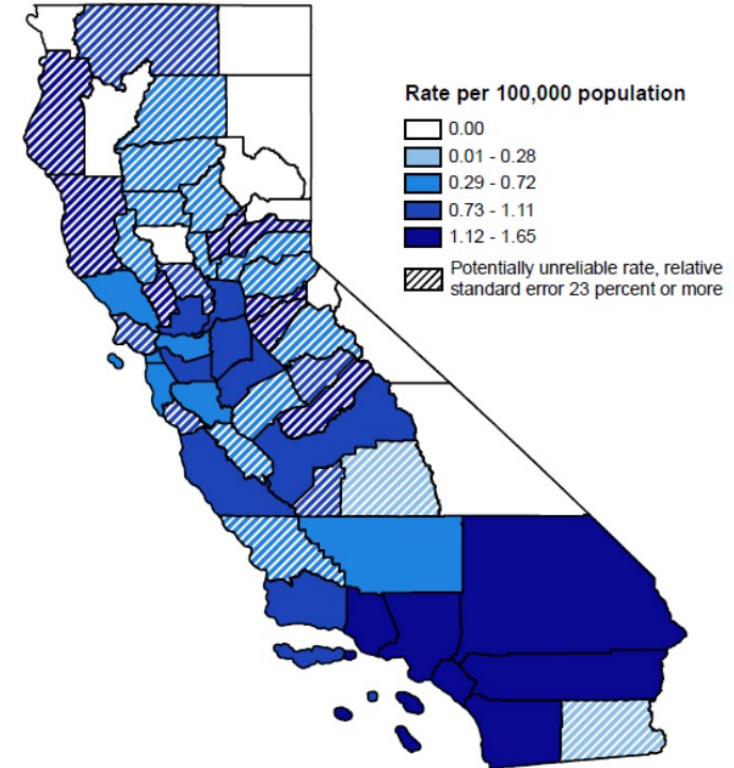
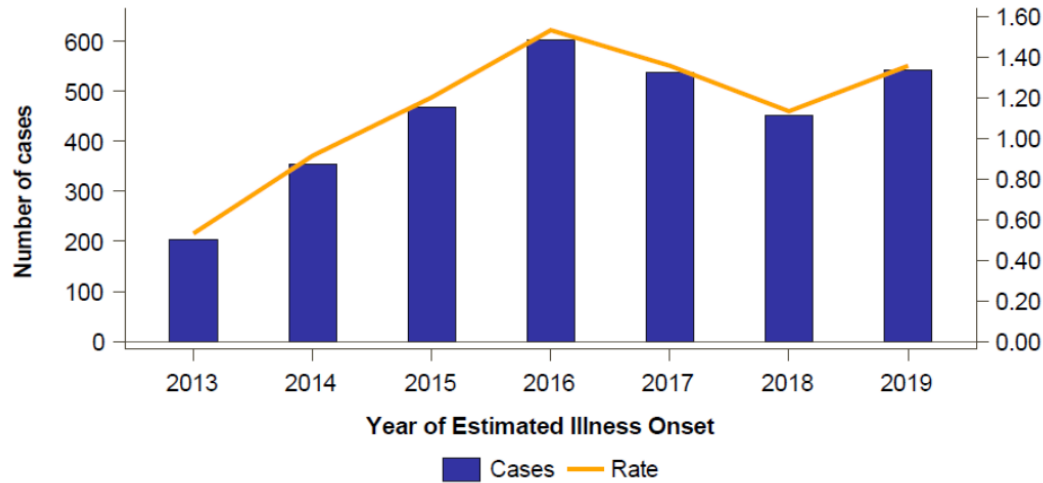
Source: Nationally Notifiable Diseases Surveillance System

[Legionnaires Disease and Pontiac Fever | CDC](http://www.cdc.gov/legionella/index.html)
(www.cdc.gov/legionella/index.html)





Legionellosis by Year of Illness Onset, California, 2013-2019



Source: Epidemiologic Summary of Legionellosis in California, 2013-2019

Large Community Outbreak of Legionnaires Disease Potentially Associated with a Cooling Tower — Napa County, California, 2022

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Abstract

Legionnaires disease is a serious infection acquired by inhalation of water droplets from human-made building water systems that contain Legionella bacteria. On July 11 and 12, 2022, Napa County Public Health (NCPH) in California received reports of three positive urinary antigen tests for Legionella pneumophila serogroup 1 in the town of Napa. By July 21, six Legionnaires disease cases had been confirmed among Napa County residents, compared with a baseline of one or two cases per year. NCPH requested assistance from the California Department of Public Health (CDPH) and CDC to aid in the investigations. Close temporal and geospatial clustering permitted a focused environmental sampling strategy of high-risk facilities which, coupled with whole genome sequencing results from samples and investigation of water system maintenance, facilitated potential linking of the outbreak with an environmental source. NCPH, with technical support from CDC and CDPH, instructed and monitored remediation practices for all environmental locations that tested positive for Legionella. The investigation response to this community outbreak illustrates the importance of interdisciplinary collaboration by public health agencies, laboratory support, timely communication with the public, and cooperation of managers of potentially implicated water systems. Timely identification of possible sources, sampling, and remediation of any facility testing positive for Legionella is crucial to interrupting further transmission.

Investigation and Results

Epidemiologic Investigation

Napa County Public Health (NCPH) defined a confirmed case as the diagnosis of Legionnaires disease based on the results

of a urinary antigen test (UAT), polymerase chain reaction (PCR) test, or culture received by a person who lived, worked, or spent time in downtown Napa, with illness onset during or after June 2022. A suspected case was defined as community-acquired pneumonia of unknown origin identified among three categories of persons: 1) a hospitalized patient; 2) a resident of, worker in, or visitor to downtown Napa; or 3) a patient who did not receive testing for Legionella spp. during hospitalization.

During July 11–August 15, 2022, NCPH identified 17 Legionnaires disease cases, including 14 confirmed and three suspected cases (Table 1). Among these 17 cases, 16 persons were hospitalized, 10 were admitted to an intensive care

INSIDE

- 1321 Progress in Immunization Safety Monitoring — Worldwide, 2020–2022
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Continuing Education examination available at https://www.cdc.gov/mmwr/mmwr_continuingEducation.html



Large Community Outbreak of Legionnaires Disease Potentially Associated with a Cooling Tower — Napa County, California, 2022 (cdc.gov) (www.cdc.gov/mmwr/volumes/72/wr/pdfs/mm7249a1-H.pdf)





Identifying Possible Legionella Cases in SNFs





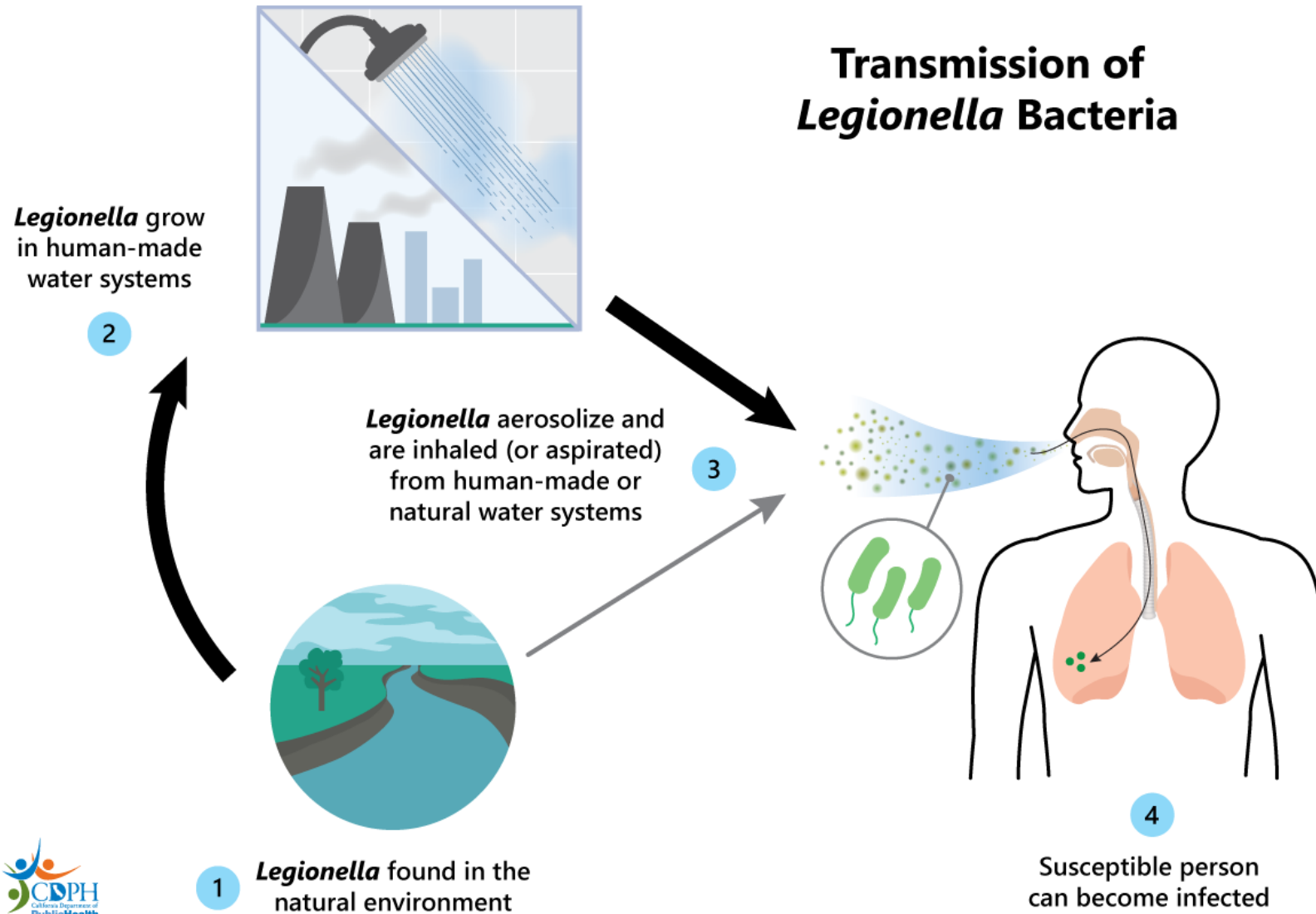
Legionella Essentials

- *Legionella* bacteria is:
 - Gram-negative with many species
 - Most cases from *Legionella pneumophila* serogroup 1
 - Cause of Legionnaires' Disease
- Transmission occurs by inhalation or aspiration
 - Person-to-person transmission extremely rare
- Found in fresh water
- Is chlorine tolerant
- Thrives in stagnant, warm water
- Healthcare facilities impact
 - Communities with large complex water systems



[Legionnaires Disease Cause and Spread | CDC](https://www.cdc.gov/legionella/about/causes-transmission.html)

[\(www.cdc.gov/legionella/about/causes-transmission.html\)](https://www.cdc.gov/legionella/about/causes-transmission.html)



[Transmission of Legionella Bacteria](http://www.cdph.ca.gov/CID/DCDC/Pages/Legionellosis(Legionella).aspx)

([www.cdph.ca.gov/CID/DCDC/Pages/Legionellosis\(Legionella\).aspx](http://www.cdph.ca.gov/CID/DCDC/Pages/Legionellosis(Legionella).aspx))





'At-Risk' Residents for Legionnaire's Disease

- Immunosuppressed
- Age >50 years
- Cancer
- Current or former smokers
- Chronic lung diseases
- Underlying kidney or liver failure
- Diabetes



[Legionnaires Disease Cause and Spread | CDC](https://www.cdc.gov/legionella/about/causes-transmission.html)

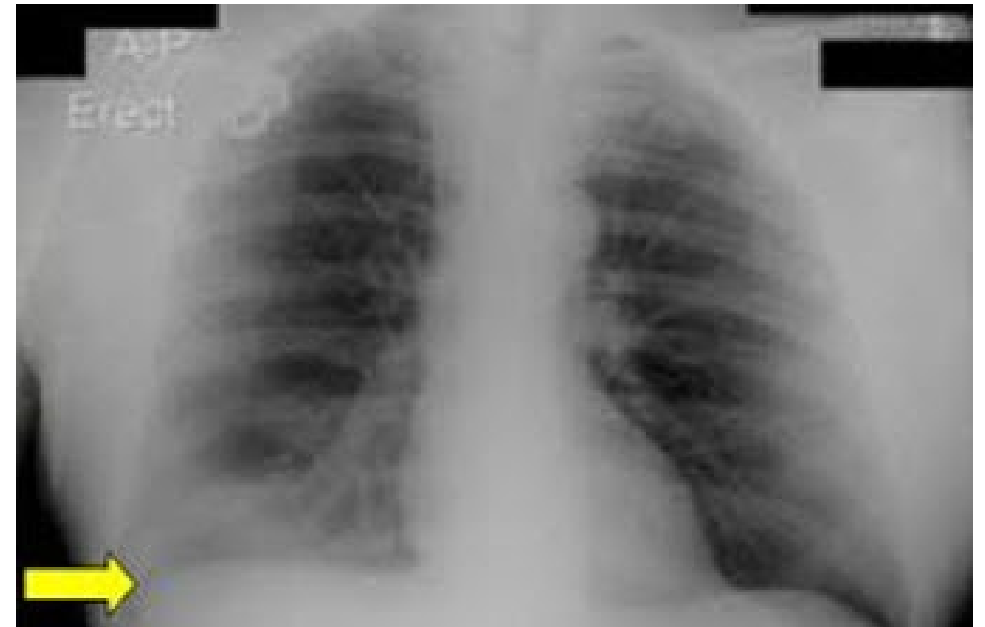
(www.cdc.gov/legionella/about/causes-transmission.html)



Diseases Cause by *Legionella*

- Pontiac Fever
 - Self-limited influenza-like illness
 - Incubation period usually 24-48 hours
 - Attack rate high, 50-90%
- Legionnaires' Disease
 - Pneumonia
 - Incubation period 2-14 days
 - Usually 5-6 days
 - Mortality: 8% (range 5-30%)
- Extrapulmonary Legionellosis can occur

These residents will test negative on respiratory viral panels



Chest X-ray with arrow pointing to pneumonia signs



Surveillance Case Definition for Legionnaires' disease

- **Clinical illness** characterized by fever, myalgia, cough, and clinical or radiographic pneumonia AND
- **Laboratory Criteria**
 - **Confirmed case:** Culture, *Legionella pneumophila* serogroup type 1 (Lp1) urine antigen test (UAT), Legionella PCR + from sample of lower respiratory specimen (BAL)
 - Lp1 accounts for only 84% of *Legionella* cases
 - Absent WBCs in sputum may occur in *Legionella* cases
 - Suspected case: Antibody titer positive to other types of *Legionella*

[Case definition of legionella](#)

(www.cdc.gov/legionella/clinicians/diagnostic-testing.html)



Suspect Potential Legionnaire's Disease Cases

When a case has been identified within the facility look for:

- Other residents with healthcare facility onset of Legionnaire's Disease within the last 12 months
 - Epidemiological link to at least one other case in the facility
- Positive environmental samples of *Legionella*
- Changes that may suggest *Legionella* potentially has infiltrated the building
 - Construction in the area adjacent to the facility
 - Low chlorine level measurements in the water
 - New decorative water feature was installed

[Legionnaires Disease Diagnosis](#)

(www.cdc.gov/legionella/clinicians/diagnostic-testing.html)



Case finding for Legionnaires' Disease in Skilled Nursing Facilities

- Perform surveillance for pneumonia cases
 - Use McGeer criteria for “acute respiratory illness”
 - Obtain chest x-ray and *Legionella* urine antigen
 - Sputum sample more accurate by bronchoscope
- Review medical records and surveillance log for past 12 months to identify residents with possible or confirmed Legionnaire’s Disease
- If SNF resident with pneumonia was transferred to an acute care hospital, ask local public health to check if the hospital reported that resident as having confirmed Legionnaire’s Disease
- If SNF resident has history of pneumonia in past 1-2 months without a cause identified, perform urinary antigen test



Additional Case Finding for Legionnaires' Disease in Skilled Nursing Facilities

- Prepare line list of suspected cases
 - Who, what, when, where
 - Initiate prospective active surveillance for at least 2 months
 - During transfers to acute care hospital for acute respiratory symptoms, notify hospital of potential exposure to Legionella
 - Report findings to local public health and CDPH Licensing and Certification (L&C)
 - Consider those with influenza-like illness who test negative for respiratory viruses, if a single case of legionella pneumonia is found
 - Possible Pontiac fever could be the cause
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CDC Guidance for Investigation of Healthcare-Associated Legionnaires' Disease

- When one DEFINITE healthcare-associated case is confirmed, investigation should include
 - An environmental assessment and cultures of the water system
 - Necessity of finding the source to prevent further cases
 - Other vulnerable individuals at facility may be exposed
 - All healthcare facilities should have a *Legionella* Water Management Program
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[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)



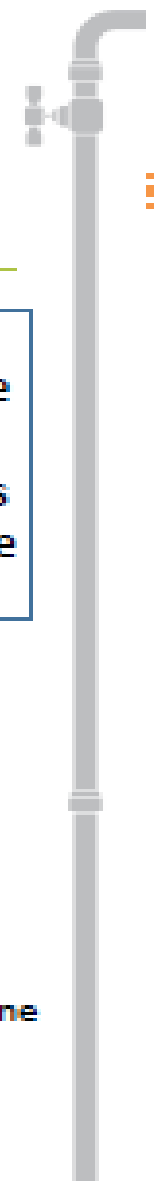


Water Management Strategies to Reduce *Legionella* Risk





From *Legionella* in fresh water to clinical disease: a multi-step cascade



Legionella lives in fresh water



- Natural reservoir for *Legionella*
- Insufficient quantities to cause disease

Certain conditions in large, complex water systems can lead to *Legionella* amplification



- Temperature (77–108°F)
- Stagnation
- Scale and sediment
- Biofilm
- Protozoa
- Absence of disinfectant

Certain devices can aerosolize water containing *Legionella*



- Showerheads and sink faucets
- Cooling towers
- Hot tubs
- Decorative fountains
- Nebulizers

Legionella can be transmitted to susceptible hosts and cause disease



- Age > 50 years
- Smoking
- Weakened immune system
- Chronic disease



Factors That Can Lead to *Legionella* Growth

- Factors external to buildings that can lead to *Legionella* growth
 - Construction
 - Water main breaks
 - Changes in municipal water quality
- Factors internal to buildings that can lead to *Legionella* growth
 - Biofilm
 - Scale and sediment
 - Water temperature fluctuations
 - Water pressure changes
 - pH
 - Inadequate disinfectant
 - Water stagnation

[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)





Municipal Water Causes Health Issues in Michigan

- City of Flint Michigan changed from Detroit Water service to water obtained from the nearby Flint River April 2014
 - Changing water source created massive pipe corrosion
- Lead poisoning of children due to lead leeching from old piping systems
- Cases of Legionnaire's Disease were reported 2014-2015
 - Associated with cooling towers of hospital and residential drinking water



Water samples from Flint Michigan residences



Legionella Can Grow in Many Parts of Building Water Systems that are Continually Wet, and Certain Devices Can Spread Contaminated Water Droplets

- **Examples include:**
 - Hot and cold-water storage tanks
 - Water heaters
 - Water-hammer arrestors
 - Expansion tanks
 - Water filters
 - Electronic and manual faucets
 - Aerators
 - Faucet flow restrictors
 - Showerheads and hoses
 - Pipes, valves, and fitting
 - Ice machines
 - Medical devices (such as CPAP machines, hydrotherapy equipment, bronchoscopes)



Other Potential Sources of *Legionella*

- Cooling towers of large building complexes
 - Uses water to evaporate and cool hot air from the building by spraying water through the tower
 - Acts as air conditioning for large facilities
 - Are breeding grounds for *Legionella* if not disinfected and maintained properly
- Air conditioners (including window type) that are improperly maintained
- Anywhere tap water is used where water can stagnate or be sprayed
 - Found in windshield washer fluid reservoirs of cars and buses

[Legionnaires Disease Cause and Spread | CDC](https://www.cdc.gov/legionella/about/causes-transmission.html)

(www.cdc.gov/legionella/about/causes-transmission.html)



What are Challenges in Water Management?

- **Biofilm:** Protects *Legionella* from heat and disinfectant, provides food and shelter to organisms, grows on any surface that is constantly moist, can last for decades
 - **Scale and sediment:** Uses of disinfectant and creates a protect home for *Legionella* and other organisms
 - **Water pressure changes:** Can cause biofilm to dislodge, which colonizes downstream plumbing, devices and filters
-
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[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)

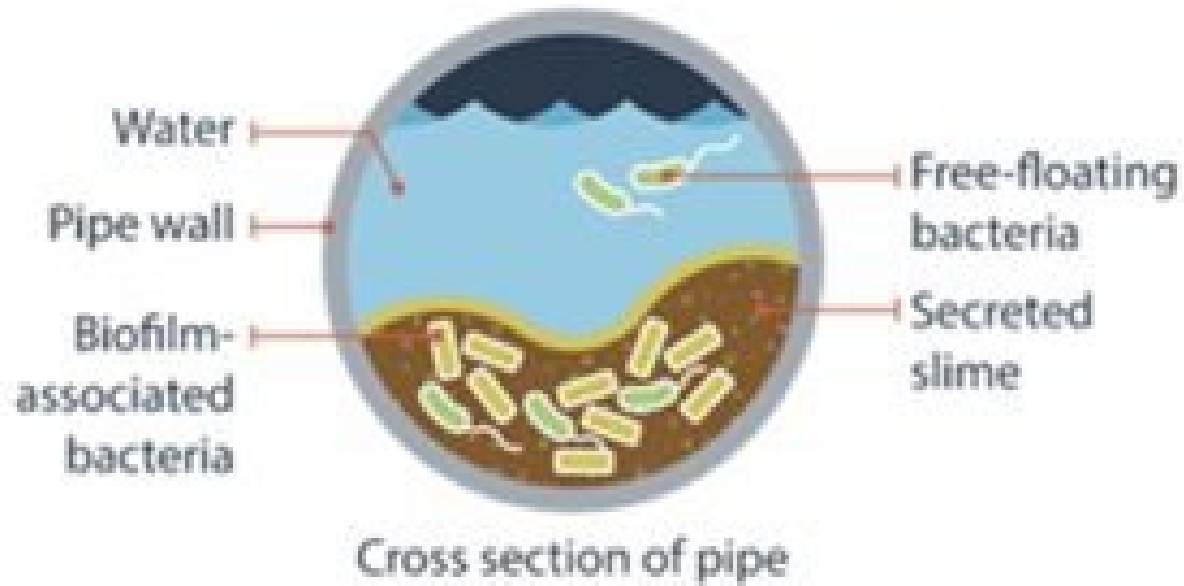




For internal use only, not for distribution

Biofilm, Scale, and Sediment

Legionella can live and grow in biofilm





Inadequate Disinfectant

- Does not kill or inactivate *Legionella*
 - If water entering your building is of high quality, it still may contain *Legionella*
- In some buildings, processes such as heating, storing, and filtering can degrade the quality of the water
 - These processes use up the disinfectant the water entered with, allowing the few *Legionella* that entered to grow into a large number
 - Charcoal filters for taste take out chlorine needed for disinfection

[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)





Disinfectant Action and Water

- **pH:** Disinfectants are most effective within a narrow range of pH (6.5 to 8.5)
- **Water stagnation:** Encourages biofilm growth and reduces water temperature and levels of disinfectant
 - Common issues that contribute to water stagnation include renovations that lead to creation of ‘dead legs’, and reduced building usage, like a shower in an unused room

[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)



What are 'Dead Legs'? Or 'Blind Legs'?

- Dead legs are sections of piping that are no longer used, or used intermittently, due to building configuration changes
 - Water stagnation in these pipes lead to biofilm formation
 - When flushed, the biofilm in those legs can seed organisms into other pipes in the system
 - Especially if not flushed at the correct temperature or pressure
- Blind legs are sections of piping that are rarely used
 - Water stagnates, forms biofilm, never gets chlorine added fresh water



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Dead legs

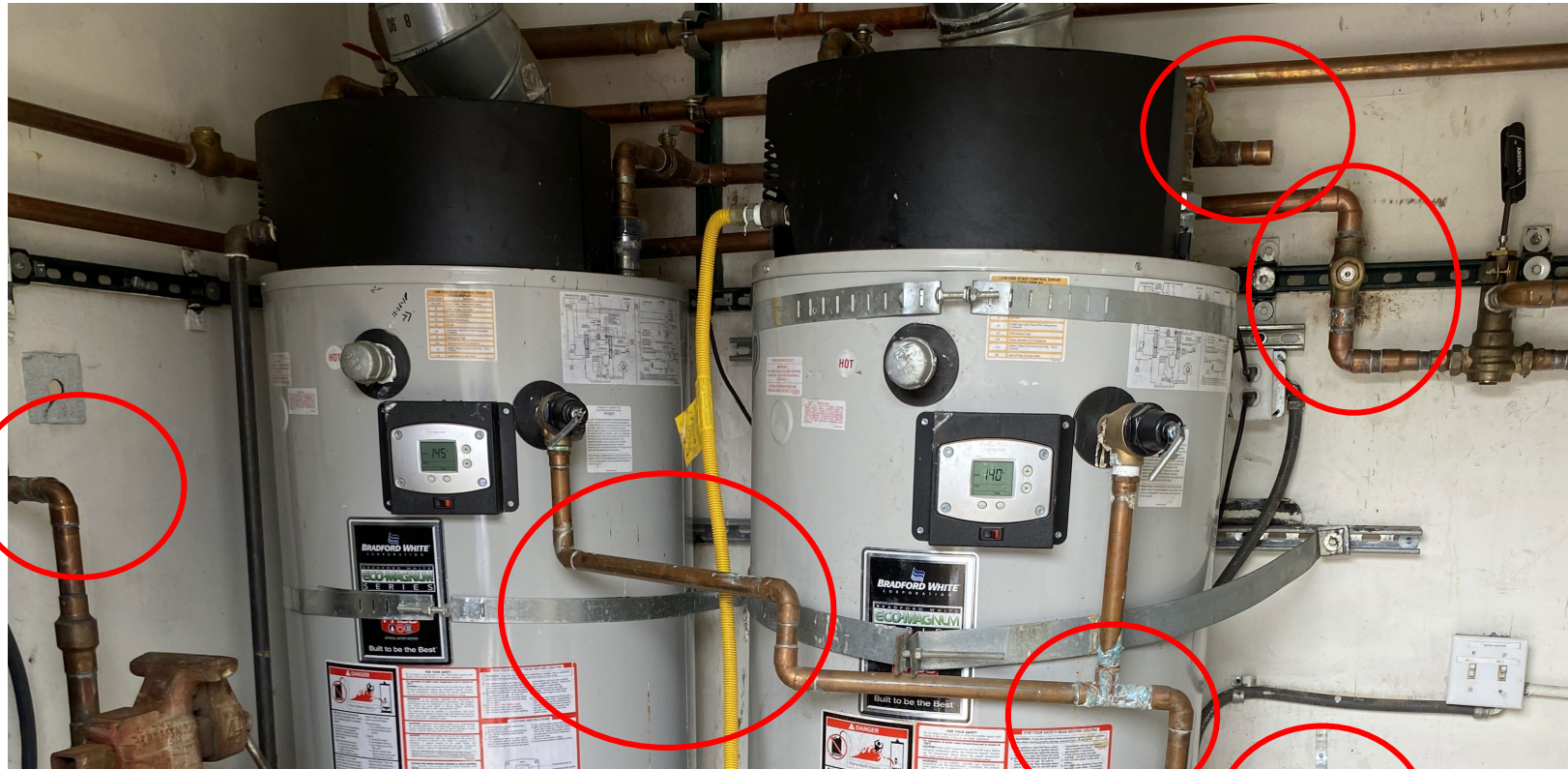


Blind legs



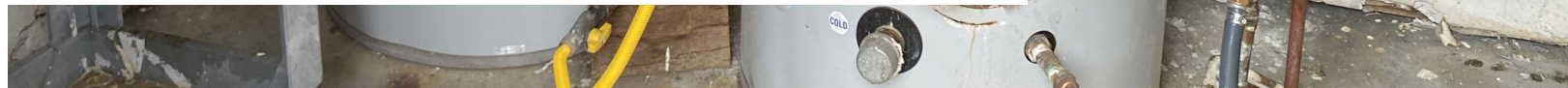


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Multiple L's, dead and blind legs, cause water turbulence and biofilm formation

Storage of water at suboptimal temperature becomes bacterial growth chamber





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Main Water Heaters in a Facility with a Legionella Case

- Pipes were flushed with hyper-chlorinated water by a third-party company, but water heaters were not cleaned
- The facility process of disinfecting water heaters internally and components were not known

HEALTHCARE-ASSOCIATED INFECTIONS PROGRAM





Water Storage: How Are Tanks and Pipes Cleaned?



In a *Legionella* outbreak facility:

- Tanks were stored outside with varying climate
- No process for cleaning tanks or rubber piping



Additional Water Challenges

- **Many events cause hot water temperature to drop into the range where *Legionella* can grow**
 - Low settings on water heaters, heat loss as water travels through long pipes away from the heat source, mixing cold and hot water within the plumbing system, heat transfer if hot and cold water pipes too close together, heat loss due to water stagnation
 - In hot weather, cold water in pipes can heat up into that range

[Legionella Toolkit](#)

(www.cdc.gov/legionella/downloads/toolkit.pdf)



Our Facility Has Hot Water, Shouldn't That Kill Waterborne Organisms?

- Certain areas have 'anti-scald' regulations to prevent burns
- Water temperature that starts at 120° F at the water heater drops as water goes through the pipes of the facility
- Cold weather will affect this more quickly
 - Depends on where the water heaters are located and the length of piping to deliver water


Anti-scald Regulation

You should follow local and state anti-scald regulations. However, maximum temperatures allowed by your state may be too low to limit *Legionella* growth. Engineering controls that mix hot and cold water together at or near the point of use can reduce the risk of scalding while allowing water in pipes to remain hot enough to limit *Legionella* growth.





Consumer Product Safety Commission Alert: Scald Prevention in Homes



Avoiding Tap Water Scalds

The majority of injuries and deaths involving tap water heaters are preventable. The Consumer Product Safety Commission (CPSC) urges consumers to lower their water heater temperature to 120 degrees Fahrenheit. In addition to preventing accidents, this decrease in temperature will conserve energy and save money.

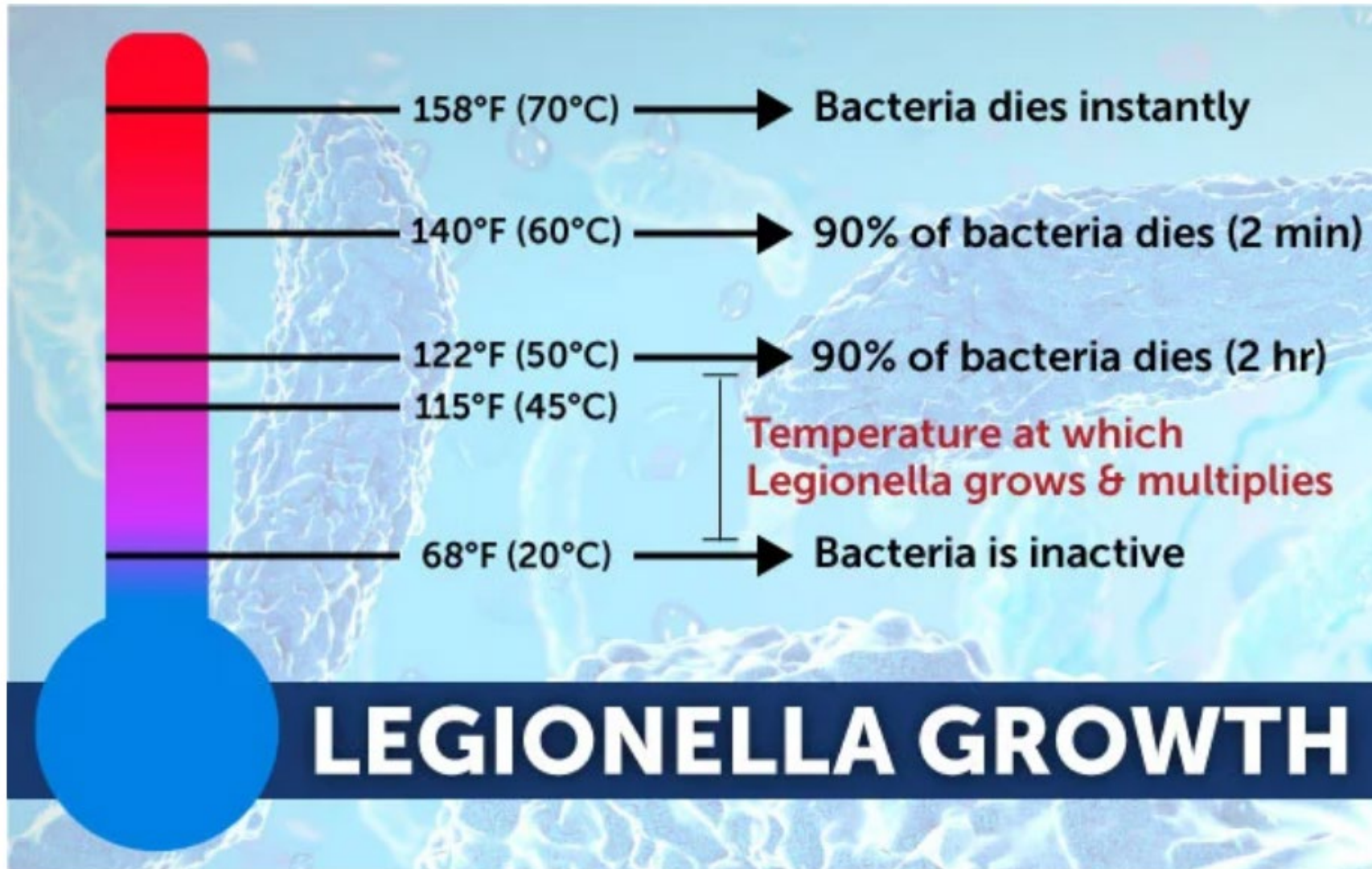
120 degrees Fahrenheit. In addition to preventing accidents, this decrease in temperature will conserve energy and save money.

Gas water heaters. Because the gas company for temperatures are at thermometer reading first three hours after water must thermostat or manufacturer's instructions with thermometer.

If you do not have a tankless water heater, your water system. Call the manufacturer for more information. If you have a tank water heater, contact the manufacturer to discuss possible options for lowering your tap water temperature. Lowering your tap water temperature will not affect the water temperature.

www.cpsc.gov/s3fs-public/5098-Tap-Water-Scalds.pdf

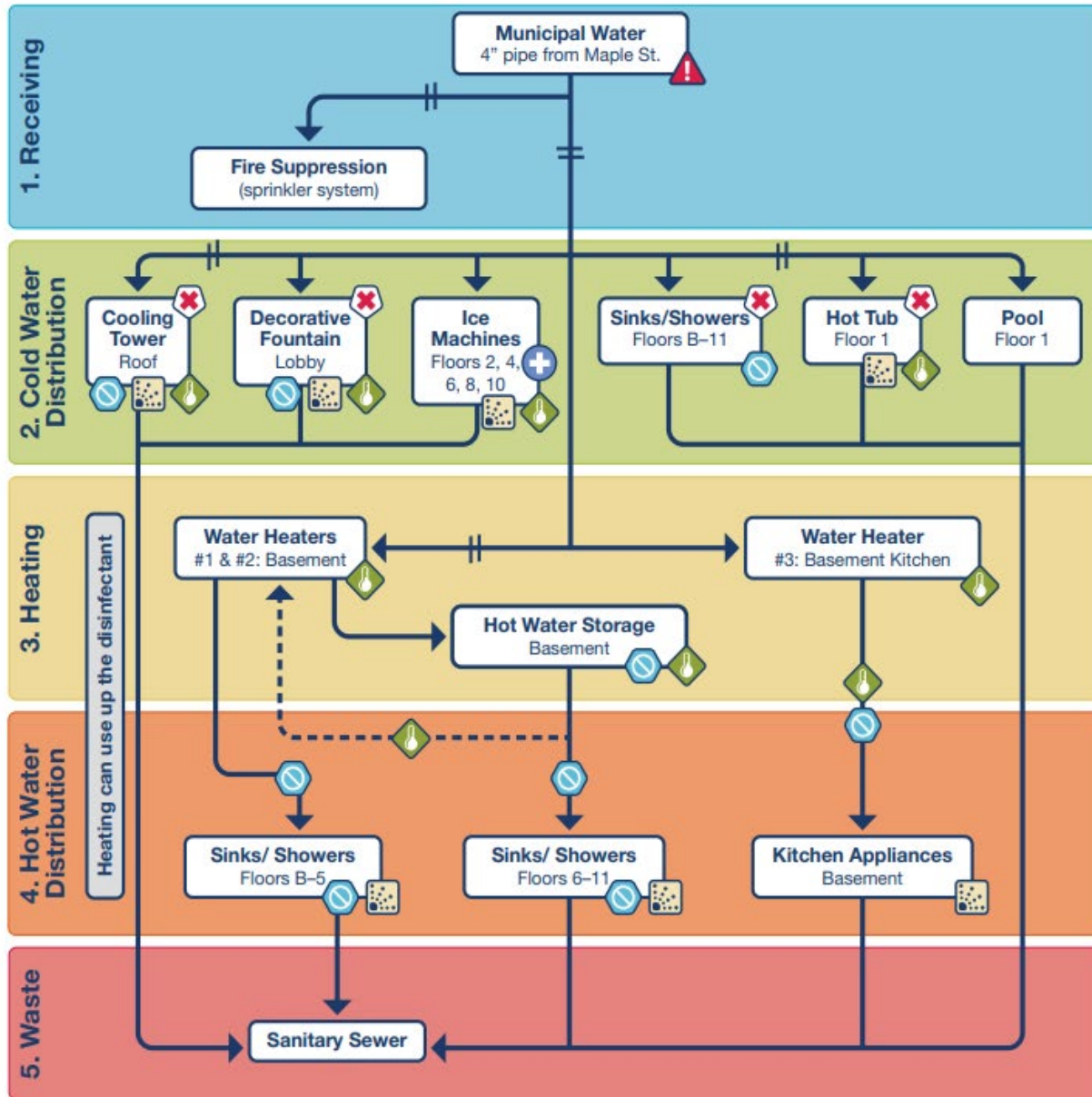




[Legionnaires' Disease Are Rising in the U.S.](http://www.circuitsolver.com/cases-of-legionnaires-are-rising/)
(www.circuitsolver.com/cases-of-legionnaires-are-rising/)



Sample Diagram of Water Pathways Where Legionella Can Grow



- Temperature Permissive
- Stagnation
- No Disinfectant
- Conditions for Bacteria Spread
- Special Considerations for Healthcare Facilities
- External Hazards (eg., construction, main break)

[Legionella Toolkit](http://www.cdc.gov/legionella/downloads/toolkit.pdf)
(www.cdc.gov/legionella/downloads/toolkit.pdf)

Legend: || Backflow Preventer ← WaterFlow ←--- Recirculating Return Flow □ Water Process





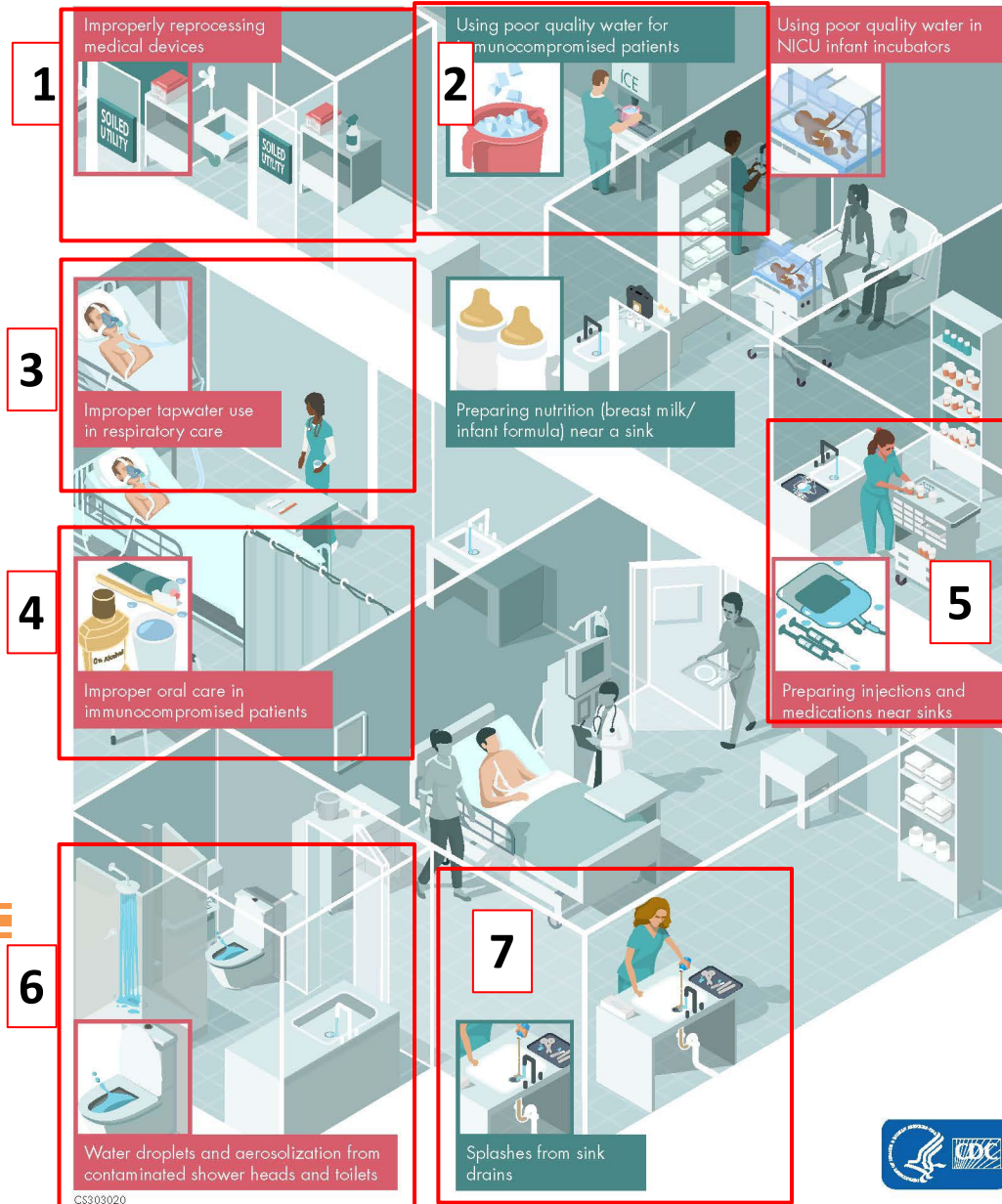
Transmission from Sources to Susceptible Residents



[What Owners and Managers of Buildings and Healthcare Facilities Need to Know About the Growth and Spread of Legionella](http://www.cdc.gov/legionella/wmp/overview/growth-and-spread.html) (www.cdc.gov/legionella/wmp/overview/growth-and-spread.html)

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Potential Transmission Routes from Water to Patients



HEALTHCARE-ASSOCIATED INFECTIONS PROGRAM

Potential Transmission Routes from Water to Residents

1. Improper reprocessing of medical devices
2. Poor quality water for bathing or feeding immunocompromised residents
3. Improper use of tap water to rinse respiratory equipment
4. Improper oral care in immunocompromised residents
5. Preparing medications and injections next to sinks
6. Water droplets from sinks and shower heads
7. Splashes from sink drains

[Reduce Risk to Patients from Plumbing](http://www.cdc.gov/hai/prevent/environment/water.html)

(www.cdc.gov/hai/prevent/environment/water.html)





DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850



Center for Clinical Standards and Quality/Quality, Safety and Oversight Group

Ref: **QSO-17-30- Hospitals/CAHs/NHs**
REVISED 07.06.2018

DATE: June 02, 2017
TO: State Survey Agency Directors
FROM: Director
Quality, Safety and Oversight Group (formerly Survey & 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 Expectations for Providers, Accrediting Organizations, and Surveyors****

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.

CMS QSO-17-30 (Revised 2018)

[CMS LTC Legionella Requirement
\(www.cms.gov/medicare/provider-enrollment-and-certification/surveycertificationgeninfo/downloads/qso17-30-hospitalcah-nh-revised-.pdf\)](http://www.cms.gov/medicare/provider-enrollment-and-certification/surveycertificationgeninfo/downloads/qso17-30-hospitalcah-nh-revised-.pdf)





CMS Facility Requirements to Prevent *Legionella* Infections

- **WHO**
 - Hospitals
 - Critical Access Hospitals
 - Nursing Homes
 - **WHAT**
 - “Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems and reduces the risk of growth and spread of Legionella and other opportunistic pathogens in water.”
-
-

CMS S&C Legionella Memo 17-30





AFL 18-29 Is Still In Effect!

The screenshot shows the California Department of Public Health website. At the top, there is a navigation bar with links for 'en Español', 'Contact Us', 'About', 'News & Media', and 'Jobs/Careers'. Below this is a search bar and a menu with options: 'I am looking for', 'I am a', 'Programs', and 'A-Z Index'. The main content area features the CDPH logo and the text 'State of California—Health and Human Services Agency California Department of Public Health'. To the right is the Governor's seal and name, 'EDMUND G. BROWN JR. Governor'. The letter title is 'AFL 18-39'. The date is 'September 17, 2018'. The recipient is 'TO: All Facilities'. The subject is 'SUBJECT: Reducing Legionella Risks in Health Care Facility Water Systems'. The authority is 'AUTHORITY: Title 42 Code of Federal Regulations sections 482.42, 483.80, and 485.635'.

Requires facility to conduct a risk assessment, develop and implement a water management program, and setting testing and control measures, in compliance with federal, state, and local requirements

All Facilities Letter (AFL) Summary

- This AFL notifies hospitals, critical access hospitals (CAHs), and skilled nursing facilities (SNFs) of the requirement to reduce the risks of Legionella in facility water systems, per the Centers for Medicare and Medicaid Services (CMS), [Quality, Safety, and Oversight \(QSO\) 17-30](#) memorandum.
- Hospitals, CAHs and SNFs 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.
- Although [QSO 17-30](#) applies to hospitals, CAHs, and SNFs, the memorandum is also intended to provide general awareness for all health care providers.





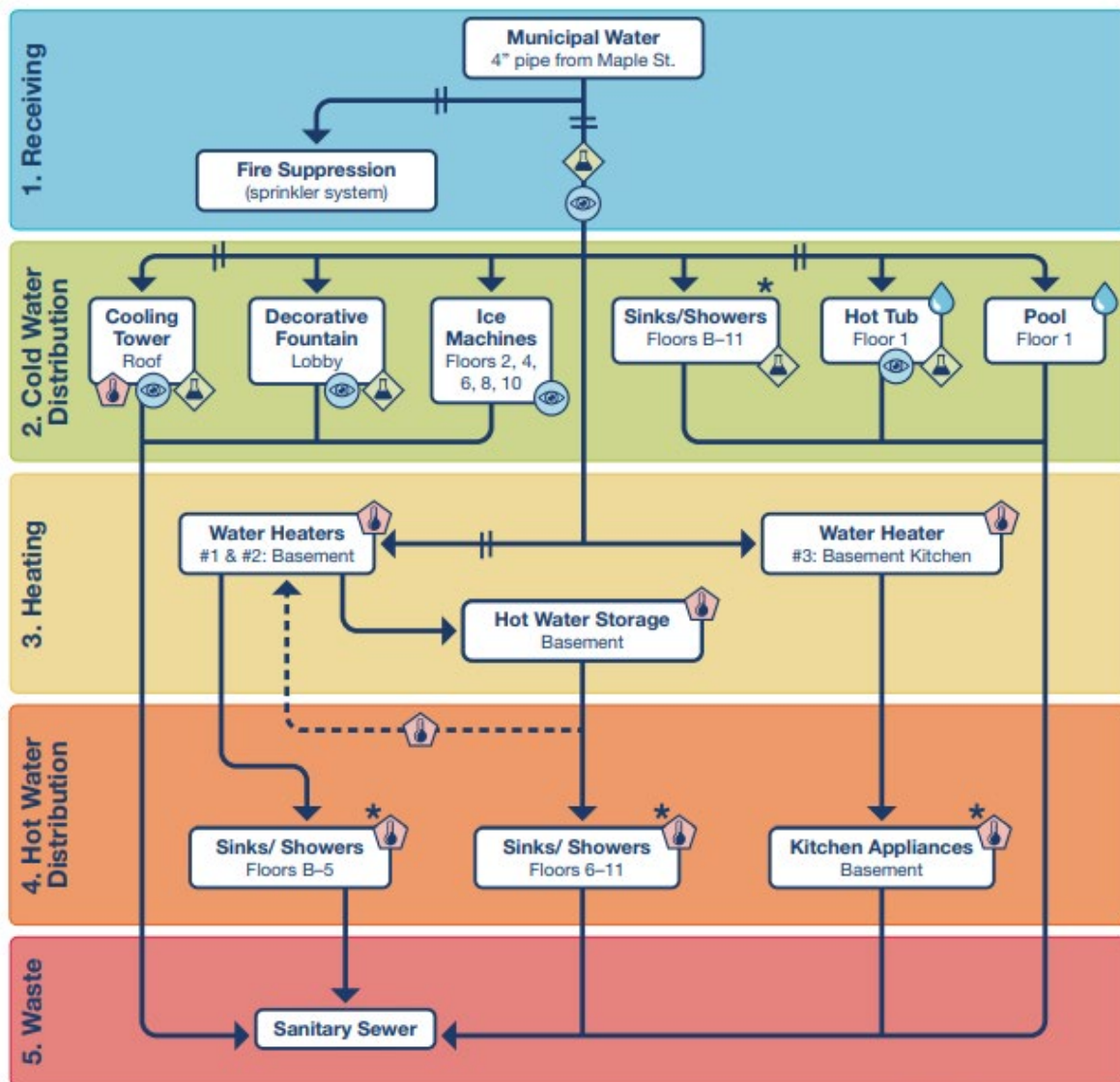
Legionella Water Management Program (WMP)

- **Establish a WMP team**
 - Include infection prevention, facilities management, infectious disease clinician, risk and quality management
- **Describe the building water systems**
 - Develop text and flow diagrams
- **Identify areas where *Legionella* could grow and spread**





Review Water Management Program: Monitoring



Legend: || Backflow Preventer ← WaterFlow ←--- Recirculating Return Flow □ Water Process

Principles:

1. Keep hot water hot
2. Keep cold water cold
3. Avoid stagnation



Visual Inspection



Check Disinfectant Levels



Check Temperature



Legionella Control Measures for Potable Water Systems

Water parameter	Control measure	Recommendations
Sediment and biofilm	Flushing, cleaning, and maintenance	<ul style="list-style-type: none"> • Flush after intrusion (example: water main break) • Clean and maintain water system components: Water heater mixing valves, aerators, showerheads, hoses, and filters regularly based on water quality
Temperature	Control limits	<ul style="list-style-type: none"> • Store hot water >140°F and maintain circulating hot water above 120°F • Store and maintain circulating cold water below the growth range most favorable to <i>legionella</i>. (<i>Legionella</i> may grow at temperatures as low as 68°F)
Water age	Flushing	<ul style="list-style-type: none"> • Flush low-flow pipe runs and dead legs at least weekly • Flush infrequently used fixtures regularly

[Controlling legionella in potable water systems](http://www.cdc.gov/legionella/wmp/control-toolkit/potable-water-systems.html)

(www.cdc.gov/legionella/wmp/control-toolkit/potable-water-systems.html)





Interim Control Measures in Outbreaks- 1

If outbreaks are identified, in consultation with LHD, minimize resident exposure to potable water sources

- Restrict showering
 - Give bed baths in the interim
- Restrict drinking from potable water sources
 - Use bottled water
- No use of ice from ice machines





Interim Control Measures in Outbreaks - 2

- Turn off decorative water features, close whirlpools and/or spas pending cultures
- Ensure use of sterile water in water-based devices that produce aerosols (e.g., respiratory therapy equipment, and humidifiers)
- Consider installing point-of use filters on showerheads and water faucets in areas of concern
- If restricting water use, prevent water stagnation by periodic flushes of showerheads and sinks



Look For Opportunities for Water to Stagnate and Grow Waterborne Organisms

- Dependent loops on shower hand-held sprayers
 - Water pools, forms biofilm
 - Stays out of temperature range of general plumbing
- If not flushed before resident bathes, will dislodge biofilm organisms that the resident could inhale





Reducing Water Exposures – Additional Strategies

Observe for additional exposures to water

- Ice from ice machines in ice chests, used for snacks/hydration
 - Ice chips for moistening residents' mouths or fever reduction
 - Drinking fountains
 - Is the water filter changed regularly per manufacturer's instructions for use (IFU) for filter and fountain
 - Water stagnates if not used regularly
 - Consider removal of fountain if not used regularly
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Splashes From Drains

- Watch for shallow sinks with high curved faucets (goose-neck) positioned over a drain
- Splashes of biofilm organisms from the sink and drain onto the environment 3 feet away
- Splash guards prevent splashes of water onto resident medications or devices in close spaces
 - CMS requirement

[Preparing for a CMS Survey: Part II, Practice - Infection Control Results](http://www.infectioncontrolresults.com/preparing-for-a-cms-survet-part-ii-practice)

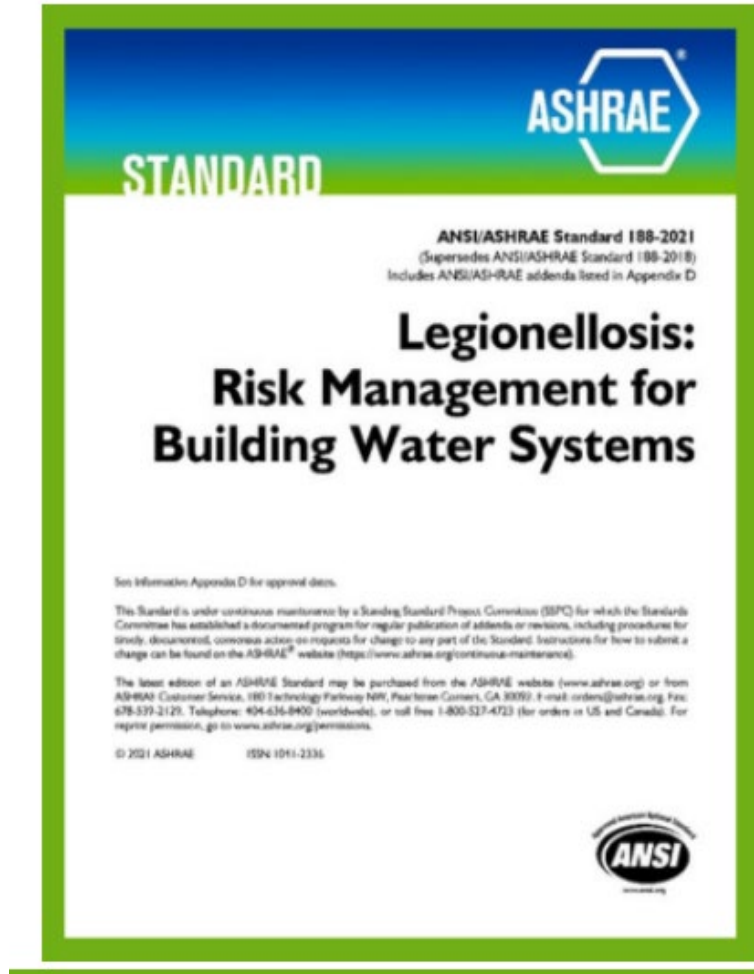
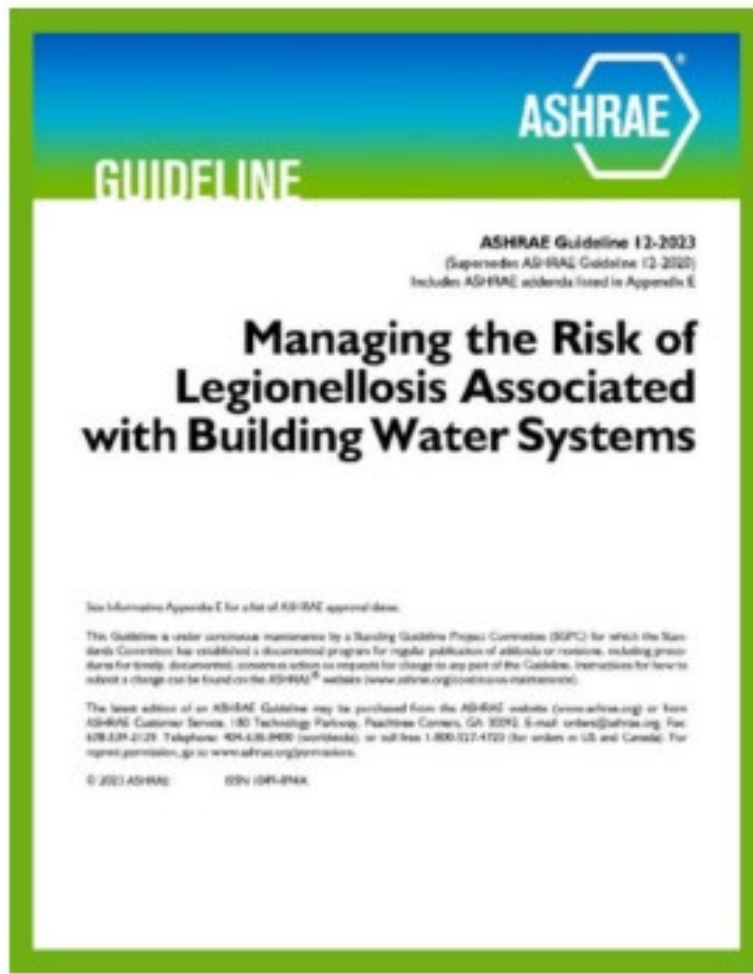
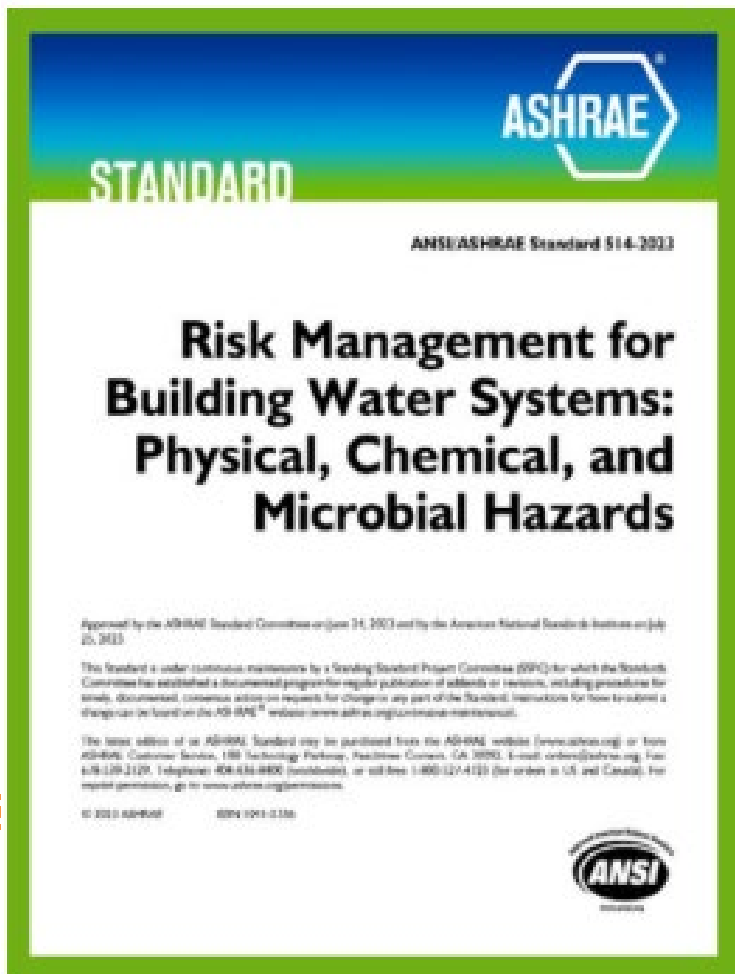
(www.infectioncontrolresults.com/preparing-for-a-cms-survet-part-ii-practice)

[A multicenter investigation to characterize the risk for pathogen transmission from healthcare facility sinks - PubMed \(nih.gov\)](#)





ASHRAE Legionellosis Standards for Water Management



[ASHRAE Standards 514, 188, and 12](https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-systems-risk-management)

www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-systems-risk-management



For internal use only, not for distribution



California Department of Public Health
Healthcare-Associated Legionnaires' Disease
Investigation Quicksheet



Legionnaires' Disease (LD)

- Legionnaires' disease (LD), a pneumonia caused by *Legionella* species bacteria, is often severe, requiring hospitalization. LD risk factors include age \geq 50 years, smoking, chronic lung disease, immune system disorders, systemic malignancy, and other chronic diseases such as diabetes, renal failure or hepatic failure.
- Transmission occurs through inhalation or aspiration of water contaminated with *Legionella*. Incubation period is 2-14 days prior to symptom onset. Standard precautions should be used when caring for hospitalized patients with LD.
- *Legionella* are found naturally in fresh water, are chlorine tolerant, and proliferate in warm, stagnant water systems, particularly within microbial biofilms on plumbing surfaces.
- Hospitals and other healthcare facilities often have large, complex water systems, making them potentially high-risk settings for transmission of *Legionella* to vulnerable patients or residents.
- The Centers for Disease Control and Prevention (CDC) recommend and the Centers for Medicare & Medicaid Services (CMS) require all hospitals and skilled nursing facilities to develop and implement a Water Management Program to reduce the growth and spread of *Legionella* and other opportunistic pathogens in premise plumbing.

Laboratory Testing Considerations

- Optimal testing for LD includes culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and *Legionella* urinary antigen test (UAT), concurrently if possible.

- Alternatively, testing for *Legionella* may be performed with a validated nucleic acid amplification test on lower respiratory secretions and UAT. If UAT or nucleic acid test is positive, lower respiratory secretions should be cultured for *Legionella* using selective media.
- The UAT is a sensitive assay for *Legionella pneumophila* serogroup 1 (Lp1), the most common cause of LD. However, it does not reliably detect Lp serogroups 2-14 or other *Legionella* species.
- Antigen from a previous *Legionella* infection can be excreted in urine for months. This may lead to a positive UAT without current signs and symptoms of pneumonia, or with pneumonia from another etiology.

Legionnaires' Disease Case Classification

Local health departments (LHD) should review patients' clinical, radiographic and microbiologic information, infectious disease consultation (if available) and clinician diagnosis. Classify reported cases of LD using the 2019 Council of State and Territorial Epidemiologists' case (CSTE) classifications:¹

- **Confirmed:** pneumonia, diagnosed clinically and/or radiographically in addition to at least one of the confirmatory laboratory criteria: positive test for Lp 1 antigen in urine, *Legionella* culture of respiratory secretions or other sterile site, detection of *Legionella* in a lower respiratory specimen or sterile site by validated nucleic acid amplification test, or seroconversion to Lp 1 using validated reagents.

CSTE Classifications

https://www.cste.org/resource/resmgr/2019ps/final/19-ID-04_Legionellosis_final.pdf

For more information or consultation, contact HAIProgram@cdph.ca.gov or call 510-412-6060.

Revised December 2019

CDPH Healthcare-Associated Legionnaires' Disease Investigation Quicksheet

[Healthcare-Associated Legionnaires' Disease Investigation Quicksheet](#)

(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/HA_LegionnairesDiseaseQuicksheet_12.20.19_final.pdf)



Guidance for Managing Legionellosis

CDPH IDB Guidance for Managing Select Communicable Diseases

LEGIONELLOSIS

LEGIONELLOSIS

I. DESCRIPTION AND EPIDEMIOLOGY

A. Overview

Legionella spp. are gram-negative bacteria that are found naturally in freshwater sources, where they are not usually present in sufficient numbers to cause disease. However, *Legionella* can grow and multiply within the built environment, especially in large buildings with complex water systems (e.g., hospitals, hotels, etc.) or devices that use water (e.g., cooling towers, hot tubs, respiratory therapy equipment, etc.). Within these built water environments, *Legionella* can live and multiply within biofilms, or as intracellular parasites within protozoa. Factors contributing to *Legionella* growth in the built environment include temperature, water age, disinfectant residual, and presence of sediment or biofilm.

[CDPH IDB Guidance for Legionellosis, March 2023 \(ca.gov\)](https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/IDB/GuidanceforCALHJs-Legionellosis.pdf)

(www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/IDB/GuidanceforCALHJs-Legionellosis.pdf)



Summary

- Water is *not* sterile
 - Can carry disease-causing organisms to susceptible residents in SNFs
- Plumbing and other types of water storage can increase the population of those organisms if not managed
- Water management programs are integral to infection prevention and control in SNFs
- Case finding is challenging, but necessary, to prevent transmission of waterborne organisms



Additional Resources

[#APIC2019 A hidden truth: Hospital faucets are often home to slime and biofilm - APIC](#)

[CDC Legionella Toolkit](#)

www.cdc.gov/legionella/downloads/toolkit.pdf

[Control of biofilm growth in drinking water distribution systems.](#)

nepis.epa.gov/Exe/ZyPDF.cgi/30004JBW.PDF?Dockey=30004JBW.PDF

[Guidelines for Environmental Infection Control in Health-care Facilities:](#)

[Recommendations of CDC and the Healthcare Infection Control Practices Advisory](#)

[Committee](#) www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm

[Hospital water and opportunities for infection prevention](#)

www.ncbi.nlm.nih.gov/pmc/articles/PMC5583638/

Thank you!

**Contact CDPH for questions:
HAIProgram@cdph.ca.gov**



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