

Legionella Webinar: Exploring National Guidance and Local Experiences

May 30, 2018

The webinar will begin at
1:00 PM ET.

Please listen through the
audio on your computer.

- Please listen through the audio on your computer
- This call is being recorded and the recording will be shared
- Submit questions through the Q&A Box at any time. We will discuss questions at the end of all the presentations
- If you need technical assistance, please use the Q&A box or email infectiousdiseases@naccho.org

Agenda

1:00	Welcome, Dr. Oscar Alleyne
1:05	<i>Legionella</i> in a Gwinnett County Fitness Facility, Alana Sulka, MPH, RN, CPH and Brittany Carter, MPH, REHS
1:25	Legionnaires' Disease: Trends and Outbreak Resources, Laura Cooley, MD, MPHTM
1:35	Legionnaires' Disease Prevention: Environmental Health Perspectives, Jasen Kunz, MPH, REHS
1:45	Overview of resources, ASTHO and NEHA
1:50	Q&A

Speaker Introductions



Alana Sulka, MPH, RN, CPH
Director of Epidemiology & Infectious Diseases
Gwinnett, Newton and Rockdale County
Health Departments

Speaker Introductions



Brittany Cantrell Carter, MPH, REHS
Epidemiology Program Manager
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Health Departments

Speaker Introductions



Laura Cooley, MD, MPHTM
Medical Epidemiologist
Respiratory Diseases Branch, Division of
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Speaker Introductions



Jasen Kunz, MPH, REHS
Environmental Health Officer
Water, Food and Environmental Health
Services Branch (WFEHSB), National
Center for Environmental Health, CDC

LEGIONELLA IN A GWINNETT COUNTY FITNESS FACILITY



<https://www.cdc.gov/legionella/images/materials-illustration.jpg>

Source: CDC

Gwinnett, Newton and Rockdale County Health Departments

Alana Sulka, MPH, RN, CPH

Director of Epidemiology and Infectious Diseases

Brittany Carter, MPH, REHS

Epidemiology Program Manager



ABOUT US

- The Gwinnett, Newton, and Rockdale (GNR) County Public Health Department serves a population of over one million residents in a three county area East of metropolitan Atlanta
- Epidemiology Program Staff
 - Provide infectious and chronic disease investigation, management, education, and prevention services for the county population
 - Perform routine surveillance for over 70 notifiable diseases
 - Provide disease prevention and mitigation activities protecting the health of the community
 - Investigate reports of non-reportable diseases such as Norovirus, head lice, and community acquired MRSA
 - Complete data requests from community partners and the general population
 - Provide infection control guidance and trainings; and collaborate with the county school system to control the spread of infectious diseases in the school population
 - GNR Epidemiology also assists and provides field investigations as requested by Georgia Department of Public Health and CDC

AN OUTBREAK IS IDENTIFIED

- Epidemiology staff conducting routine *Legionella* disease surveillance identified a common exposure among two Gwinnett County individuals
 - Initial case interviewed November 1, 2017
 - Second case interviewed November 6, 2017
- Both individuals had *Legionella pneumophila* SG1 confirmed by urine antigen testing
 - No cultures were available
- Both reported onset of fever, cough, fatigue, and shortness of breath in mid-October 2017 and were diagnosed with pneumonia (Legionnaires' Disease) by chest x-ray
- The average age of the cases was 71 and both were female
- The common exposure included aquatic aerobics classes and use of the spa and shower areas at a local fitness facility

CDC Guidance:

“Clusters and outbreaks have the same definition and you can use either term. Both terms describe two or more people with Legionnaires’ disease exposed to *Legionella* at the same place at about the same time (as defined by the investigators)”

<https://www.cdc.gov/legionella/health-depts/epi-resources/outbreak-investigations.html>

LEGIONELLA BASICS

- Bacterial illness that can cause Legionnaires' disease or Pontiac fever, collectively known as legionellosis
 - Over 60 species of *Legionella*
 - Most disease caused by *Legionella pneumophila* (especially serogroup 1)
- Individuals are infected when they breathe in small droplets of water that contain *Legionella*
- *Legionella* can be found naturally in freshwater environments but also grows in man-made water systems
- *Legionella* grow and multiply within amoebas and ciliated protozoa providing the *Legionella* nutrients for growth and protection from harsh environments due to extreme temperatures and chemicals
 - *Legionella* can also live and grow in biofilms

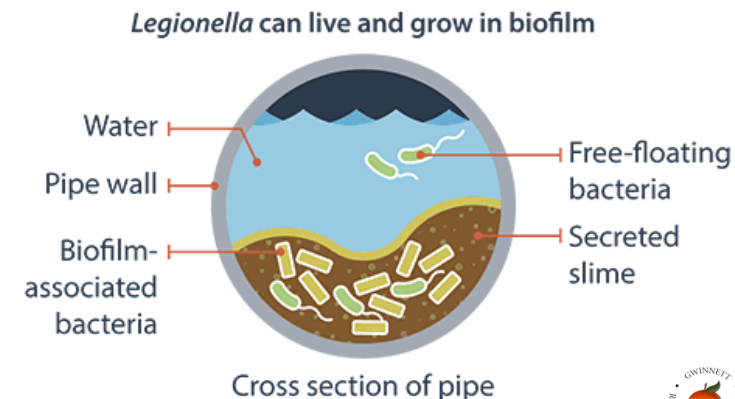
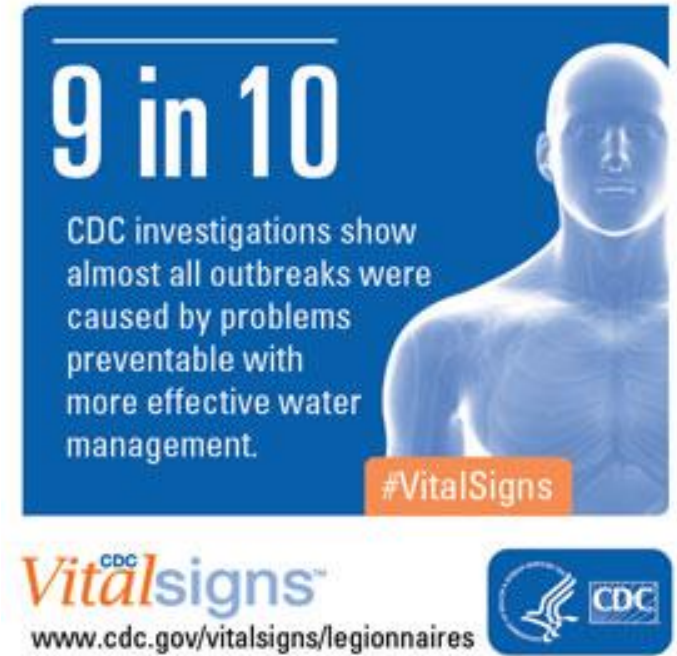


Image source: <https://www.cdc.gov/legionella/wmp/overview/growth-and-spread.html>

LEGIONELLA CLINICAL FEATURES

	Legionnaires' Disease	Pontiac Fever
Clinical Features	Fever, myalgia and cough, shortness of breath, headache, and confusion; nausea and diarrhea may also be present.	Flu-like illness with fever, chills, headache, myalgia, fatigue, malaise
Diagnosis of Pneumonia	Yes	No
Incubation Period	Generally 2 to 10 days following exposure	24 – 72 hours after exposure
Percent of people who become ill following exposure	Less than 5%	Greater than 90%
Treatment	Antibiotics	Supportive
Organism Isolation	Possible	Never demonstrated
Outcome	Hospitalization common. CFR 10% (25% for hospital acquired)	Hospitalization uncommon. CFR extremely low

INITIAL STEPS TAKEN

- GNR staff notified and consulted with the Georgia Department of Public Health, Acute Disease Epidemiology Section (ADES)
 - Other Districts notified of outbreak and potential facility exposure
- Local hospitals also notified to conduct active case finding
- GNR Epidemiologist and Environmentalist met with facility management on site on November 6th to discuss the cases and provide initial recommendations
- Facility voluntarily closed all pools, whirlpools, steam and sauna rooms, and showers while investigation was ongoing
 - Facility notified patronage about closures via email
- GNR staff returned to the facility on November 7th to meet with facility management and a private consultant hired by the facility to assist with the investigation and any needed remediation
 - Standard inspection conducted under local pool regulations
 - No significant issues were identified under routine inspection
 - Full walk through and environmental assessment utilizing CDC's *Legionella* Environmental Assessment Form was also completed

Legionella Environmental Assessment Form

HOW TO USE THIS FORM

This form enables public health officials to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of legionellosis. It can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to develop a sampling plan. The assessment should be performed on-site by an epidemiologist and an environmental health specialist with knowledge of the ecology of *Legionella*. Keep in mind that conditions promoting *Legionella* amplification include water stagnation, warm temperatures (77-108°F or 25-42°C), availability of organic matter, and lack of residual disinfectant such as chlorine. For training and information, please visit CDC's legionellosis resources webpage at: <http://www.cdc.gov/legionella/outbreak-toolkit/>.

Complete the form in as much detail as possible. Do not leave sections blank; if a question does not apply, write "N/A". If a question applies but cannot be answered, explain why. Where applicable, specify the units of measurement being used (e.g., ppm). Completion of the form may take several hours.



BEFORE ARRIVING ON SITE

- ☐ Request the attendance of the lead facility manager as well as others who have a detailed knowledge of the facility's water systems, such as a facility engineer or industrial hygienist.
- ☐ Request that they have maintenance logs and blueprints available for the meeting.
- ☐ Bring a plastic bottle, thermometer, pH test kit, and a chlorine test kit that can detect a wide range of residual disinfectant (<1 ppm for potable water and up to 10 ppm for whirlpool spas).
- ☐ If the epidemiologic information available suggests a particular source (e.g., whirlpool spa, cooling tower), request that they shut it down (but do not drain or disinfect) in order to stop transmission.

INSTRUCTIONS FOR MEASURING WATER PARAMETERS IN THE PREMISE PLUMBING (TABLE P. 8)

It is very important to measure and document the current physical and chemical characteristics of the potable water, as this can help determine whether conditions are likely to support *Legionella* amplification.

STEP 1: Plan a sampling strategy that incorporates all central hot water heaters/boilers and various points along each loop of the potable water system. For example, if the facility has one loop serving all occupant rooms, an occupant room near (proximal) the central hot water heater and another at the farthest point (distal) of the loop should be sampled.

STEP 2: For each sampling point (e.g., tap in an occupant room):

- a. Turn on the hot water tap. Collect the first 50 ml from the tap. Measure the free chlorine residual and pH. Document the findings in the table on p. 8. Note: If there is no residual chlorine in the hot water, measure it in the cold water. Note: Total chlorine should be measured instead of free chlorine if the method of disinfection is not chlorine (e.g., monochloramine).
- b. Allow the hot water tap to run until it is as hot as it will get. Collect 50 ml and measure the temperature. Document the temperature and the time it took to reach the maximum temperature.

National Center for Immunization and Respiratory Diseases
Division of Bacterial Diseases



06/2015 CS254361-A

LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM

Persons completing the assessment:

Name: _____ Job Title: _____ Organization: _____

Telephone: _____ E-mail: _____

Name: _____ Job Title: _____ Organization: _____

Telephone: _____ E-mail: _____

Assessment details:

Facility Name: _____ Date of Assessment: _____

Facility Address: _____ street _____ city _____ state _____ zip _____

Person(s) interviewed during assessment:

Name: _____ Job Title: _____

Name: _____ Job Title: _____

Name: _____ Job Title: _____

Facility Characteristics

1. Is this a healthcare facility or senior living facility with skilled nursing care (e.g., hospital, long term care/rehab/assisted living/skilled nursing facility, or clinic)?
☐ YES → If yes, skip to Q.3 & also complete Appendix A.
☐ NO
2. If NO, indicate type of facility (check all that apply):
☐ Senior living facility (e.g., retirement home without skilled nursing care)
☐ Other residential building (e.g., apartment, condominium)
☐ Hotel, motel, or resort
☐ Recreational facility (e.g., health club, water park)
☐ Office building
☐ Manufacturing facility
☐ Restaurant
☐ Other _____
3. Total number of buildings on campus: _____ Total number of buildings being assessed: _____
4. Total number of rooms that can be occupied overnight (e.g., patient rooms, hotel rooms): _____
5. Does occupancy vary throughout the year? ☐ YES ☐ NO
If YES, seasons with lowest occupancy (check all that apply):
☐ Winter ☐ Spring ☐ Summer ☐ Fall
6. Are any occupant rooms taken out of service during specific parts of the year, e.g., low season?
☐ YES ☐ NO
If YES, which rooms? _____

2 | CDC Legionella Environmental Assessment Form | www.cdc.gov/legionella/outbreak-toolkit/

INITIAL ENVIRONMENTAL INVESTIGATION

- Consultant presented facility and Health Department with a water testing and remediation plan in accordance with CDC and OSHA standards on November 9th including
 - Pre-remediation environmental water sampling
 - Remediation of the water systems in accordance with industry standards for *Legionella* (CDC and OSHA guidance were provided)
 - Post-remediation environmental water sampling
 - Establishment of a water management plan for the facility
- GNR approved the plan on November 9th
- Consultant conducted pre-remediation water sampling on November 10th
- Following water testing, the facility completed a full water system disinfection and treatment utilizing high heat and high level chlorine treatment
- Facility was allowed to reopen following full disinfection and treatment of the water system in accordance with the approved plan

SUMMARY OF ENVIRONMENTAL TESTING

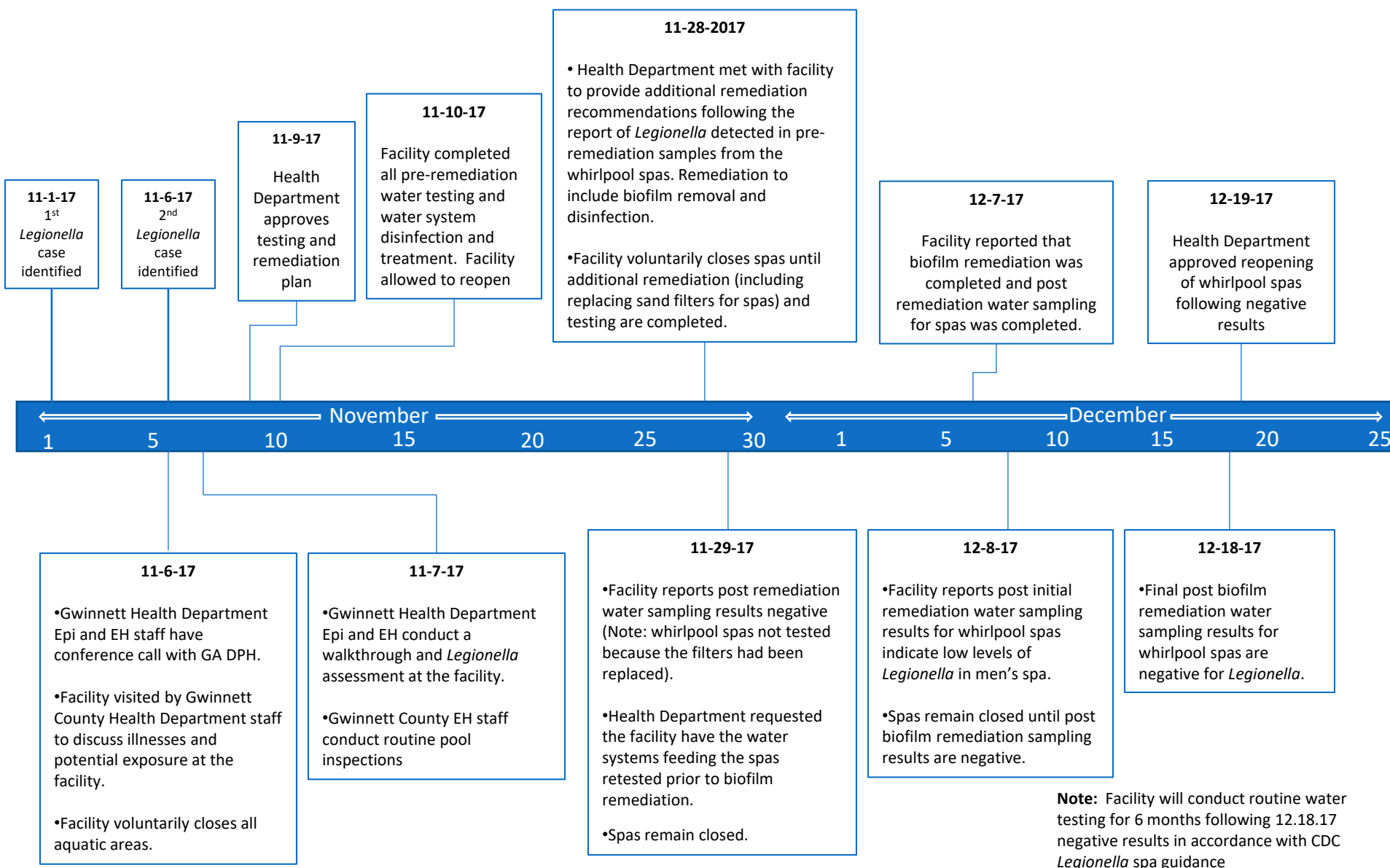
- Pre-remediation results
 - *Legionella pneumophila* SG1 was identified in both the men's and women's hot tub filters
- Post-initial remediation results
 - No *Legionella* was detected in the water samples taken from the hot tubs
 - The filters were not tested initially due to them being replaced
 - We requested the filters be tested even through they were replaced
 - *Legionella* was again detected in the women's spa filter
- Due to continued detection of *Legionella*, biofilm remediation was required
- Post biofilm remediation results
 - No *Legionella* was detected
- Facility was required to continue testing in accordance with CDC recommendations every two weeks for three months and then every month for an additional three months
 - To date, all follow up testing has been negative for *Legionella*

SUMMARY OF PERTINENT LAB RESULTS

Date	Remediation Status	Specimen	Result
11/16/17	Pre-remediation	Women's hot tub	None detected
11/16/17	Pre-remediation	Women's hot tub filter	<1 CFU/ml <i>Legionella pneumophila</i> SG1
11/16/17	Pre-remediation	Men's hot tub	None detected
11/16/17	Pre-remediation	Men's hot tub filter	7 CFU/ml <i>Legionella pneumophila</i> SG1
11/28/17	Post-initial remediation	Women's hot tub	None detected
11/28/17	Post-initial remediation	Men's hot tub	None detected
12/7/17	Post-initial remediation	Women's hot tub filter*	<1 CFU/ml <i>Legionella pneumophila</i> SG1
12/7/17	Post-initial remediation	Men's hot tub filter*	None detected
12/18/17	Post biofilm remediation	Women's hot tub filter	None detected
12/18/17	Post biofilm remediation	Men's hot tub filter	None detected

* The filters were not initially tested in post-remediation testing because the sand filtration systems had been completely replaced. GNR requested these filters be tested.

LEGIONELLA OUTBREAK TIMELINE



SUMMARY

- An outbreak of *Legionella pneumophila* SG1 was investigated among patrons of a local fitness facility
- The facility voluntarily closed upon notification and followed all recommendations made by the Health Department
- Remediation steps were significant and resulted in the facility's aquatic areas and showers being closed for close to a month
 - Initially allowed to reopen following initial remediation
 - Closed again following detection of *Legionella* after initial remediation
- No additional cases were identified despite active case finding
- Outbreak resulted in significant media interest

LESSONS LEARNED

- Relationships are key! Meeting in person and onsite with facility leadership and maintaining that personal communication was essential
 - This proved important when drafting communication that was going to be sent to facility membership as well as the media
 - Weekly meetings/and or calls kept facility and Health Department leadership apprised of the progress and mitigation plan
- Variations in environmental assessment and sampling tools and guidance available made the initial planning challenging
 - Relied heavily on CDC guidance, but also reviewed OSHA standards
- Once a plan is set, ensure all guidance supports your plan and you can justify decisions.
 - Ensure that affected areas are not allowed to reopen until all final testing results are in, regardless of the remediation steps
 - Utilize available tools such as CDC's "Disinfection of Hot Tubs that Contain *Legionella*" to help plan the investigation process and interventions

Disinfection of Hot Tubs that Contain *Legionella*

[cdc.gov/legionella](https://www.cdc.gov/legionella)

Hot tubs* that contain *Legionella* bacteria can cause outbreaks of disease. *Legionella* can cause [Legionnaires' disease](#), a serious type of lung infection, and a milder infection called Pontiac fever. It is critical to collect water samples **then** disinfect hot tubs linked to cases of Legionnaires' disease or Pontiac fever.

CDC-recommended best practices

No scientific studies have determined the best way to disinfect a hot tub that contains *Legionella*. CDC recommends following these steps based on currently available scientific information:

- Close the hot tub immediately.**
 - Shut down the hydrotherapy jets and circulation pumps, but **do not** drain the water.
- Contact your state or local public health agency.**
 - The health department will determine if you need to conduct laboratory testing.
- Collect water samples if directed by the health department.**
 - If so, always collaborate with your state or local public health agency and a laboratory with *Legionella* testing expertise. View a [CDC list of laboratories that test for Legionella](#).
 - Have samples taken from the tub, hydrotherapy jets, drain, and filters or filter media before proceeding to step 4. Find [additional information and tools from CDC on water sampling](#).
 - You do not have to wait for laboratory results before disinfecting the hot tub. However, do not re-open the hot tub for use until all test results are negative for *Legionella*.
- Drain all water from the hot tub.**
 - Dispose of the water to waste or as directed by the local regulatory authority.
- Vigorously scrub all hot tub surfaces, skimming devices, and circulation components.**
 - Use water with free chlorine at a minimum concentration of 5 parts per million (ppm) to remove any biofilm (slime). After scrubbing, rinse the tub with clean water and flush to waste.
- Replace filters (for cartridge or diatomaceous earth filters) or filter media (for sand filters).**
 - Bag these and dispose as normal solid waste.
- Make any needed repairs.**
 - Inspect the hot tub thoroughly for any broken or poorly functioning components such as valves, sensors, tubing, or disinfectant feeders.
- Refill and hyperchlorinate using 20 ppm free chlorine.**
 - Keep the hydrotherapy jets off and let the hyperchlorinated water circulate for 1 hour in all of the components of the hot tub including the compensation/surge tank, filter housing, and piping.
 - Turn on the hydrotherapy jets to circulate the hyperchlorinated water for 9 additional hours. Maintain 20 ppm of free chlorine in the system for the **entire 10 hours**.



This photograph shows *Legionella* spp. colonies grown in culture and illuminated using ultraviolet light.

- Flush the entire system.**
 - This removes the hyperchlorinated water from all equipment.
- Take new samples to confirm the elimination of *Legionella*.**
 - At least 24 hours after the device has been restored to normal operating conditions, have samples taken from:
 - Tub
 - Hydrotherapy jets
 - Drain
 - Filters or filter media
 - Any part of the hot tub that originally tested positive for *Legionella*
- Keep the hot tub closed until testing confirms the elimination of *Legionella*.**
 - If laboratory testing is positive for *Legionella*, repeat steps 4 through 10 until all testing is negative.
 - If laboratory testing is negative for *Legionella*, proceed to step 12.
- Ensure water quality prior to reopening the hot tub for use.**
 - Ensure that halogen (chlorine or bromine) and pH levels meet local and state standards.
- Maintain water quality according to local and state standards.**
 - See "Prevention through regular operation and maintenance" section below for additional information.
 - Continued *Legionella* testing may be considered on a case-by-case basis.
 - If the hot tub is associated with an outbreak, the following continued laboratory testing schedule may be considered:
 - Conduct culture-based testing every 2 weeks for 3 months, then every month for 3 months.
 - If testing finds *Legionella* at any time during this 6-month period, disinfect again and start the testing schedule over.
 - For hot tubs that continue to grow *Legionella*, consider hiring a consultant with expertise in *Legionella* remediation.



This image is of a typical pool/spa water chemistry test kit for measuring chlorine, bromine, and pH.

Note: There are no data to suggest that personal protective equipment is required for disinfecting a hot tub, but N95 respirator masks may be worn during the disinfection process. Respirators must be used in accordance with a comprehensive respiratory protection program, which includes fit testing, training, and medical clearance (see [Occupational Safety and Health Administration standard 29 CFR 1910.134](#)). Visit the [National Institute for Occupational Safety and Health N95 respirator web page](#).

Prevention through regular operation and maintenance

[Proper operation and maintenance of hot tubs](#) can help prevent the growth of *Legionella* and protect people's health. View CDC's [Model Aquatic Health Code](#) for guidance on making water activities healthier and safer. Water management programs take a preventive approach by reducing the risk of *Legionella* growing and spreading in building water systems. See CDC's toolkit on [how to develop a Legionella water management program](#).

References:

- ANSI/ASHRAE. [Legionellosis: Risk management for building water systems](#). Atlanta, GA: ASHRAE; 2015.
- ASHRAE. [Minimizing the risk of legionellosis associated with building water systems](#). Atlanta, GA: ASHRAE; 2000.
- CDC. [Developing a water management program to reduce Legionella growth and spread in buildings: A practical guide to implementing industry standards](#). Atlanta, GA: 2017.

* The phrase "hot tubs" in this document includes hot tubs, whirlpool spas, and hydrotherapy spas.

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Division of Bacterial Diseases



LESSONS LEARNED (CONT.)

- Internal Health Department relationships and collaboration are key
 - Epidemiology and Environmental Health have to work as a team to fully assess the situation and develop a mitigation plan to prevent the spread of infection
 - Having Epidemiologists that are Registered Environmental Health Specialists (REHS) adds credibility and the knowledge base to work collaboratively with Environmental Health partners
- Partnership and collaboration with Public Health Partners (Federal, State, and Local) and *Legionella* experts early in the process is beneficial
 - Collaboration on the initial plan is beneficial and can lead to a more informed plan
 - Recommendations and input received after the plan is in place can be challenging and create issues for follow-up

ACKNOWLEDGEMENTS

- Gwinnett County Health Department staff involved in the investigation
 - Brittany Carter- Epidemiology Program Manager
 - Keisha Francis – Environmental Epidemiologist
 - Jason Reagan – District Environmental Health Director
 - David Hornsby – Environmental Health Specialist
 - Alana Sulka – Director of Epidemiology and Infectious Diseases
 - Joseph Sternberg – Director of Environmental Health and Injury Prevention
 - Summer Nix – Public Information Officer
 - Veronica Mahathre – Health Communications Coordinator
- Facility leadership and staff
- Georgia Department of Public Health, Acute Disease Epidemiology Section Epidemiology staff



Legionnaires' Disease: Trends and Outbreak Resources

Laura A. Cooley, MD, MPHTM

National Center for Immunization and Respiratory Diseases

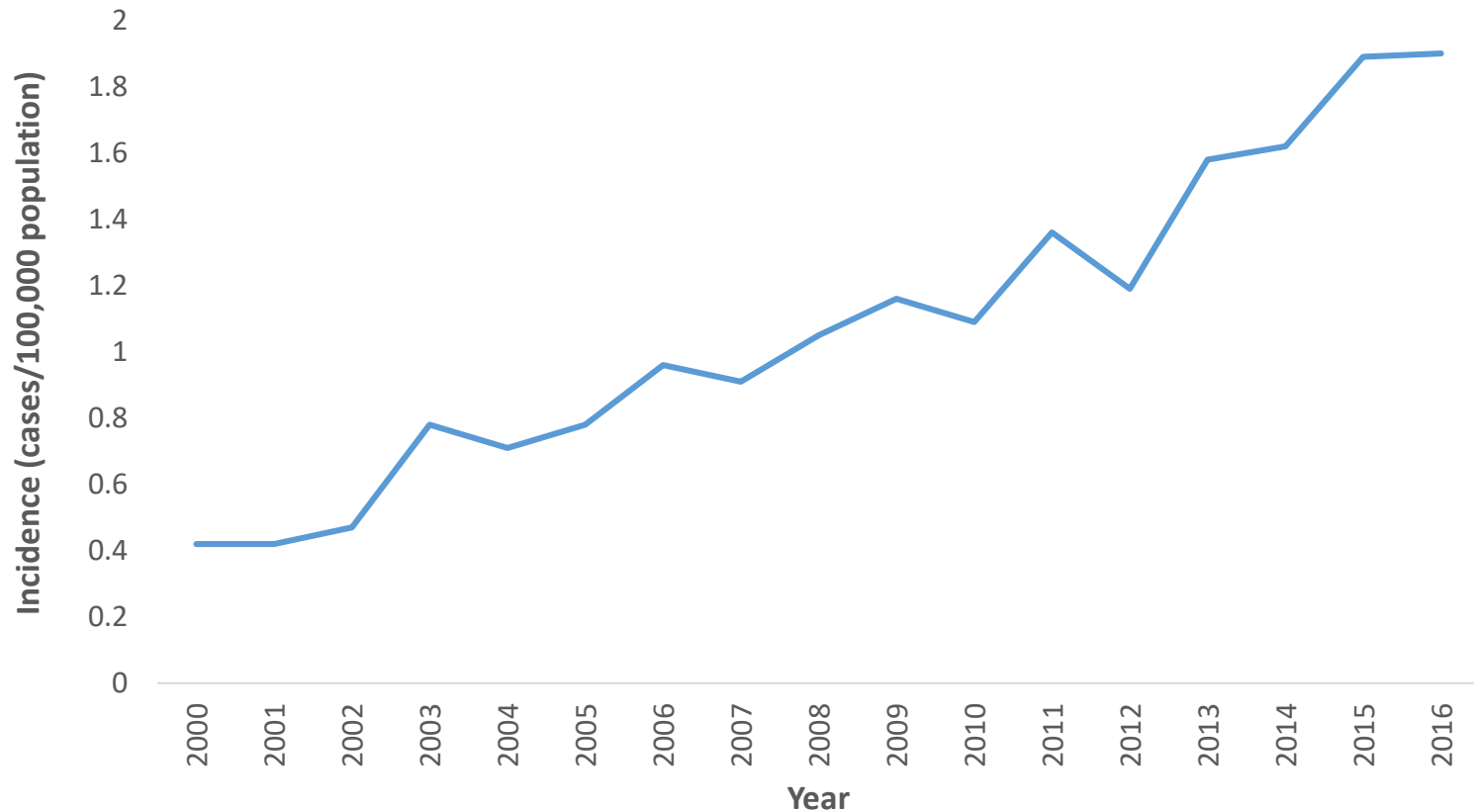
NACCHO *Legionella* Webinar: Exploring National Guidance and Local Experiences

May 30, 2018



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

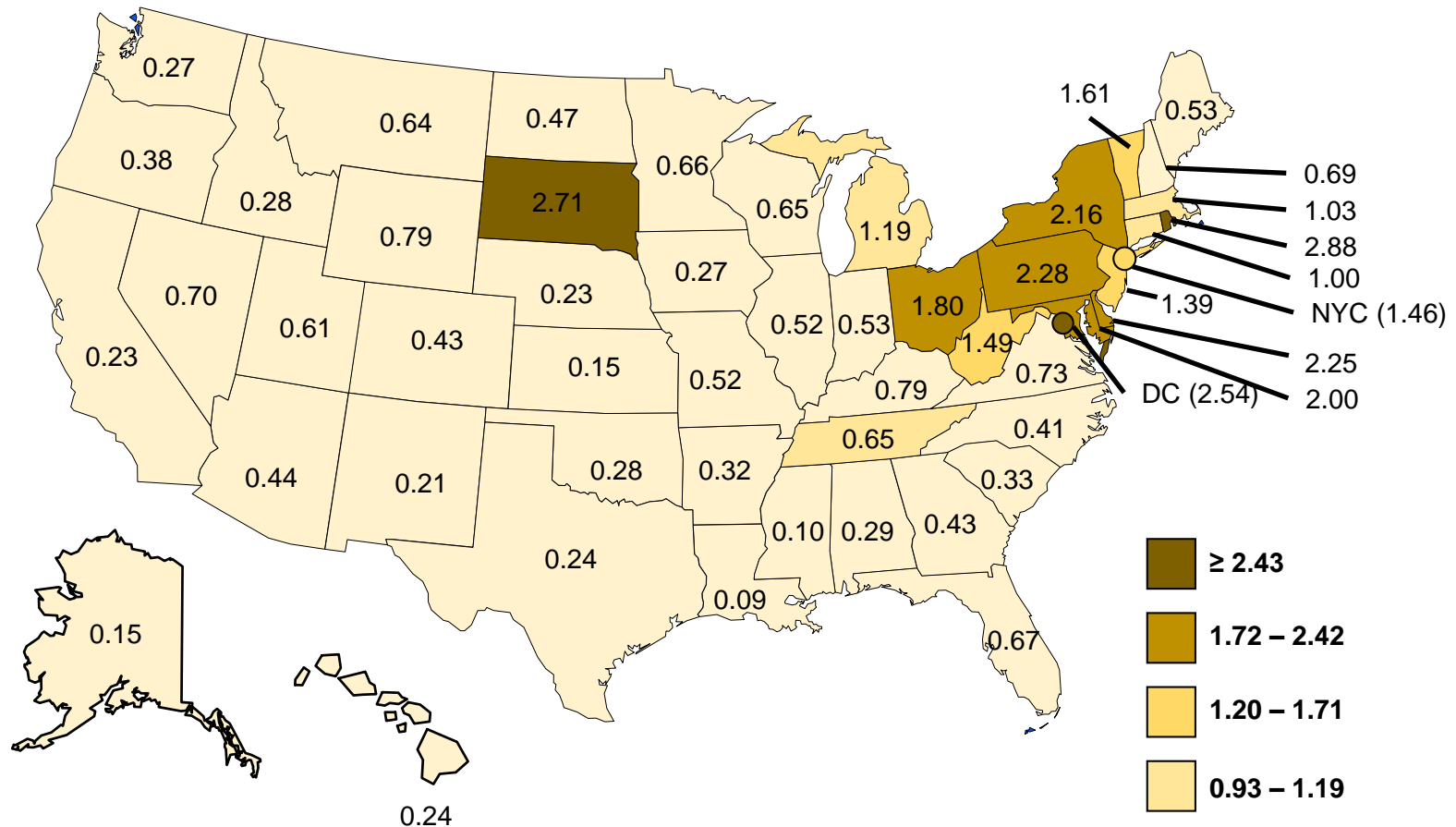
Legionnaires' disease is on the rise in the United States



Rate of reported cases increased 4.5 times (2000–2016)

Source: National Notifiable Diseases Surveillance System

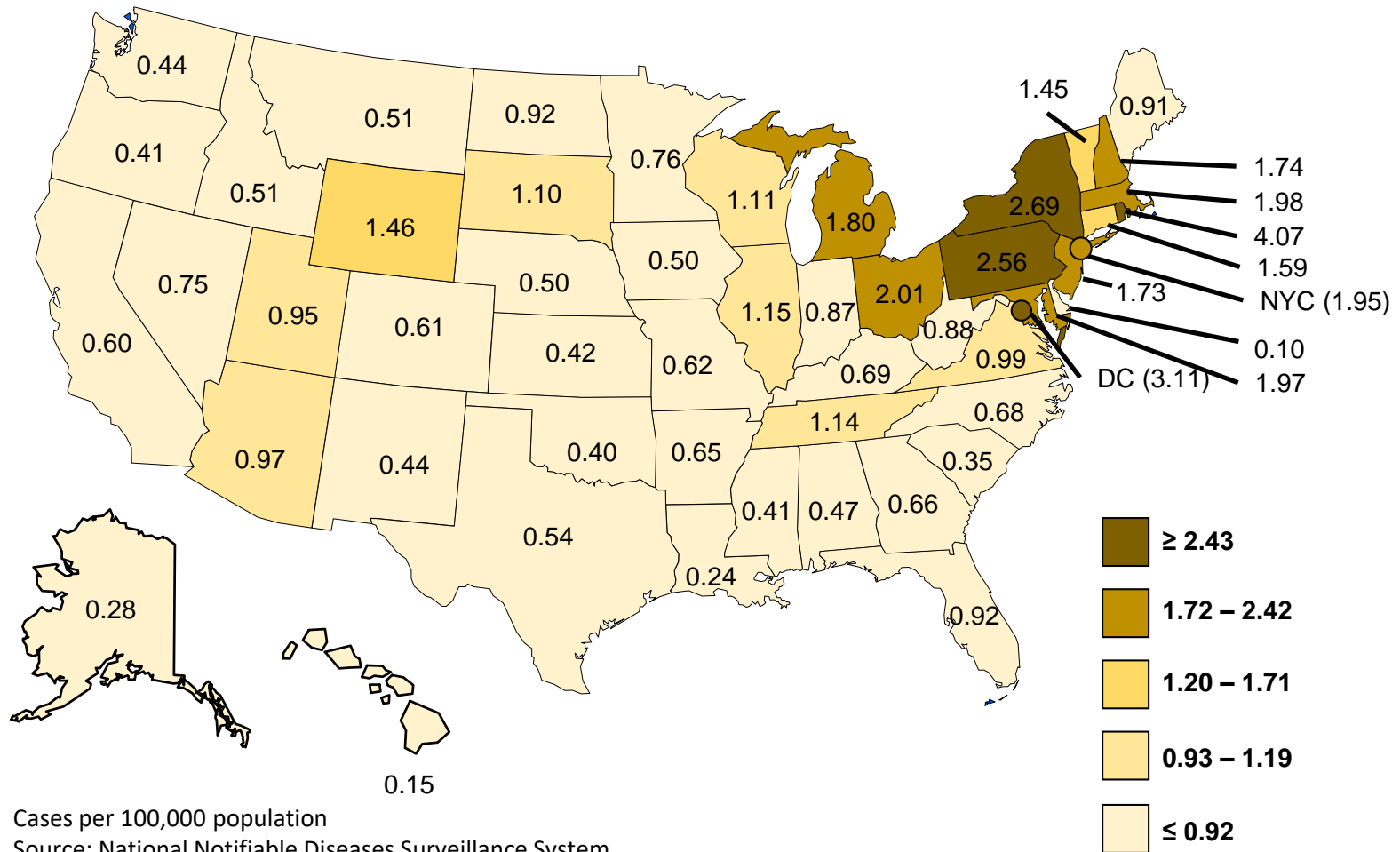
2005: Rates of reported legionellosis cases by state



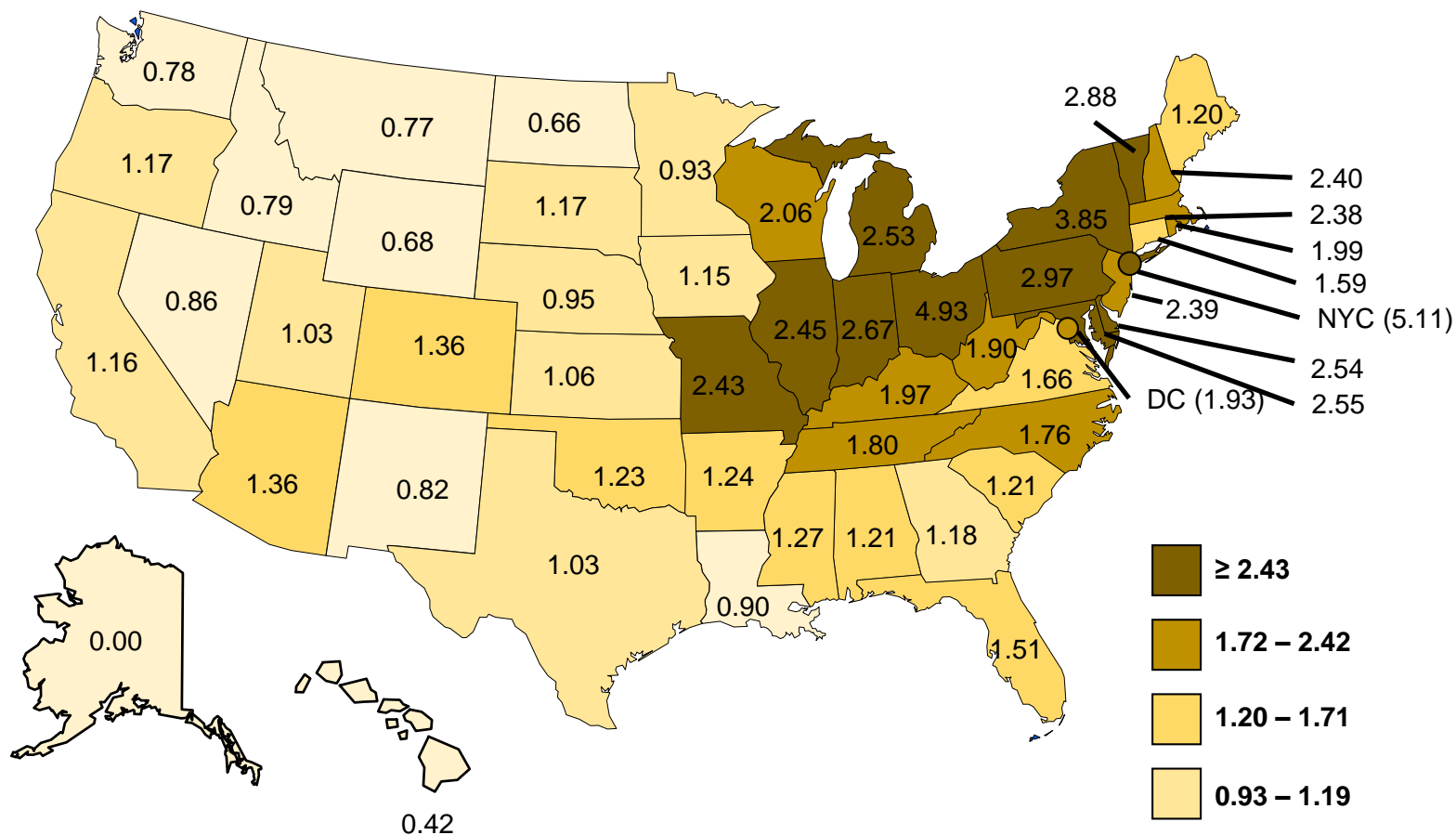
Cases per 100,000 population

Source: National Notifiable Diseases Surveillance System

2010: Rates of reported legionellosis cases by state



2015: Rates of reported legionellosis cases by state



Cases per 100,000 population

Source: National Notifiable Diseases Surveillance System

Possible reasons for these increases

- Increased susceptibility
 - Aging U.S. population
 - More people on immune suppressing medications
- More *Legionella* in the environment
 - Warmer temperatures
 - Aging infrastructure
 - Water-saving building modifications
- Improved diagnostic capabilities
 - Urinary antigen test (UAT) availability
- Improved diagnosis and reporting
 - Increased awareness and testing
 - Increased surveillance capacity



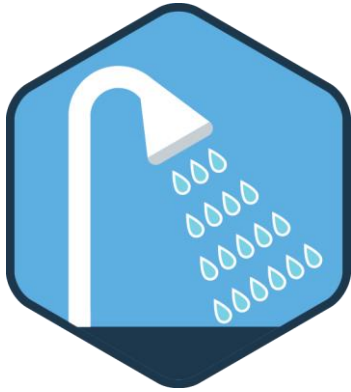
Steps leading to Legionnaires' disease



- Bacteria called *Legionella* live in fresh water
 - Natural reservoir
 - Insufficient numbers to cause disease
- Conditions in large, complex water systems can lead to bacteria growth
 - Temperature (77–108°F)
 - Stagnation
 - Scale and sediment
 - Biofilm
 - Protozoa
 - Absence of disinfectant



Steps leading to Legionnaires' disease



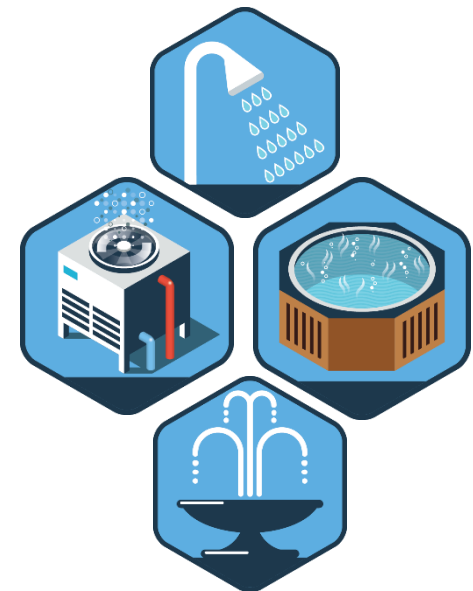
- Certain devices can aerosolize water containing *Legionella*
 - Showers and faucets
 - Cooling towers
 - Hot tubs
 - Decorative fountains



- People breathe *Legionella* in and some are more likely to get sick
 - People ≥ 50 years old
 - Current or former smokers
 - People with weak immune systems
 - People with chronic disease

What do we know about source attribution?

- **2016: CDC analyzed data from 27 building-associated outbreaks (2000–2014)**
- **Common settings**
 - Hotels (44%)
 - Long-term care facilities (19%)
 - Hospitals (15%)
- **Common sources**
 - Potable water (56%)
 - Cooling towers (22%)
 - Hot tubs (7%)
 - Decorative fountains (4%)
 - Industrial equipment (4%)



Source: Garrison LE et al. *MMWR*. 2016;65(22):557–61.

Prevention through effective water management programs

Centers for Disease Control and Prevention
MMWR

Morbidity and Mortality Weekly Report

Early Release / Vol. 65

June 7, 2016

Vital Signs: Deficiencies in Environmental Control Identified in Outbreaks of Legionnaires' Disease — North America, 2000–2014

Laurel E. Garrison, MPH¹; Jasen M. Kunz, MPH²; Laura A. Cooley, MD¹; Matthew R. Moore, MD¹; Claressa Lucas, PhD¹; Stephanie Schrag, DPhil¹; John Sarisky, MPH²; Cynthia G. Whitney, MD¹

9 in 10

CDC investigations show almost all outbreaks were caused by problems preventable with more effective water management

JUNE 2016

VitalSigns™

Legionnaires' Disease

Use water management programs in buildings to help prevent outbreaks

CDC investigated the first outbreak of Legionnaires' disease, a serious lung infection (pneumonia), in 1976. An increasing number of people in the US are getting this disease, which is caused by breathing in water contaminated with *Legionella* germs. About 5,000 people are diagnosed with Legionnaires' disease and there are at least 20 outbreaks reported each year. Most identified outbreaks are in buildings with large water systems, such as hotels, long-term care facilities, and hospitals. *Legionella* grows best in building water systems that are not well maintained. Building owners and managers should adopt newly published standards that promote *Legionella* water management programs, which are plans to reduce the risk of this germ in building water systems.

Building owners and managers can:


- Learn about and follow newly published standards for *Legionella* water management programs. www.techstreet.com/ashrae/products/71897561
- Determine if the water systems in their buildings are at increased risk of growing and spreading *Legionella*.
- Develop and use a *Legionella* water management program as needed. www.cdc.gov/legionella/MMWRtoolkit
- Monitor and...

Visit to learn more? www.cdc.gov/vitalsigns/legionnaires

4x
The number of people with Legionnaires' disease grew by nearly 4 times from 2000–2014.

1 in 10
Legionnaires' disease is deadly for about 10% of people who get it.

9 in 10
CDC investigations show almost all outbreaks were caused by problems preventable with more effective water management.

 Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

2016 MMWR Vital Signs

www.cdc.gov/vitalsigns/legionnaires

New, expanded resources for health departments

For Health Departments	–
Surveillance & Reporting Resources	+
Epidemiology Resources	+
Healthcare Resources	+
Environmental Resources	
Communications Resources	
Request CDC Assistance	

- Surveillance and reporting
 - Case definitions
 - CDC surveillance classifications
 - Guidance on reporting cases
- Epidemiology
 - Case verification
 - Patient interview tools
 - Considerations during outbreaks

www.cdc.gov/legionella/

New, expanded resources for health departments

For Health Departments	–
Surveillance & Reporting Resources	+
Epidemiology Resources	+
Healthcare Resources	+
Environmental Resources	
Communications Resources	
Request CDC Assistance	

- Healthcare resources
 - Key definitions
 - Considerations specific to healthcare cases and outbreaks
- Communication resources
 - Notification letter templates
 - Fact sheets
 - Sample press releases and health advisories

Detailed considerations for outbreak investigations



For Health Departments	-
Surveillance & Reporting Resources	+
Epidemiology Resources	-
Case Verification	
Patient Interview Tools	
Things to Consider: Outbreak Investigations	

- Conducting a full investigation
 - From identification to remediation
- Considerations specific to
 - Potable water
 - Cooling towers
 - Hot tubs
 - Decorative fountains
 - Travel
 - Community-based

Print-ready fact sheets for clinicians and the public

What Clinicians Need to Know about LEGIONNAIRES' DISEASE

Legionnaires' disease is a sometimes fatal form of pneumonia that is on the rise in the United States. Unfortunately, this disease is often underrecognized and underdiagnosed. Clinicians are in a unique position to make sure cases are detected, allowing rapid investigation by public health officials and prevention of additional cases.

Diagnosis and Testing

Clinical features of Legionnaires' disease include cough, fever, and radiographic pneumonia. Signs and symptoms for Legionnaires' disease are similar to pneumonia caused by other pathogens; the only way to tell if a pneumonia patient has Legionnaires' disease is by getting a specific diagnostic test. Indications that warrant testing include:

- Patients who have failed outpatient antibiotic therapy for community-acquired pneumonia
- Patients with severe pneumonia, in particular those requiring intensive care
- Immunocompromised patients with pneumonia*
- Patients with a travel history: patients who have traveled away from their home within 10 days before the onset of illness
- All patients with pneumonia in the setting of a Legionnaires' disease outbreak
- Patients at risk for Legionnaires' disease with healthcare-associated pneumonia (pneumonia with onset ≥48 hours after admission)

* Disease may also consider testing for Legionnaires' disease in patients with other risk factors for this infection (see page 3).

Testing for healthcare-associated Legionnaires' disease is especially important 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 12 months
- Recent changes in water quality that may lead to Legionella growth (such as low chlorine levels)

Infection control staff may have more information about these situations in your facility.

The preferred diagnostic tests for Legionnaires' disease are culture of lower respiratory secretions (e.g., sputum, bronchoalveolar lavage) on selective media and the Legionella urinary antigen test. Serological assays can be nonspecific and are not recommended in most situations. Best practices to obtain high-quality culture and a urinary antigen test concurrently. Specimens should ideally be obtained prior to antibiotic administration, but antibiotic treatment should not be delayed to facilitate this process. The urinary antigen test can detect Legionella infections in some cases for days to weeks after treatment. The urinary antigen test directly identifies Legionella pneumoniae serogroup 1. The most common cause of Legionnaires' disease. Detection of Legionella by culture is important for detection of other species and serogroups and for public health investigation. Molecular techniques can be used to compare clinical isolates to environmental isolates and confirm the outbreak source.

Order both a culture of a lower respiratory specimen and a urinary antigen test when testing patients for Legionella.

In the United States, reported cases of Legionnaires' disease have grown by nearly four and a half times since 2000. More than 4,000 cases of Legionnaires' disease were reported in 2015, but this number is likely an underestimate as the illness is thought to be underreported.

Most cases occur in the summer and early fall, but Legionnaires' disease can happen any time of year.

Most likely sources of infection include:

- Having chronic lung disease, such as emphysema or chronic obstructive pulmonary disease (COPD)
- Having a weakened immune system from diseases like cancer, diabetes, or kidney failure
- Taking medication that weakens your immune system

Certain People Are at Increased Risk for Legionnaires' Disease

Most healthy people do not get Legionnaires' disease after being exposed to Legionella. Being 50 years or older or having certain risk factors can increase your chances of getting sick. These risk factors include:

- Being a current or former smoker
- Having chronic lung disease, such as emphysema or chronic obstructive pulmonary disease (COPD)
- Having a weakened immune system from diseases like cancer, diabetes, or kidney failure
- Taking medication that weakens your immune system

Legionella Are Usually Spread through Water Droplets in the Air

In nature, Legionella live in fresh water and rarely cause illness. In man-made settings, Legionella can grow if water is not properly maintained. These man-made water sources become a health problem when small droplets of water that contain the bacteria get into the air and people breathe them in. In rare cases, someone inhales Legionella while they are drinking water and it "springs down the wrong pipe" into the lungs. In general, people do not spread Legionnaires' disease to other people.

Common Sources of Infection

Outbreaks of Legionnaires' disease are often associated with large or complex water systems, like those found in hospitals, hotels, and cruise ships.

The most likely sources of infection include:

- Water used for drinking (potable water)
- Cooling towers (parts of large air conditioning systems)
- Decorative fountains
- Hot tubs

**U.S. Department of Health and Human Services
Centers for Disease Control and Prevention**

cdc.gov/legionella bit.ly/legionella bit.ly/legionella

LEGIONNAIRES' DISEASE

Legionnaires' (LEE-juh-nees) disease is a very serious type of pneumonia (lung infection) caused by bacteria called Legionella. If you develop pneumonia symptoms and may have been exposed to Legionella, see a doctor right away. Be sure to mention if you have used a hot tub, spent any nights away from home, or stayed in a hospital in the last two weeks.

Legionnaires' Disease Can Cause Pneumonia Symptoms

Signs and symptoms of Legionnaires' disease can include:

- Cough
- Shortness of breath
- Fever
- Muscle aches
- Headache

Doctors use chest x-rays or physical exams to check for pneumonia. Your doctor may also order tests to see a sample of urine and sputum (phlegm) to see if your lung infection is caused by Legionella.

Legionnaires' Disease Is Serious, but Can Be Treated with Antibiotics

Legionnaires' disease is treated with antibiotics (drugs that kill bacteria in the body). Most people who get sick need care in a hospital but make a full recovery. However, about 1 out of 10 people who get Legionnaires' disease will die from the infection.

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Legionnaires' Disease

A problem for health care facilities

Legionnaires' disease (LD) is a serious, and often deadly, lung infection (pneumonia). People usually get it by breathing in water droplets containing Legionella germs. People can also get it if contaminated water accidentally goes into the lungs while drinking. Many people being treated at health care facilities, including long-term care facilities and hospitals, have conditions that put them at greater risk of getting sick and dying from LD. Legionella grows best in buildings with large water systems that are not managed effectively. CDC outbreak investigations show that effective water management programs—actions that reduce the risk of Legionella growing and spreading in building water systems—can help prevent problems that lead to LD. Health care facility leaders* should be aware that LD is a risk in their facility and that they can take action to prevent infections.

Health care facility leaders can:

- Build a team focused on keeping their facility's water safe.
- Create and use a water management program to limit Legionella and other waterborne germs from growing and spreading.
- Work with healthcare providers to identify LD cases early and determine if the cases may be associated with a health care facility.
- Report LD cases to local public health authorities quickly and work with them to investigate and prevent additional cases.

76% People effectively get Legionnaires' disease from a health care facility in 76% of facilities reporting exposures.

1 in 4 Legionnaires' disease kills 25% of those who get it from a health care facility.

4 in 5 Most problems leading to LD health care-associated outbreaks could be prevented with effective water management.

*Leaders may include infection control practitioners, facility managers, hospital administrators, quality assurance staff, or others.

Want to learn more? www.cdc.gov/vitalsigns/legionella

**U.S. Department of Health and Human Services
Centers for Disease Control and Prevention**

Legionnaires' Disease

Use water management programs in buildings to help prevent outbreaks

CDC investigated the first outbreak of Legionnaires' disease, a serious lung infection (pneumonia), in 1976. An increasing number of people in the US are getting this disease, which is caused by breathing in water contaminated with Legionella germs. About 4,000 people are diagnosed with Legionnaires' disease and there are at least 20 outbreaks reported each year. Most identified outbreaks are in buildings with large water systems, such as homes, long-term care facilities, and hospitals. Legionella grows best in building water systems that are not well maintained. Building owners and managers should adopt newly published standards that promote Legionella water management programs, which aim to reduce the risk of the germ in building water systems.

Building owners and managers can:

- Learn about and follow newly published standards for Legionella water management programs.
- Determine if the water systems in their buildings are at increased risk of growing and spreading Legionella.
- Develop and use a Legionella water management program as needed.
- Monitor and respond to changes in water quality.

4x The number of people with Legionnaires' disease grew by nearly 4 times from 2000–2014.

1 in 10 Legionnaires' disease is deadly for about 1 in 10 people who get it.

9 in 10 CDC investigations show almost all outbreaks were caused by problems preventable with more effective water management.

Want to learn more? www.cdc.gov/vitalsigns/legionella

**U.S. Department of Health and Human Services
Centers for Disease Control and Prevention**

Customizable questionnaire templates



For Health Departments	–
Surveillance & Reporting Resources	+
Epidemiology Resources	–
Case Verification	
Patient Interview Tools	

Case ID: _____

Legionnaires' Disease Hypothesis-generating Questionnaire Template

<Instructions to the interviewer appear in italics. Please read the entire questionnaire before beginning the interview.>

<After confirming a case of Legionnaires' disease or Pontiac fever and completing the CDC Legionellosis Case Report Form, you can use this form to collect additional epidemiologic data. These data may be useful in detecting outbreaks or in a future cluster/outbreak investigation. You may add this form to your state's electronic notifiable disease surveillance system in whole or in part for routine data collection. A more detailed questionnaire that you can customize to the outbreak location should be developed and used for cases associated with a known outbreak.>

What was the patient's outcome? ☐ Recovered ☐ Still Ill ☐ Died ☐ Unknown

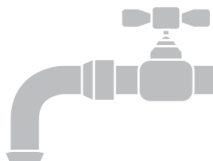
Interviewer identification

Interviewer's name: _____ Health department: _____

Customizable line list templates

- Travel-associated
- Community-associated
- Healthcare-associated

ID #	Age	Sex	Underlying medical conditions (list)	Date of symptom onset	Symptoms	Outcome of illness



Legionella (Legionnaires' Disease and Pontiac Fever)

Legionella Home

About the Disease



Fast Facts

For Clinicians



For Health Departments



Surveillance & Reporting Resources



Epidemiology Resources



Healthcare Resources



Environmental Resources

Communications Resources

Request CDC Assistance

For Laboratories

Prevention with Water Management Programs



Outbreaks

[CDC](#) > [Legionella Home](#)

For Health Departments



CDC developed the following resources to assist state and local health department personnel in investigating individual cases and outbreaks of Legionnaires' disease. State and local health departments have jurisdiction over investigations in their state.

Laboratory Investigation Resources

CDC [developed tools](#) to assist in the laboratory component of Legionnaires' disease outbreak investigations.

SURVEILLANCE AND REPORTING RESOURCES

Provides case definitions, surveillance classifications, instructions on how to report cases...

EPIDEMIOLOGY INVESTIGATION RESOURCES

Explains how to verify cases, what to consider during investigations, prevention tips...

HEALTHCARE INVESTIGATION RESOURCES

Describes how to define healthcare-associated Legionnaires' disease, what to consider, prevention tips...

www.cdc.gov/legionella/



Legionnaires' Disease Prevention: Environmental Health Perspectives

CDR Jasen Kunz, MPH

National Center for Environmental Health

Environmental Health Specialist, *Legionella* Team



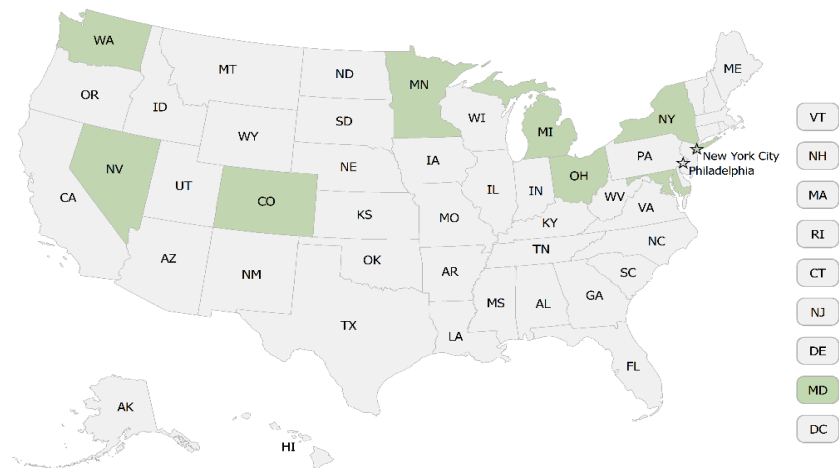
U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Environmental health expertise is key to preventing Legionnaires' disease

- We must understand **environmental** factors that allow *Legionella* to survive and reach susceptible host
- Need Laboratory + Epidemiology + **Environmental** expertise to identify and control *Legionella* outbreaks
- Developing and adopting evidence-based **environmental** prevention practices = reducing risk
- **Environmental** health Legionnaires' disease capacity is lacking completely or is inadequate in most states

Environmental health capacity building

- Since FY 2016, CDC has partnered with state and local health departments through the *Legionella* ELC Cooperative Agreement
- Key environmental health ELC goal
 - Build capacity for Legionnaires' disease response and prevention through increased utilization of environmental assessments and water management programs (WMPs) that are compliant with industry standards

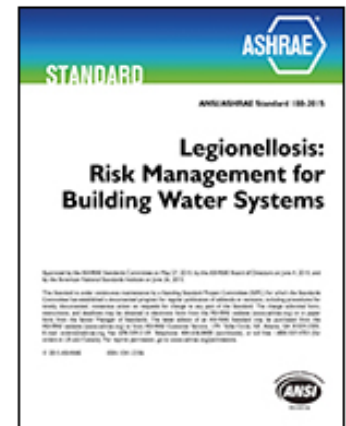




Prevention Resources

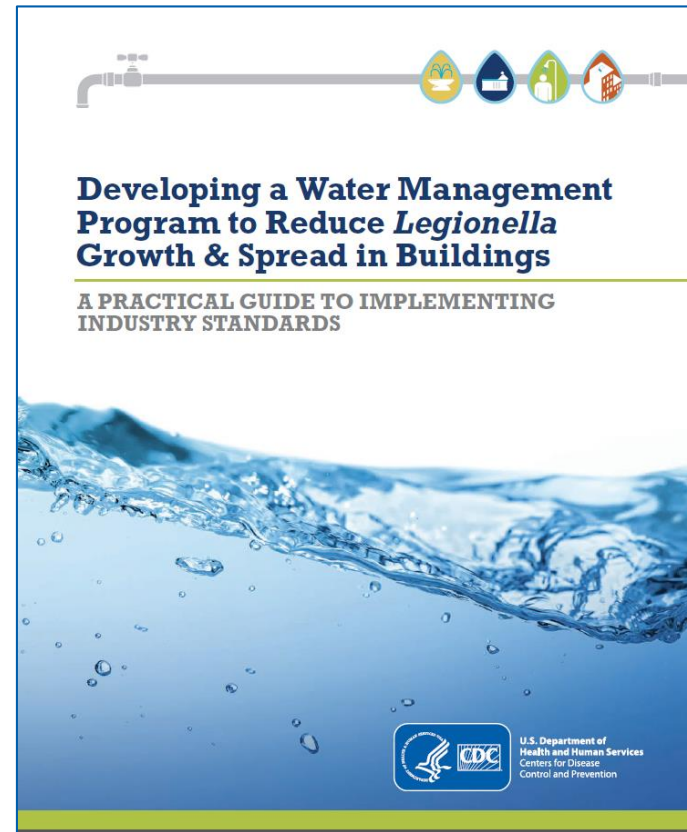
Primary prevention of Legionnaires' disease

- Ensuring proper maintenance of building water systems and aerosol-generating devices is key
- Current guidelines, standards, and protocols
 - HICPAC (2003, 2004)
 - ASHRAE Guideline 12 (2000)
 - VHA Directive 1061 (2014)
 - **ASHRAE Standard 188 (2015)**
 - AIHA Guideline (2015)
 - NYC/NYS regulations (2015, 2016)
 - NSF 453 (2017)
 - CMS Memo (2017)
 - Others in development



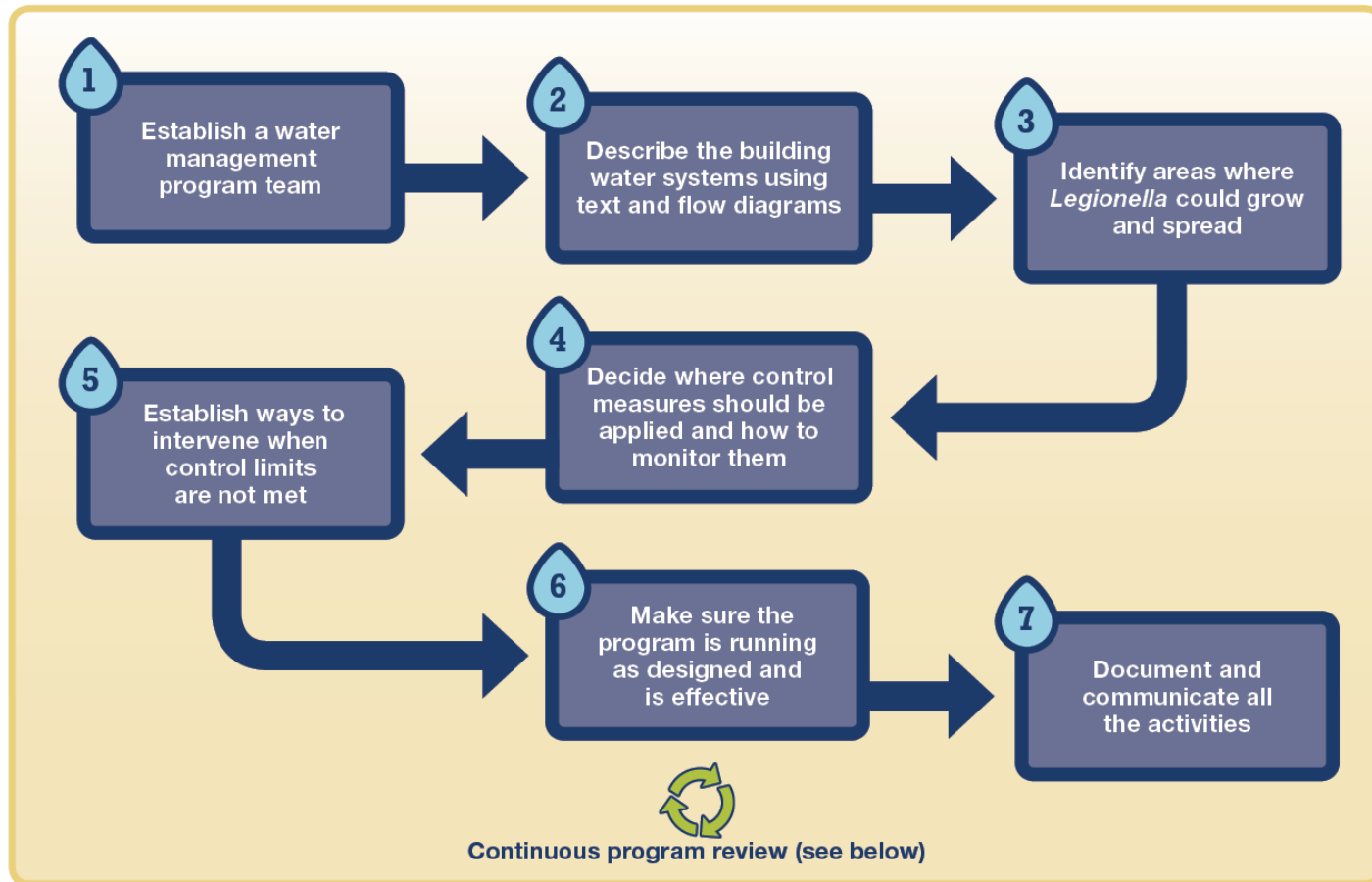
Translating ASHRAE 188 for wider audiences

- CDC *Legionella* WMP toolkit
- Plain language
- Step-by-step guide to creating a WMP



www.cdc.gov/legionella/WMPtoolkit

Steps in a water management program



www.cdc.gov/legionella/WMPtoolkit



Response Resources

Legionella Environmental Assessment Form (LEAF)

- Use the LEAF to:
 - Document a facility's water systems,
 - Help determine whether to conduct *Legionella* environmental sampling,
 - And, if so, develop a sampling plan

Centers for Disease Control and Prevention
Legionella Environmental Assessment Form

HOW TO USE THIS FORM

This form enables public health officials to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of legionellosis. It can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to develop a sampling plan. The assessment should be performed on-site by an epidemiologist and an environmental health specialist with knowledge of the ecology of *Legionella*. Keep in mind that conditions promoting *Legionella* amplification include water stagnation, warm temperatures (77-108°F or 25-42°C), availability of organic matter, and lack of residual disinfectant such as chlorine. For training and information, please visit CDC's legionellosis resources webpage at: <http://www.cdc.gov/legionella/outbreak-toolkit/>.

Complete the form in as much detail as possible. Do not leave sections blank; if a question does not apply, write "N/A". If a question applies but cannot be answered, explain why. Where applicable, specify the units of measurement being used (e.g., ppm). Completion of the form may take several hours.

BEFORE ARRIVING ON SITE

- ☐ Request the attendance of the lead facility manager as well as others who have a detailed knowledge of the facility's water systems, such as a facility engineer or industrial hygienist.
- ☐ Request that they have maintenance logs and blueprints available for the meeting.
- ☐ Bring a plastic bottle, thermometer, pH test kit, and a chlorine test kit that can detect a wide range of residual disinfectant (<1 ppm for potable water and up to 10 ppm for whirlpool spas).
- ☐ If the epidemiologic information available suggests a particular source (e.g., whirlpool spa, cooling tower), request that they shut it down (but do not drain or disinfect) in order to stop transmission.

INSTRUCTIONS FOR MEASURING WATER PARAMETERS IN THE PREMISE PLUMBING
(TABLE R. 8)

It is very important to measure and document the current physical and chemical characteristics of the potable water, as this can help determine whether conditions are likely to support *Legionella* amplification.

STEP 1: Plan a sampling strategy that incorporates all central hot water heaters/boilers and various points along each loop of the potable water system. For example, if the facility has one loop serving all occupant rooms, an occupant room near (proximal) the central hot water heater and another at the farthest point (distal) of the loop should be sampled.

STEP 2: For each sampling point (e.g., tap in an occupant room):

- Turn on the hot water tap. Collect the first 50 ml from the tap. Measure the free chlorine residual and pH. Document the findings in the table on p. 8. Note: If there is no residual chlorine in the hot water, measure it in the cold water. Note: Total chlorine should be measured instead of free chlorine if the method of disinfection is not chlorine (e.g., monochloramine).
- Allow the hot water tap to run until it is as hot as it will get. Collect 50 ml and measure the temperature. Document the temperature and the time it took to reach the maximum temperature.

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Division of Bacterial Diseases

CDC

8/2015 C254961-A

<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf>

Environmental investigation videos

Videos:

- *Legionella* Ecology and Introduction to Environmental Health and Engineering
- Conducting and Interpreting the Environmental Assessment
- How to...
 - Make a Sampling Plan
 - Sample Potable Water
 - Sample Cooling Towers
 - Sample Spas and Fountains



<https://www.cdc.gov/legionella/videos.html>

Additional resources

Considerations when working with *Legionella* consultants:

- Level of experience
- Laboratory expertise
- Environmental assessment expertise
- Remediation expertise
- Water management expertise
- Knowledge of codes, standards, and regulations
- Potential conflicts of interest

Disinfection of Hot Tubs that Contain *Legionella*

[cdc.gov/legionella](https://www.cdc.gov/legionella)

Hot tubs* that contain *Legionella* bacteria can cause outbreaks of disease. *Legionella* can cause [Legionnaires' disease](#), a serious type of lung infection, and a milder infection called Pontiac fever. It is critical to collect water samples **then** disinfect hot tubs linked to cases of Legionnaires' disease or Pontiac fever.

CDC-recommended best practices

No scientific studies have determined the best way to disinfect a hot tub that contains *Legionella*. CDC recommends following these steps based on currently available scientific information:

1. **Close the hot tub immediately.**
 - Shut down the hydrotherapy jets and circulation pumps, but **do not** drain the water.
2. **Contact your state or local public health agency.**
 - The health department will determine if you need to conduct laboratory testing.
3. **Collect water samples if directed by the health department.**
 - If so, always collaborate with your state or local public health agency and a laboratory with *Legionella* testing expertise. View a [CDC list of laboratories that test for *Legionella*](#).
 - Have samples taken from the tub, hydrotherapy jets, drain, and filters or filter media before proceeding to step 4. Find [additional information and tools from CDC on water sampling](#).
 - You do not have to wait for laboratory results before disinfecting the hot tub. However, do not re-open the hot tub for use until all test results are negative for *Legionella*.
4. **Drain all water from the hot tub.**
 - Dispose of the water to waste or as directed by the local regulatory authority.
5. **Vigorously scrub all hot tub surfaces, skimming devices, and circulation components.**
 - Use water with free chlorine at a minimum concentration of 5 parts per million (ppm) to remove any biofilm (slime). After scrubbing, rinse the tub with clean water and flush to waste.
6. **Replace filters (for cartridge or diatomaceous earth filters) or filter media (for sand filters).**
 - Bag these and dispose as normal solid waste.
7. **Make any needed repairs.**
 - Inspect the hot tub thoroughly for any broken or poorly functioning components such as valves, sensors, tubing, or disinfectant feeders.
8. **Refill and hyperchlorinate using 20 ppm free chlorine.**
 - Keep the hydrotherapy jets off and let the hyperchlorinated water circulate for 1 hour in all of the components of the hot tub including the compensation/surge tank, filter housing, and piping.
 - Turn on the hydrotherapy jets to circulate the hyperchlorinated water for 9 additional hours. Maintain 20 ppm of free chlorine in the system for the **entire 10 hours**.



This photograph shows *Legionella* spp. colonies grown in culture and illuminated using ultraviolet light.

National Center for Immunization and Respiratory Diseases
Division of Bacterial Diseases



CL320203 7 Feb 2018

<https://www.cdc.gov/legionella/wmp/consultant-considerations.html>



Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Association of State and Territorial Health Officials



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EH Role in *Legionella*

- What programs lack
- What elements are necessary in a functioning program

Christl Tate ctate@neha.org



Source: CDC



The National Academies of
SCIENCES • ENGINEERING • MEDICINE

A committee of experts will produce a comprehensive report regarding improvements in the management of *Legionella* in water systems to protect public health and identifying gaps in research that are barriers to more effective management. The report will be useful to federal, state, and other agencies with responsibilities to protect public health, supply safe drinking water, and maintain high quality water in built water systems.

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Contact study director Laura Ehlers (lehlers@nas.edu), associate program officer Andrea Hodgson (ahodgson@nas.edu), or senior project assistant Remy Chappetta (rchappetta@nas.edu) if you have material you would like to share with the committee

Discussion

Please enter your
questions/comments in to the
Q&A box

Thank you for joining us!



Contact us with questions

Email: infectiousdiseases@naccho.org