



January 21, 2026

# **Eastern Oregon Infection Prevention & Control (IPC) Community of Care**



# *Legionella* and Water Management Programs

# Meet your OHA Team!

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**Pam Bruhn**  
IP  
Regions  
6, 7, and 9



**Katie Cox**  
Epi  
Regions  
6 and 9



**Dan Daniluk**  
Epi  
Region 7



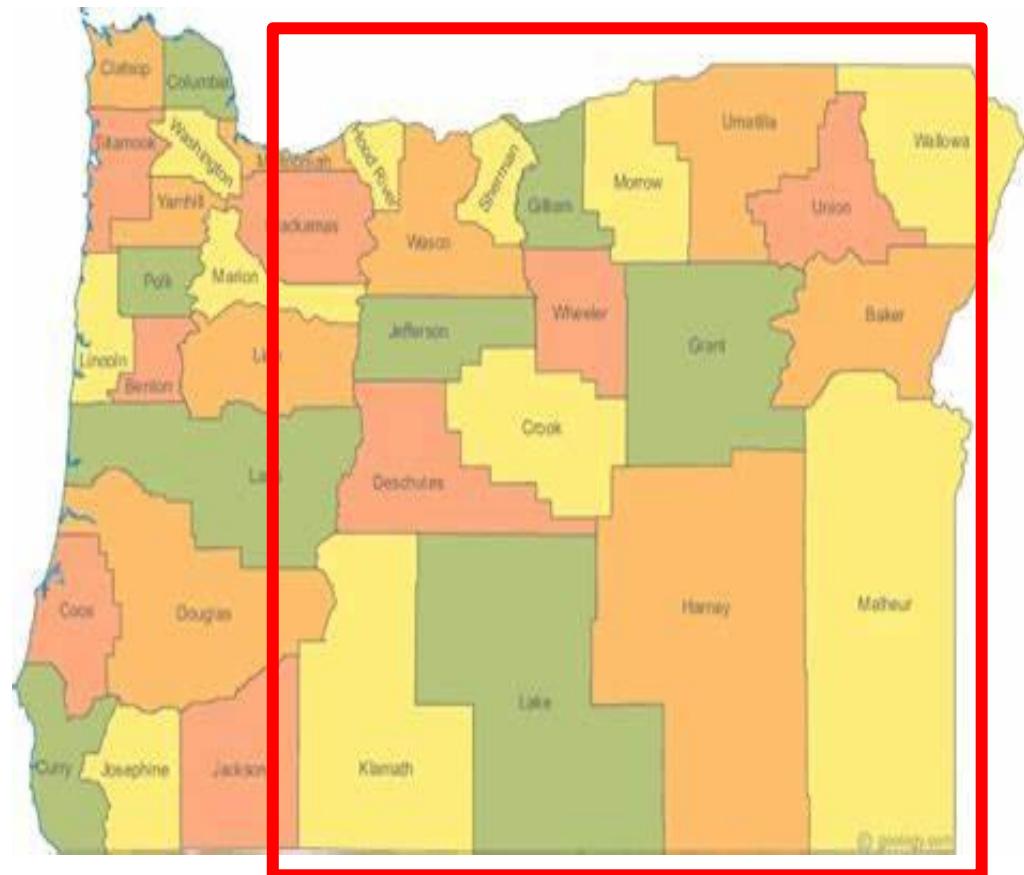
**Elizabeth Johnson**  
MDRO IP Eastern  
Oregon

# Purpose

Our time is intended to provide a space for infection preventionists and local public health personnel in Regions 6, 7 and 9 to come together to share ideas and stories and to learn about topic in infection prevention.

Our goal is to build community among a group of practitioners who are commonly isolated as the only one in their setting.

This time is **not** intended to provide specific recommendations for a facility. This space will provide a connection with the OHA or LPHA infection preventionists and epidemiologists who can provide that direct guidance.



# Housekeeping

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- Please turn off any AI recording/technology (against OHA policy)
- If you have questions during today's presentation, please feel free to raise your hand or type your question into the chat.

# Agenda

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- *Legionella* and Water Management Programs
  - Presenter: Katie Cox, All Hazards Regional Epidemiologist, OHA



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*Legionella*

# Introduction

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- Pathogens live and replicate in water and cause disease.
- Water provides an optimal environment for bacteria.
  - Water can serve as a reservoir for bacteria.
  - Water containing bacteria can also contaminate surfaces.



# Waterborne pathogens can be transmitted to patients and healthcare personnel (HCP) via multiple routes.

- Improperly reprocessing medical devices.
- Improper tap water use in respiratory care.
- Improper oral care in immunocompromised patients.
- Using poor quality water for immunocompromised patients.
- Using poor quality water in NICU infant incubators.
- Splashes from sink drains.
- Preparing injections and medications near sinks.
- Preparing nutrition near a sink.
- Water droplets and aerosolization from contaminated shower heads and toilets.

Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003)



Source: CDC



# Waterborne Pathogens in Healthcare Facilities

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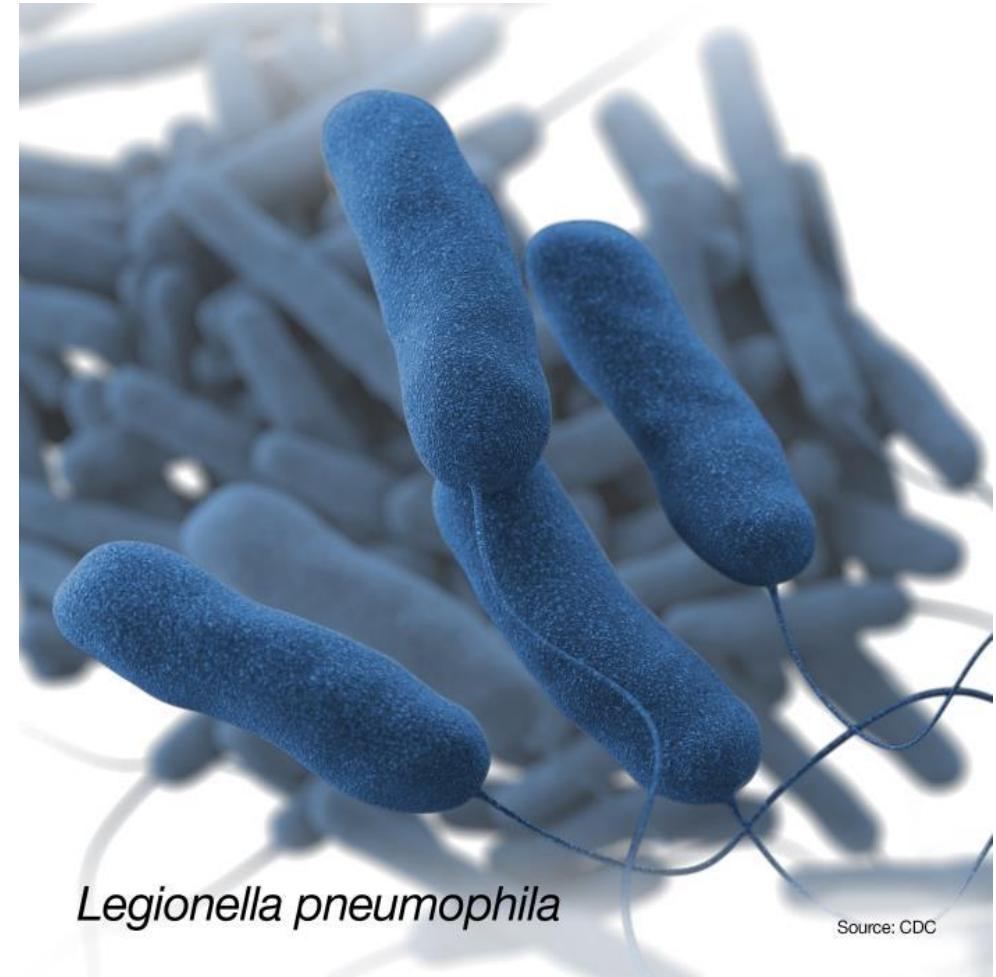
- Some waterborne pathogens of concern for healthcare facilities include:
  - *Legionella*
  - *Pseudomonas*
  - *Acinetobacter*
  - *Burkholderia*
  - *Elizabethkingia*
  - *Stenotrophomonas*
  - *Nontuberculous mycobacteria*
  - *Fungi*



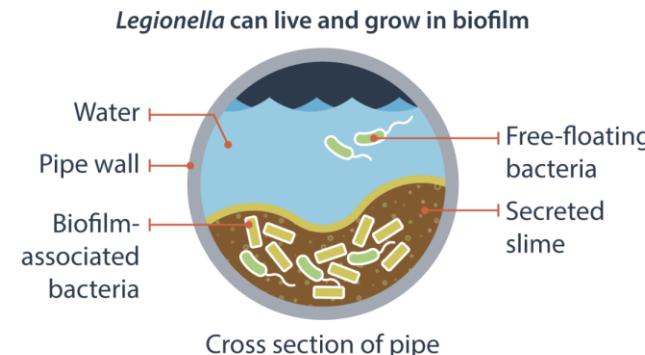
# Legionella Background

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- *Legionellae* are gram-negative bacilli (50 species & 70 serogroups).
  - *L. pneumophila* is responsible for >90% of infections.
- Reservoirs include warm, aquatic environments (especially stagnant water).
  - Can be found in tap water, distilled water, and biofilms.
- *Legionellae* are relatively resistant to chlorine & heat.
- People can become infected by inhaling aerosolized water or aspirating water containing *Legionella* bacteria.



# How Legionella Spreads



Source: CDC



Source: CDC

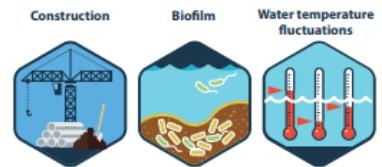
[CDC: How Legionella Spreads](#),

[CDC: How Legionella affects building water systems and people](#),

[CDC Toolkit: Developing a Legionella Water Management Program](#)

## How Legionella affects building water systems and people

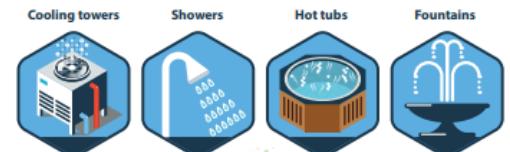
1. Internal and external factors can lead to Legionella growth in building water systems.



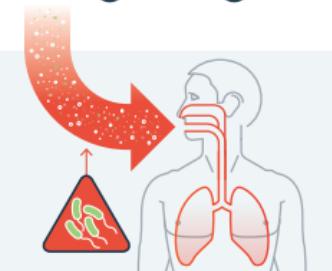
2. Legionella grows best in large, complex water systems that are not adequately maintained.



3. Water containing Legionella is aerosolized through devices.



4. People can get sick when they breathe in small droplets of water or accidentally swallow water containing Legionella into the lungs. Those at increased risk are adults 50 years or older, current or former smokers, and people with a weakened immune system or chronic disease.



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

03/30/21

Source: CDC

# History of Legionnaires' Disease

Source: CDC



Source: CDC

- *Legionella* was discovered after people who attended an American Legion convention in Philadelphia in July 1976 became ill with a mystery respiratory illness.
- In total, there were 221 cases linked to this outbreak and 34 deaths.
- The disease was named: Legionnaires' disease.
- CDC investigators suspected that the source of the outbreak was *Legionella* contamination in the air conditioning system at the hotel where the convention took place.
- Video: We Were There – Legionnaires [CDC]  
[https://www.youtube.com/watch?v=ALZyly9\\_I4w&t=23s](https://www.youtube.com/watch?v=ALZyly9_I4w&t=23s)
- Video: Legionnaires' Disease [Two Rivers Public Health Dept]  
<https://www.youtube.com/watch?v=bMQpExjG2fU>

David J. Sencer CDC Museum: Legionnaires' Disease

History Channel: Remembering the Legionnaires' Outbreak

# Legionellosis

	Legionnaires' Disease	Pontiac Fever	Extrapulmonary Legionellosis
<b>Clinical criteria for diagnosis</b>	Radiographically or clinically diagnosed <b>pneumonia</b> .	Mild influenza-like illness <b>without pneumonia</b> .	Evidence of disease at an extrapulmonary site.
<b>Lab criteria for diagnosis</b>	Urine antigen + lower respiratory culture are gold standard.	Urine antigen + lower respiratory culture are gold standard.	Culture or PCR from tissue at extrapulmonary site.
<b>Symptoms</b>	Fever or cough, chest discomfort, headache, malaise, myalgia, nausea, diarrhea, abdominal pain, shortness of breath.	Chills, fatigue, fever, headaches, malaise, myalgia, nausea or vomiting.	Endocarditis, wound infection, joint infection, graft infection.
<b>Incubation period (time from exposure to symptom onset)</b>	2-14 days.	< 72 hours.	Not defined.
<b>Treatment</b>	Antibiotics.	Patients typically recover without antibiotics.	Consult with infectious disease specialist.
<b>Severity</b>	Hospitalization is common. Case-fatality rate ~10% (HAI ~25%).	Hospitalization and death are rare.	Not much information available in the literature.

[Oregon Legionellosis Investigative Guidelines](#),

[CDC: Clinical Overview of Legionnaires' Disease](#),

[CDC: Clinical Features of Legionnaires' Disease and Pontiac Fever](#),

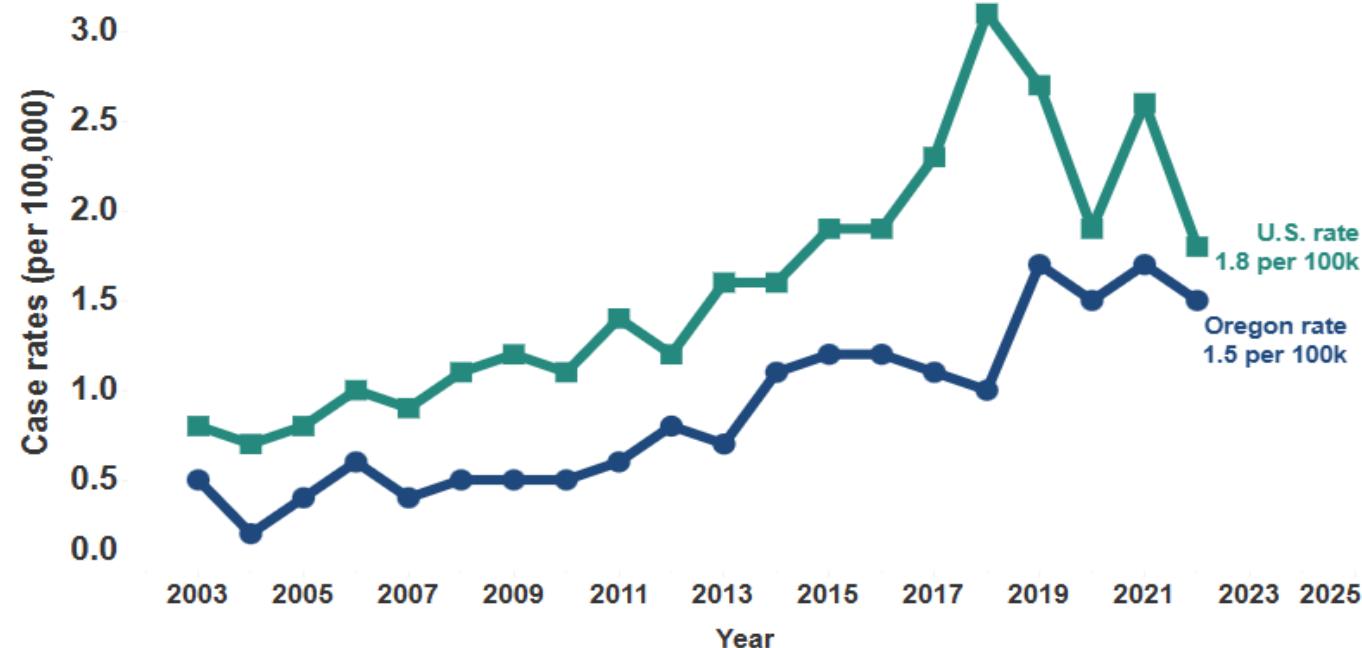
[CDC: Clinical Guidance for \*Legionella\* Infections](#)

# Legionellosis Data

## Oregon 2022 Selected Reportable Communicable Disease Summary

### Case rates of legionellosis in Oregon vs nationwide, 2003 to 2022.

U.S. case counts, population and birth estimates exclude Oregon for comparison.



U.S. data sources: Nationally Notifiable Infectious Diseases and Conditions, CDC Wonder (annual, weekly); Census Bureau's Annual Population Estimates as of July 1st of each year; Births: Final Data for 2021 from National Vital Statistics Reports. Oregon data sources: Orpheus, Portland State University's annual population estimates, Oregon's vital statistics birth data. FoodNet data sources: Foodborne Diseases Active Surveillance Network, Census Bureau's Annual Population estimates as of July 1st of each year.

# Legionellosis Data

## OHA Monthly Communicable Disease Surveillance Report

**Oregon Health Authority**  
Public Health Division  
Center for Public Health Practice

**MEMENTO MORBI**  
A Monthly Communicable Disease Surveillance Report

**Data are updated through November 2025**  
Data are current as of December 9, 2025.

This report contains several dashboards that allow you to explore monthly trends in communicable disease in Oregon over the past 10 years. Click on the different icons below to view data tables and charts by demographic group or county.

This report is an early source of infectious disease surveillance data for Oregon. These data are important for monitoring early trends of infectious diseases and for targeting prevention and control efforts. Data are provisional and subject to change upon the completion of ongoing disease investigations.

**Icons:**

- Data by demographic group
- Data charts
- Data tables
- Data by County
- Data charts
- Data tables

**Feedback:** [Submit feedback.](#)

**MEMENTO MORBI**  
A Monthly Communicable Disease Surveillance Report

**REMINDER:**  
All data in the monthly report are provisional.

**Explore the Data: Compare Demographic Groups**

Select a disease: Legionellosis | Select a month: December | Select a year: 2025 | [View Race & Ethnicity Data](#)

**Legionellosis Case counts by Age Group: Oregon, December through 2025 (Year to date)**

Age Group	2024	2025
<5	0	0
5 to 9	0	0
10 to 14	0	0
15 to 19	0	0
20 to 24	0	2
25 to 29	0	3
30 to 39	0	7
40 to 49	0	18
50 to 59	0	21
60 to 69	0	14
70 to 79	0	16
80+	0	0

**Legionellosis Case counts by Sex: Oregon, December through 2025 (Year to date)**

Year	Male	Female
2021	40	33
2022	36	28
2023	42	25
2024	47	34
2025	52	32

**Additional tables:**  
Ten years of communicable disease data presented by month, county of residence and year.

**OREGON HEALTH AUTHORITY**

\*\* To protect confidentiality, data is suppressed whenever there are fewer than 6 cases in the state (or fewer than 6 cases in a category for lead poisoning, childhood lead poisoning, HIV, and pesticide poisoning).



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# Water Management Programs

# Question

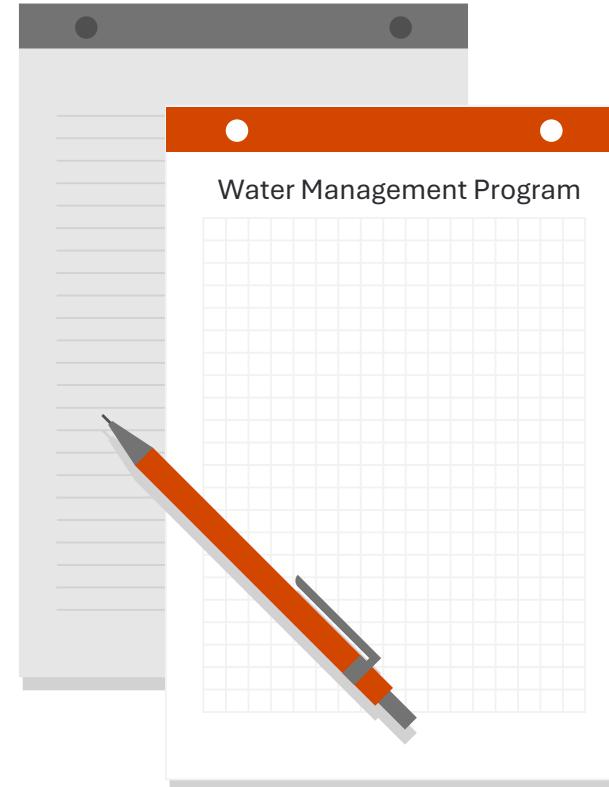
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- **Does your healthcare facility have a water management program (WMP)?** Please type your response into the meeting chat if you feel comfortable sharing.
  - A. Yes.
  - B. Not yet, but we are working on creating one.
  - C. No.
  - D. I don't know.

# Getting Started: WMPs

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- What is a water management program or WMP?
  - A water management program (WMP) is a detailed document that outlines a facility's policies and procedures for limiting growth and spread of certain pathogens, including *Legionella*, in the building water systems.



CMS: Requirement to Reduce Legionella Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)

CDC Toolkit: Developing a Legionella Water Management Program

# Getting Started: WMPs

The Centers for Medicare & Medicaid Services (CMS) requires that healthcare facilities (hospitals, critical access hospitals (CAH), and long-term care facilities (LTCFs) regulated by CMS:

Conduct a facility risk assessment to identify where *Legionella* and other opportunistic waterborne pathogens could grow and spread in the facility water system.

Develop and implement a WMP that considers the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) industry standard and the CDC Toolkit: Developing a *Legionella* Water WMP.

Specify testing protocols and acceptable ranges for control measures.

Document the results of testing and corrective actions taken when control limits are not maintained.

[CMS: Requirement to Reduce Legionella Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease \(LD\)](#)

[ANSI/ASHRAE Standard 188-2021, Legionellosis: Risk Management for Building Water Systems](#)

[CDC Toolkit: Developing a Legionella Water Management Program](#)

Source: CMS

# Getting Started: WMPs

## CDC Considerations for Reducing Risk: Water in Healthcare Facilities

### Summary of considerations

<b>Consideration 1: Maintain a water management program.</b>	<ul style="list-style-type: none"><li>A healthcare water management program identifies both hazardous conditions and corrective actions that can minimize the growth and spread of waterborne pathogens in healthcare facilities.</li></ul>
<b>Consideration 2: Conduct a water infection control risk assessment.</b>	<ul style="list-style-type: none"><li>Healthcare facilities can use a Water Infection Control Risk Assessment (WICRA) to assess: water sources; mode of transmission; patient susceptibility; patient exposure; program preparedness.</li></ul>
<b>Consideration 3a: Reduce exposure from sinks and drains.</b>	<ul style="list-style-type: none"><li>Healthcare facilities can reduce splashing from sinks and drains that can expose people to pathogens.</li></ul>
<b>Consideration 3b: Intentional sink design choices.</b>	<ul style="list-style-type: none"><li>When installing or modifying sinks, healthcare facilities can consider selecting designs that prevent splashing.</li></ul>

Source: CDC

## CDC Healthcare Facility Water Management Program Checklist

Healthcare Facility Water Management Program Checklist

**CDC**  
U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

Healthcare Facility Water Management Program Checklist

Available from: <https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html>

This checklist is intended to assist in the development of an all-microbial hazards approach to water management in a healthcare facility, and can:

- Evaluate a comprehensive water management program.
- Identify individuals to participate in the water management program.
- Assist with assessments, including hazard analyses, environmental risk assessments, and infection control risk assessments.
- Inform water monitoring practices guided by the management program.

Depending on complexity of the building plumbing systems, a comprehensive program may include some water management plans. These plans should include identifying areas within the system where control points are and monitoring methods and procedures (see [ASHRAE 188-2021: ASHRAE Guideline 12: 2023](#) and [ASHRAE 514:2023](#))

**Establish a Water Management Program Team (the Designated Team)**

For all facility types, establish clear lines of communication with representatives such as the water utility provider and the local health department on an as needed basis.

Define membership (at a minimum should represent the following 'roles' and may include others depending on facility size and type):

- Facilities management or senior leader
- Facilities engineer or maintenance representative
- Infection prevention
- Environmental services
- Department heads or designee

Develop a charter that defines roles and responsibilities of members, chair, meeting schedule, etc.

Have you identified team members who should:

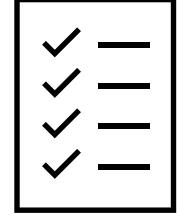
- Y  N Be familiar with the facility water system(s)
- Y  N Identify control locations and control limits

For nursing homes, the group may consist of three or more individuals representing management, nursing (someone filling the role of infection control), and the facilities engineer; ad hoc members with subject matter expertise (to provide advice) may be water consultants.

Larger facilities representation may include a senior leader, risk management, infection prevention, facilities engineers, central sterile services, laboratory, and ad hoc members from clinical departments or water consultants.

Updated: 04/22/2024

1



Source: CDC



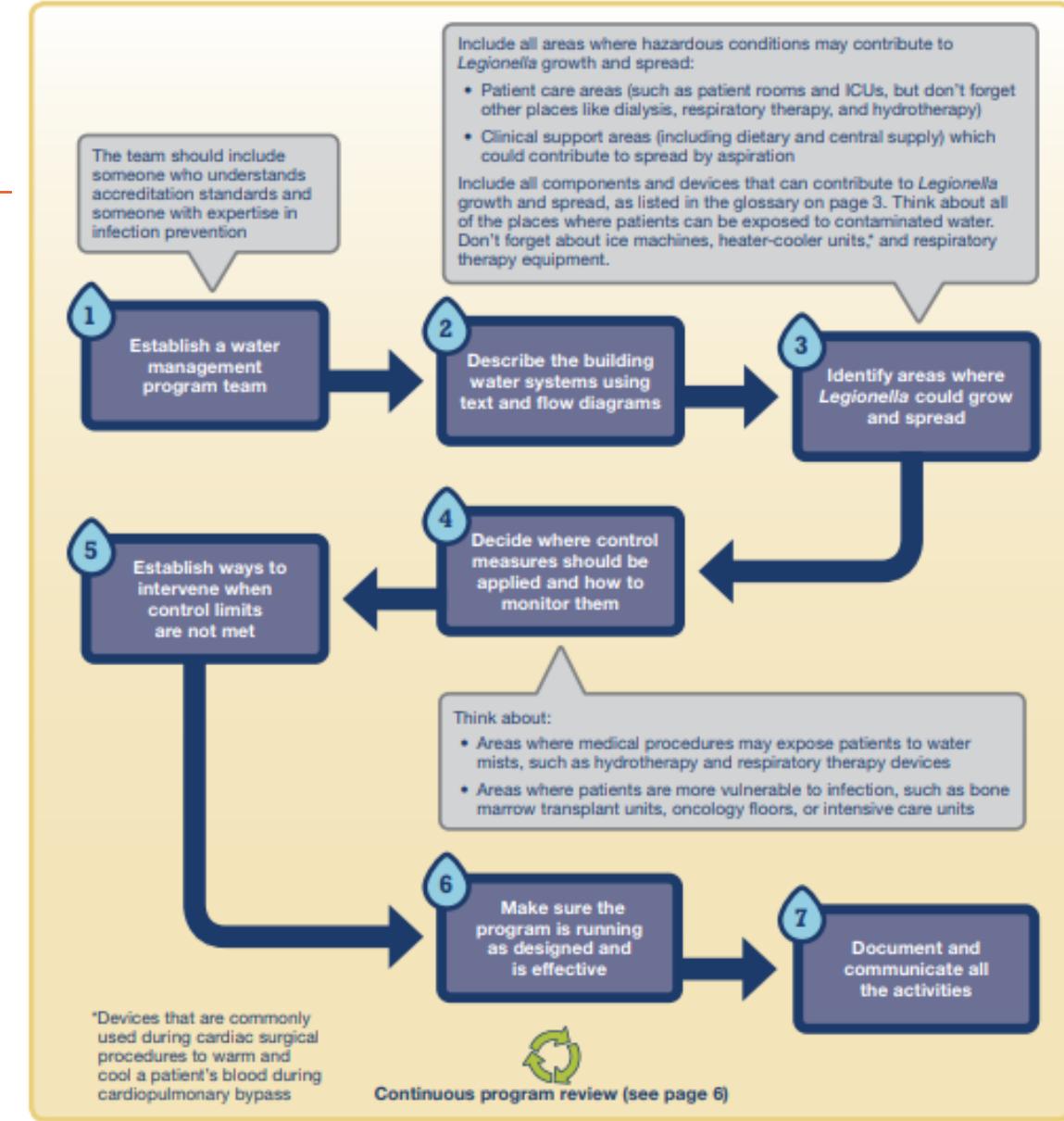
# Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS



Source: CDC

CDC Toolkit: Developing a Legionella Water Management Program



Source: CDC



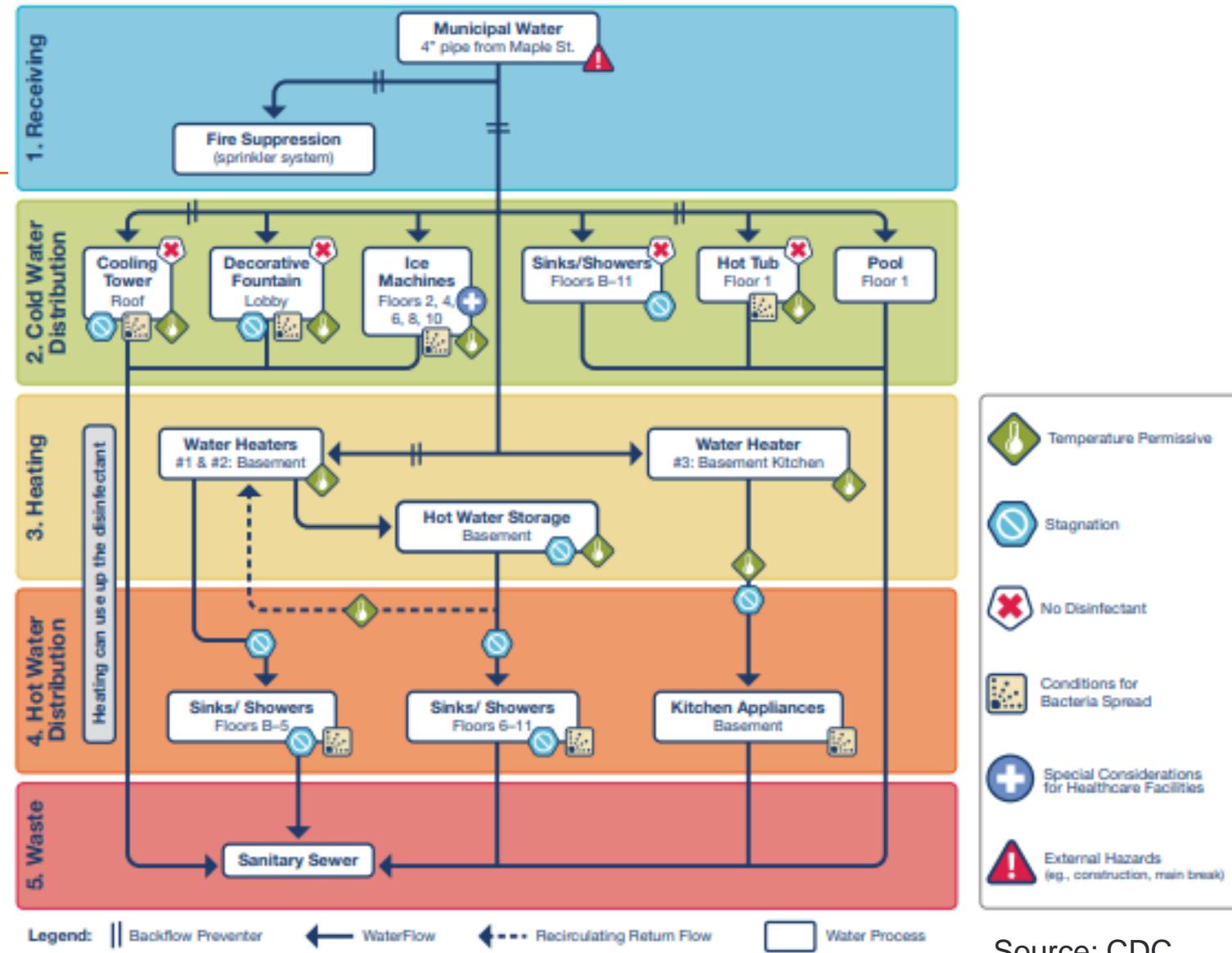
# Element 1: Establish a WMP Team



Source: CDC



## Element 2: Describe the Building Water Systems Using Text and Flow Diagrams

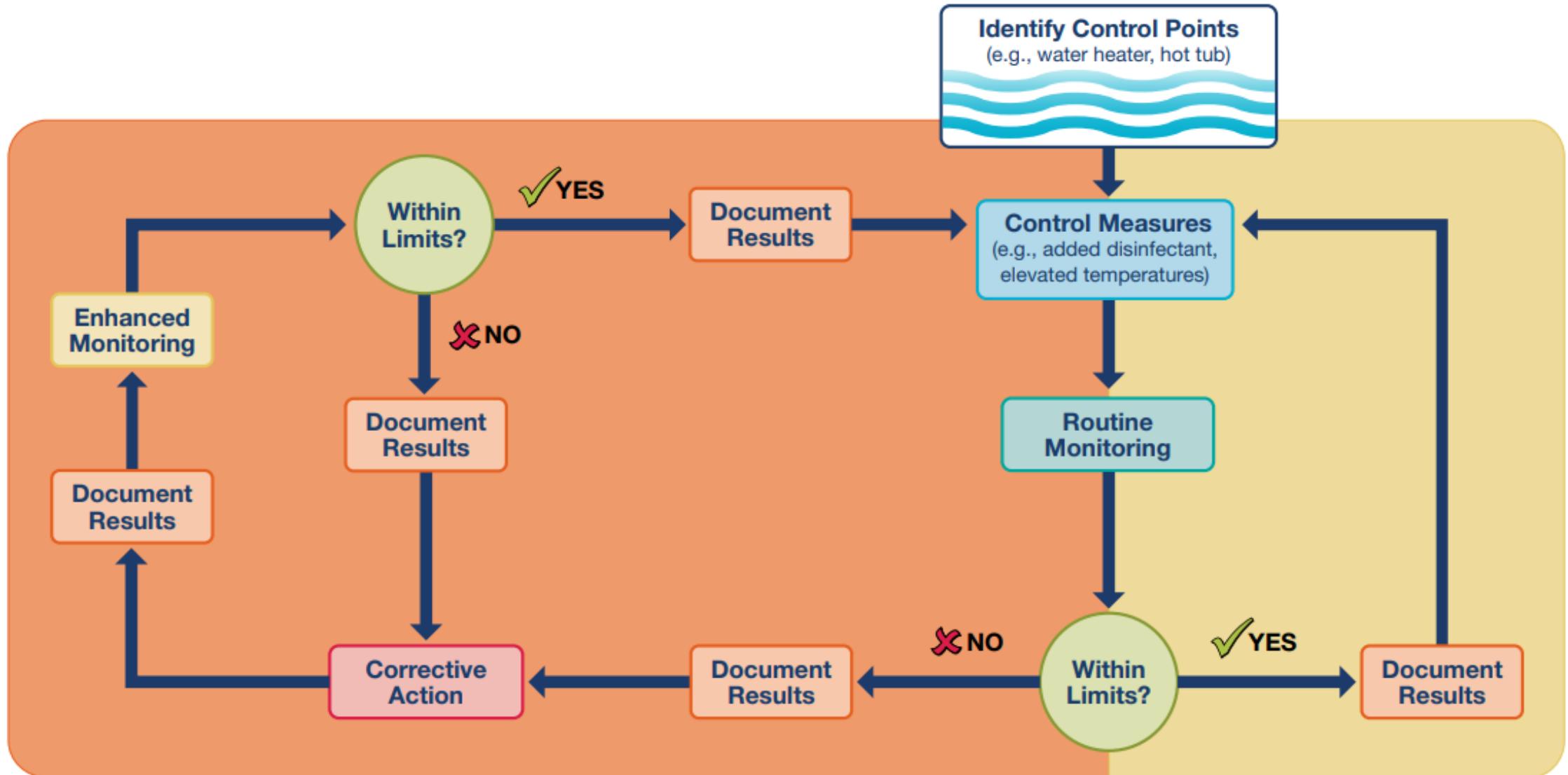


Source: CDC

CDC Toolkit: Developing a Legionella Water Management Program,  
Drinking Water Data Online Tool

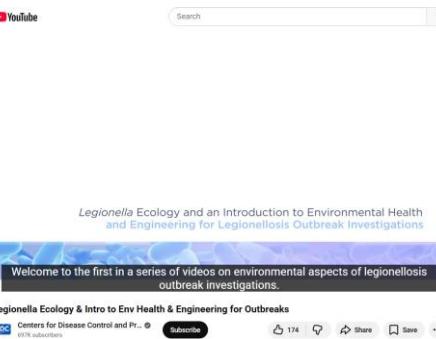


## Element 3: Identify Areas Where *Legionella* Could Grow and Spread



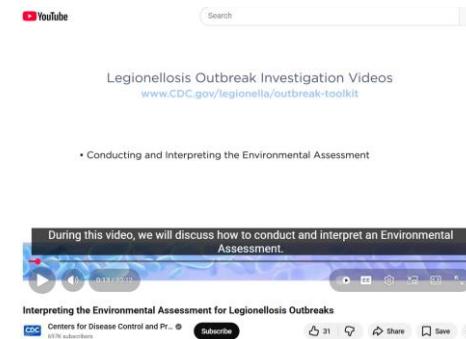
# Identify Areas Where *Legionella* Could Grow & Spread

The image shows the CDC's Legionella Environmental Assessment Form (LEAF). The form is a white document with a blue header and footer. The header reads 'Centers for Disease Control and Prevention' and 'Legionella Environmental Assessment Form'. The footer includes the CDC logo and the text 'CDC: LEAF'.



CDC: Legionella Ecology and an Introduction to Environmental Health and Engineering for Legionellosis Outbreak Investigations [video]

The image shows the CDC's Legionella Environmental Assessment Form Marking Guide. It is a white document with a blue header and footer. The header reads 'Centers for Disease Control and Prevention' and 'Legionella Environmental Assessment Form Marking Guide'. The footer includes the CDC logo and the text 'CDC: LEAF Marking Guide'.



CDC: Conducting and Interpreting the Environmental Assessment [video]

- Environmental Assessment
- Evaluate potential sources of *Legionella* exposure, including potable water sources & devices.
- Use CDC's *Legionella* Environmental Assessment Form (LEAF) and LEAF Marking Guide.

# Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

## INTRODUCTION

## INSTRUCTIONS



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

CS314808

## WATER INFECTION CONTROL RISK ASSESSMENT (WICRA) FOR HEALTHCARE SETTINGS

- ◆ A water infection control risk assessment (WICRA) is a critical component of water management programs (WMP) in healthcare settings. WMP team members can use a WICRA to evaluate water sources, modes of transmission, patient susceptibility, patient exposure, and program preparedness.
- ◆ A WICRA may be conducted during the initial development of a WMP and updated over time. The frequency of subsequent assessments should be informed by and defined in the WMP.
- ◆ Performing a WICRA using this tool will generate numerical scores of perceived risk, which can assist in prioritizing WMP activities such as monitoring and mitigation efforts. Total risk scores are intended for internal prioritization and do not hold significance outside the context of each site-specific WMP. Typically, the risks with highest scores will be used for priority focus, though some with lower scores may be given special consideration (e.g., mitigation can be quickly and easily implemented). Specific risk management actions should be determined in accordance with WMP activities.
- ◆ This WICRA tool provides a completed example for a Burn Intensive Care Unit (BICU). This may be used as a reference when completing the fillable document, which is intended to be flexible for different WMP needs.

- ◆ **Step 1:** Identify the areas within your facility to assess using the WICRA tool. Consider grouping each page by location (e.g., unit/ward/wing/building). Use the Location column for additional information (e.g., space/room/area).
- ◆ **Step 2:** Identify potential water sources, considering the examples on the next page. Each row of the WICRA table may be used for a unique exposure, or set of like exposures, in a location (e.g., sink, hopper, shower, fountain, ice machine).
- ◆ **Step 3:** Categorize potential modes of transmission for water-associated pathogens, considering the categories on the next page. Record this in the Modes of Transmission column.
- ◆ **Step 4:** Classify the patient susceptibility for each water source, considering the categories on the next page (highest, high, moderate, low). Record a score in the Patient Susceptibility column (e.g., from 4 to 1).
- ◆ **Step 5:** Characterize patient exposure, considering the categories on the next page (high, moderate, low, none). Record a score in the Patient Exposure column (e.g., from 3 to 0).
- ◆ **Step 6:** Determine the current level of preparedness in your WMP, considering the categories on the next page (poor, fair, good). Record a score in the Current Preparedness column (e.g., from 3 to 1).
- ◆ **Step 7:** Multiply the numerical scores in each column to calculate a total risk score for each water source. Record notes on specific pathogens or other considerations in the Comments column.
- ◆ **Step 8:** Rank the total risk scores, by location and across the facility. Use this internal ranking to inform WMP activities.

**For more  
information about  
water-associated  
pathogens, see  
[CDC's Reduce Risk  
from Water page.](#)**





## WATER SOURCES

Patients are potentially exposed to water via the healthcare environment, equipment, or procedures. Water sources include, but are not limited to:

- ◆ Sinks
- ◆ Toilets
- ◆ Endoscopes
- ◆ Lactation equipment
- ◆ Water source
- ◆ Hoppers
- ◆ Heater cooler devices
- ◆ Enteral feeding
- ◆ Sinks
- ◆ Humidification devices
- ◆ Ice machines
- ◆ Bathing procedures
- ◆ Drains
- ◆ Mechanical ventilators
- ◆ Indoor decorative fountains
- ◆ Showers



## MODES OF TRANSMISSION

When assessing risk of healthcare-associated infections caused by waterborne pathogens, consider the diverse modes of transmission, including:

- ◆ Direct contact (e.g., bathing, showering)
- ◆ Ingestion of water (e.g., consumption of contaminated ice)
- ◆ Indirect contact (e.g., from an improperly reprocessed medical device)
- ◆ Inhalation of aerosols dispersed from water sources (e.g. faucets with aerators)
- ◆ Aspiration of contaminated water (e.g. use of tap water to flush enteral feedings)



## PATIENT SUSCEPTIBILITY

Patient populations with compromised immune status, comorbidities, and exposure to certain procedures are more vulnerable to infections caused by waterborne pathogens. Units/wards/wings can be classified according to those patients treated in these areas:

- ◆ Highest (e.g., BMT, solid-organ transplant, hematology, medical oncology, burn unit, NICU)
- ◆ High (e.g., non-transplant ICUs, ORs)
- ◆ Moderate (e.g., general inpatient units)
- ◆ Low (e.g., waiting rooms, administrative office areas)



## PATIENT EXPOSURE

In order to characterize patient exposure to water sources, consider a categorization scheme that encompasses factors such as the frequency (how often), magnitude (how much), and duration (how long) of exposure:

- ◆ High (e.g., high frequency, magnitude, and duration)
- ◆ Moderate (e.g., combination of high and low frequency, magnitude, and duration)
- ◆ Low (e.g., low frequency, magnitude, and duration)
- ◆ None (e.g., patients are not exposed to the water source)



## CURRENT PREPAREDNESS

Consider how your WMP addresses different water sources, as determined by factors such as policies and procedures already in place, relevant staff practice, and implemented mitigation strategies.

- ◆ Poor (e.g., limited policies and procedures, staff practice, and mitigation strategies)
- ◆ Fair (e.g., some policies and procedures, staff practice, and mitigation strategies)
- ◆ Good (e.g., robust policies and procedures, staff practice, and mitigation strategies)

## WATER INFECTION CONTROL RISK ASSESSMENT (WICRA) FOR HEALTHCARE SETTINGS

## Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

Facility Name: Hospital A

Assessment Location: Burn ICU

Performed By (names): Jane Smith and John Doe

Assessment Date: 10/01/2020

WMP Team Role(s) (check all that apply):

<input checked="" type="checkbox"/> Hospital Epidemiologist/Infection Preventionist	<input checked="" type="checkbox"/> Facilities Manager/Engineer	<input type="checkbox"/> Environmental Services	<input type="checkbox"/> Compliance/Safety Officer
<input type="checkbox"/> Risk/Quality Management Staff	<input type="checkbox"/> Infectious Disease Clinician	<input type="checkbox"/> Consultant	
<input type="checkbox"/> Equipment/Chemical Acquisition/Supplier	<input type="checkbox"/> Other (please specify):		

Location	Water Source	Modes of Transmission	Patient Susceptibility	Patient Exposure	Current Preparedness	Total Risk Score = Patient Susceptibility x Patient Exposure x Preparedness	Comments
BICU Inpatient Rooms	Sink counter storage of patient care supplies	Indirect contact; splashing onto supplies	4 Highest = 4 High = 3 Moderate = 2 Low = 1	3 High = 3 Moderate = 2 Low = 1 None = 0	3 Poor = 3 Fair = 2 Good = 1	36	Install splash guards; QI for sink hygiene; and flushing
BICU Inpatient Rooms	Toilets without lid	Direct contact	4	3	2	24	Place lid on toilet if in patient room
BICU Soiled Utility	Hopper, no lid, behind closed door	Indirect contact	4	2	1	8	Automatic door closure; appropriate soiled equipment storage
BICU Medication Preparation Room	Sink with aerator, no splash guard	Aerosolization, and potential for splashing	4	2	3	24	Install splash guards; evaluate removing aerator
BICU Hydrotherapy Room	Debridement showers	Direct contact	4	3	1	12	Monthly EVS audits room indicating 95% adherence to policies
BICU Nurses Station	Sink closest to door	Indirect contact; HCW hands; devices	4	2	3	24	Install splash guards or move IV bags storage

WATER INFECTION CONTROL RISK ASSESSMENT (WICRA) FOR HEALTHCARE SETTINGS

CDC Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

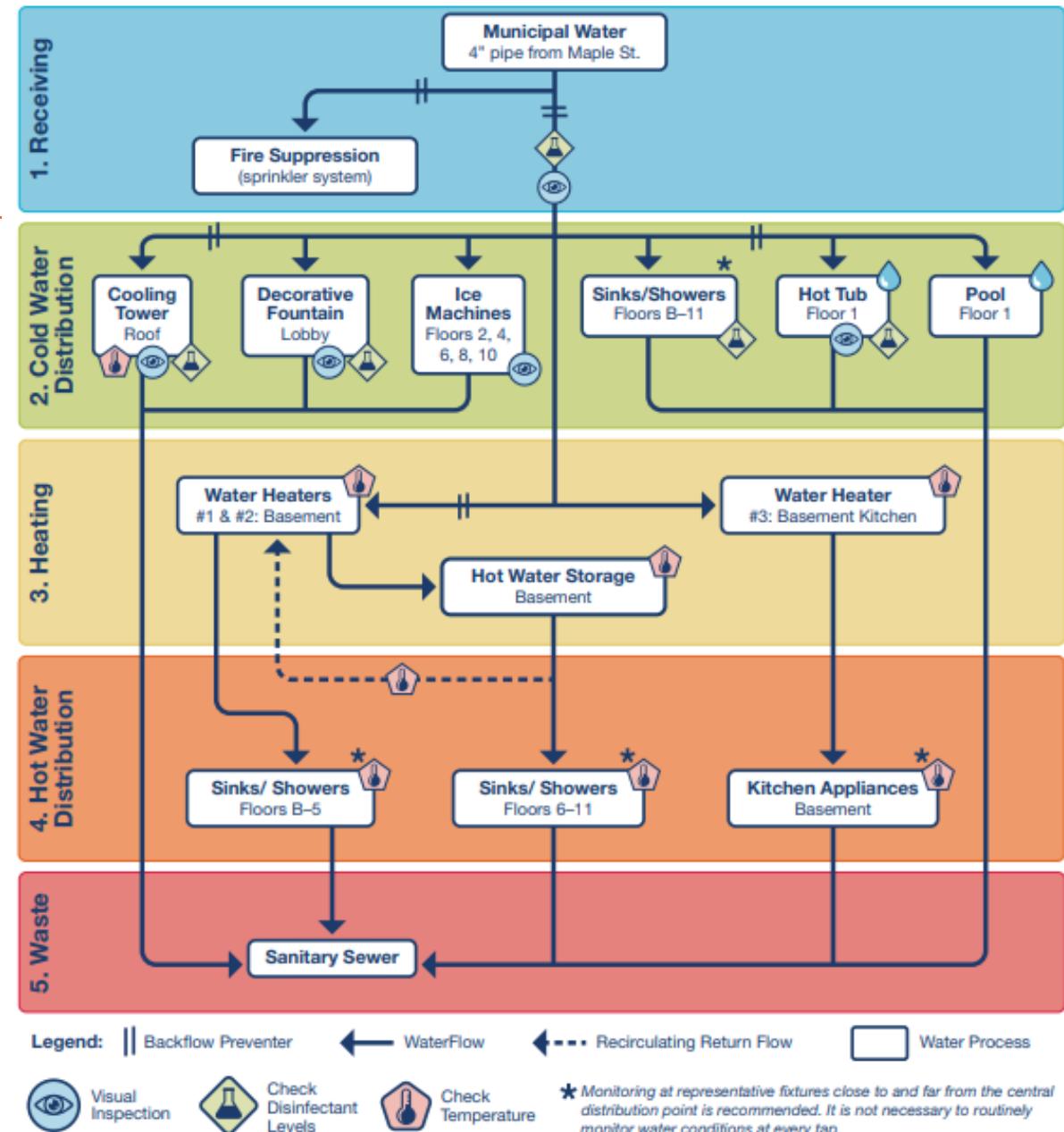
Source: CDC



## Element 4: Decide Where Control Measures Should Be Applied and How to Monitor Them

# Control Measures

- CDC Toolkit: Developing a Legionella Water Management Program
- CDC: Toolkit for Controlling Legionella in Common Sources of Exposure
- CDC: Implementing Control Measures in Healthcare Facilities
- Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003)
- Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities (2003)
- HICPAC Guidance
- CDC: Monitoring Building Water



Source: CDC

**Table 1. Legionella Control Measures for Potable Water Systems**

Water Parameter		Control Measure	Recommendations
<b>S</b>	<b>Sediment and Biofilm</b>	Flushing, cleaning, and maintenance	<ul style="list-style-type: none"><li>Flush after an intrusion event (e.g., water main break).</li><li>Clean and maintain water system components such as water heaters, mixing valves, aerators, showerheads, hoses, and filters regularly as indicated by water quality measurements.</li></ul>
<b>T</b>	<b>Temperature</b>	Control limits	<ul style="list-style-type: none"><li>Store hot water above 140°F (60°C) and maintain circulating hot water above 120°F (49°C).</li><li>Store and maintain circulating cold water below the growth range most favorable to <i>Legionella</i> (77–113°F, 25–45°C). Note that <i>Legionella</i> may grow at temperatures as low as 68°F (20°C).</li></ul>
<b>A</b>	<b>Water Age</b>	Flushing	<ul style="list-style-type: none"><li>Flush low-flow pipe runs and dead legs at least weekly.</li><li>Flush infrequently used fixtures regularly.</li></ul>
<b>R</b>	<b>Disinfectant Residual*</b>	Control limits	<ul style="list-style-type: none"><li><b>Chlorine:</b> Detectable residual as directed by WMP.</li><li><b>Monochloramine:</b> Detectable residual as directed by WMP.</li></ul>

\* Disinfectant residual recommendations apply to disinfectant delivered by the municipal water authority. Supplemental disinfection system control limits are not prescribed here and must be dictated by the water treatment professional and water management program.

**Table 5. Legionella Control Measures for Other Devices**

Water Parameter		Control Measure	Recommendations
<b>S</b>	<b>S</b> ediment and Biofilm	Flushing, cleaning, and maintenance	<ul style="list-style-type: none"><li>• Clean and maintain water system components regularly in accordance with manufacturer recommendations.</li></ul>
<b>T</b>	<b>T</b> emperature	Control limits	<ul style="list-style-type: none"><li>• Store and maintain water at temperatures outside the favorable growth range for <i>Legionella</i> (77–113°F, 25–45°C);<ul style="list-style-type: none"><li>• Note that <i>Legionella</i> may grow at temperatures as low as 68°F (20°C).</li></ul></li></ul>
<b>A</b>	<b>W</b> ater <b>A</b> ge	Flushing and water replacement	<ul style="list-style-type: none"><li>• Flush and replace water according to manufacturer recommendations.</li></ul>
<b>R</b>	<b>D</b> isinfectant <b>R</b> esidual*	Control limits	<ul style="list-style-type: none"><li>• Consider using a disinfectant appropriate for the system and in accordance with manufacturer recommendations.</li></ul>

\* Residual disinfectant recommendations apply to disinfectant delivered by the municipal water authority. Supplemental disinfection system control limits are not prescribed here and must be dictated by the water treatment professional, water management program, and/or manufacturer's instructions.

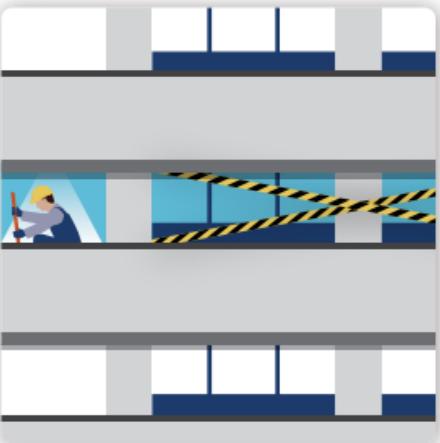
Source: CDC



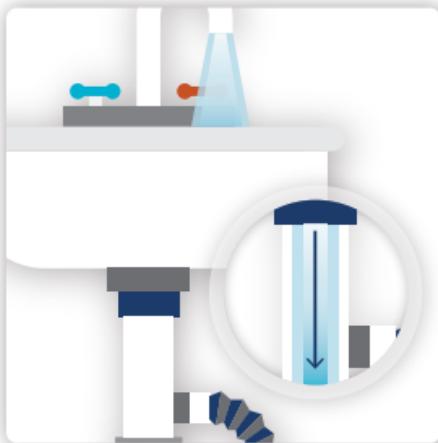
## Element 5: Establish Ways to Intervene When Control Limits Are Not Met

# Corrective Actions

## Example 2—Unoccupied floor



1. The eighth floor of the building is being renovated and is closed to the public. Jason Hernandez understands that this may cause a temporary hazardous condition because water usage will decrease, which means that stagnation is possible.



2. After discussing the issue with his supervisor, Jason counteracts the potential for stagnation by daily flushing of the sinks and fixtures with hot and cold water in several rooms including those at the end of the hall, which are farthest from the vertical pipe serving that floor (riser).



3. Jason also increases the frequency of measuring temperature and chlorine levels on the eighth floor from weekly to daily for the duration of the renovation.



4. He documents the method and duration of flushing and records his daily temperature and chlorine readings in his log book. He reviews his documentation with his supervisor.

Source: CDC

CDC Toolkit: Developing a Legionella Water Management Program,  
Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003),  
Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

# Response activities

## Example 1—Biofilm growth in the fountain



1. During the annual review of the water management program, supervisor Anson Cho notes that Michelle and Jason performed six interim cleanings of the lobby fountain due to excessive biofilm growth in the past year.
2. Upon further review of the logs, he discovers that the biofilm growth was observed near the inner wall where incandescent lighting illuminates the water.
3. Anson decides to replace the incandescent bulbs with LED bulbs to prevent the lights from heating the water to a temperature that allows biofilm to grow.
4. After three months of routine inspections show that this corrective action reduces biofilm growth and eliminates the need for interim cleaning, Anson amends the water management program to specify use of only LED bulbs in the fountain and he informs the owner.

Source: CDC

CDC Toolkit: Developing a Legionella Water Management Program,  
Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003),  
Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

# Immediate Control Measures

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- Immediate control measures
  - Prevent exposure to suspected sources of *Legionella*.
  - Reduce risk of continued transmission.
- Should be based on initial findings of the environmental assessment.
- Should be specific to the suspected source, building, & investigation.



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[CDC: Controlling Legionella in Potable Water Systems](#),

[CDC: Implementing Control Measures](#),

[Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities \(2003\)](#),

[Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities \(2003\)](#)

# Examples: Immediate Control Measures

<b>Potable water systems (water intended for people to drink) and water devices:</b>	<b>Healthcare Facilities:</b>
Restrict showers.	Avoid exposure to hydrotherapy tubs.
Avoid exposure to hot tubs.	Avoid use of water from faucets in patient rooms.
Restrict access to areas with water devices, like hot tubs.	Limit consumption of non-sterile ice from ice machines.
Temporarily close the affected building, area, or device.	Provide sterile water to hematopoietic stem cell or solid-organ transplant patients for brushing teeth, drinking; use sterile water to flush feeding tubes.
Turn off water devices (such as hot tubs and cooling towers).	Provide bottled water to all other patients.
Add point-of-use filters.	Always use sterile water for respiratory equipment intended for nebulization (even if there is no outbreak).
Send exposure notification letters.	Pause new admissions.

[CDC: Implementing Control Measures,](#)

[CDC: Implementing Control Measures in Healthcare Facilities,](#)

[HICPAC Guidance](#)

[CDC: Controlling Legionella in Potable Water Systems,](#)

[Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities \(2003\)](#)

Source: CDC

# Remediation

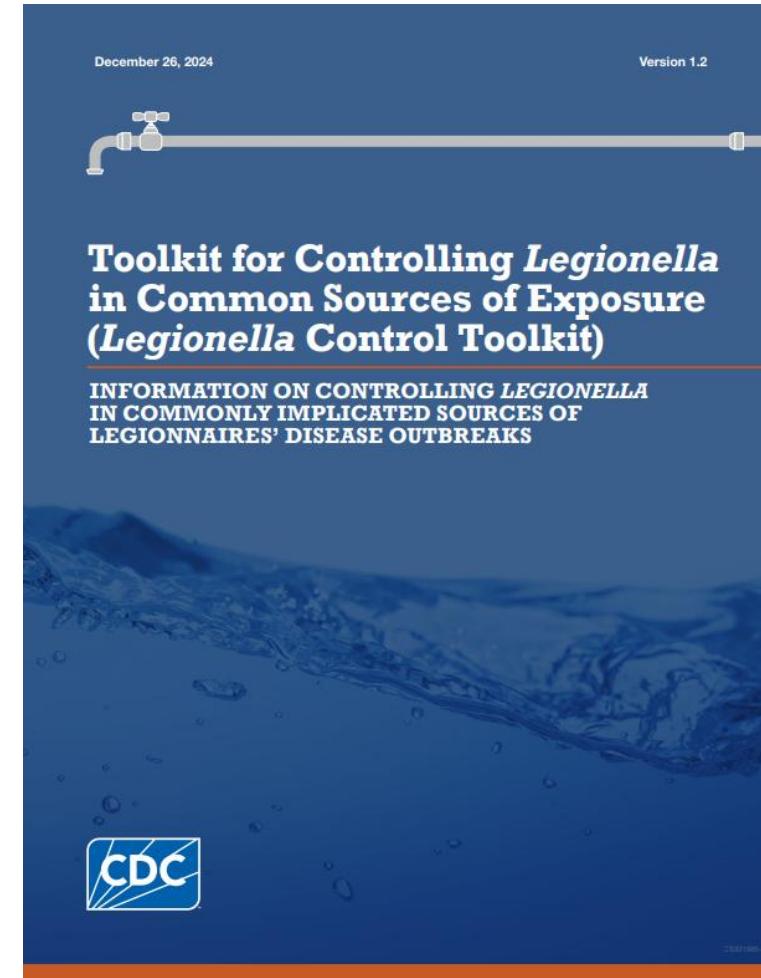
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- Remediation
  - Recommended when control measures are not sufficient to reduce growth and transmission of *Legionella* within a water system or device.
  - Recommended if *Legionella* is detected during routine environmental testing, cases of legionellosis have been identified, or there have been any disruptions to the water system.
  - Remediation activities should be selected based on the environmental assessment, environmental testing, and investigation.
- Examples of remediation activities:
  - Hyperchlorinating the water system or device.
  - Draining & scrubbing devices to remove biofilm.
  - Replacing or repairing parts.
  - Superheating & flushing devices.
- Post-remediation environmental testing is recommended.
  - Collect environmental samples at least 48 hours after restoring water systems or devices to normal operating conditions;
  - At 2-week intervals for 3 months;
  - At monthly intervals for 3 more months.

CDC: Toolkit for Controlling Legionella in Common Sources of Exposure,  
Water guidelines from the Guidelines for Environmental Infection Control in Health-Care Facilities (2003),  
Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities (2003),  
HICPAC Guidance

# Toolkit: Controlling *Legionella* in Common Sources of Exposure

- More information about control measures and remediation activities for water systems and devices can be found in the CDC's [Toolkit for Controlling Legionella in Common Sources of Exposure](#)
  - [Potable water systems](#)
  - [Cooling towers](#)
  - [Fountains](#)
  - [Hot tubs](#)
  - [Other devices](#)
  - [Healthcare facilities](#)



Source: CDC



# Element 6: Make Sure the Program is Running as Designed and is Effective

# Verification & Validation

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## Verification

- Check that WMP activities are being implemented as intended.
- Verification should be completed by a team member who is not responsible for the activity.



## Validation

- Regularly check that the WMP is effective at controlling *Legionella*.
- Consider routine environmental testing for *Legionella*.

# Routine Environmental Testing

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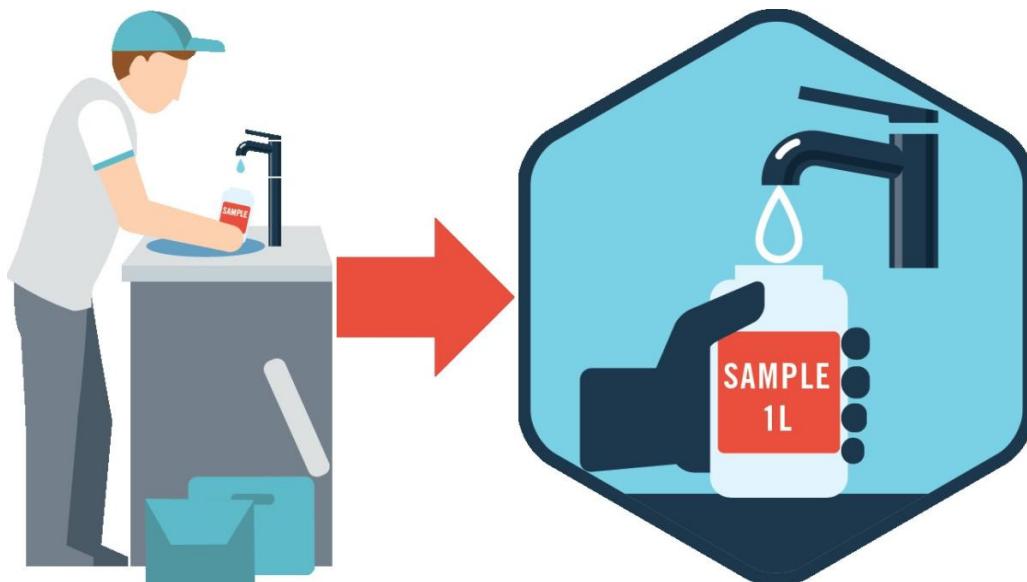


- Routine environmental testing
  - Establish a baseline measurement for performance indicators.
  - Evaluating potential growth & transmission sources.
  - Validating a WMP.
- Routine environmental testing can be helpful for:
  - Facilities that house or treat individuals at increased risk for Legionnaires' Disease.
  - Facilities that do not consistently meet control limits
  - Facilities with a history of Legionnaires' Disease cases.

CDC: Routine Testing for *Legionella* Control,  
CDC: Routine Testing for *Legionella*

# Routine Environmental Testing

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Source: CDC

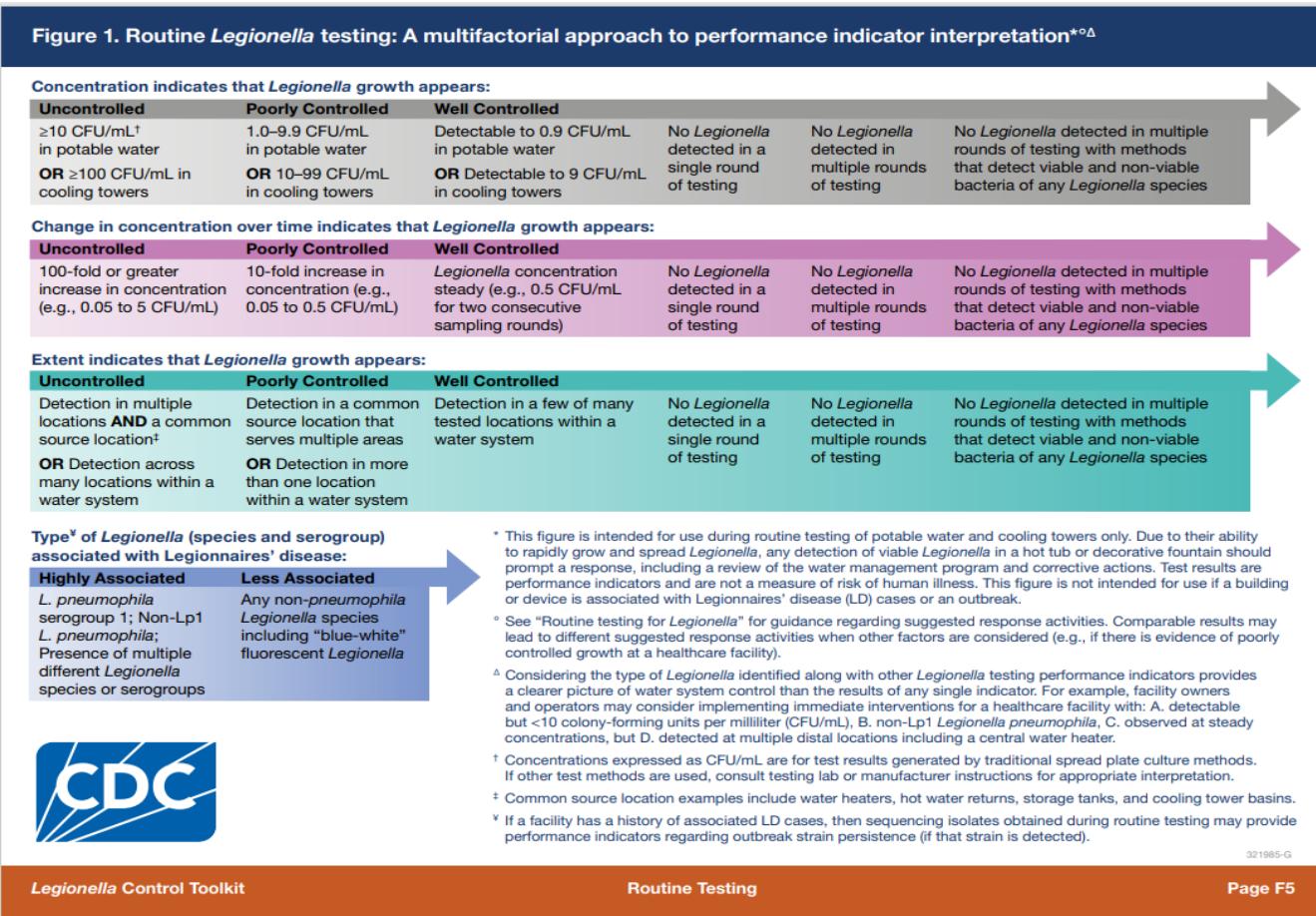
- Before starting routine testing as part of your WMP:
  - Perform an environmental assessment to identify areas at increased risk of *Legionella* growth and spread
  - Develop a sampling plan to identify:
    - Sample locations
    - Sample types
    - Sampling materials needed

CDC: Routine Testing for *Legionella* Control,

CDC: Routine Testing for *Legionella*,

Appendix C. Water: Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

# Routine Environmental Testing



CDC: Routine Testing for *Legionella* Control,  
CDC: Routine Testing for *Legionella*,  
Figure 1: *Legionella* Control Toolkit

Source: CDC

- Determine which lab the samples will be sent to for routine testing, find out what test methods will be used, and learn how to interpret the results
- Select an accredited laboratory for routine environmental testing
  - ELITE Laboratories (environmental samples)
  - TNI-Accredited Laboratories (environmental samples)
- Include plans in your WMP for what corrective actions and response activities will be implemented if results indicate that *Legionella* growth is not well-controlled.

# Routine Environmental Testing



Sampling Procedure and Potential Sampling Sites

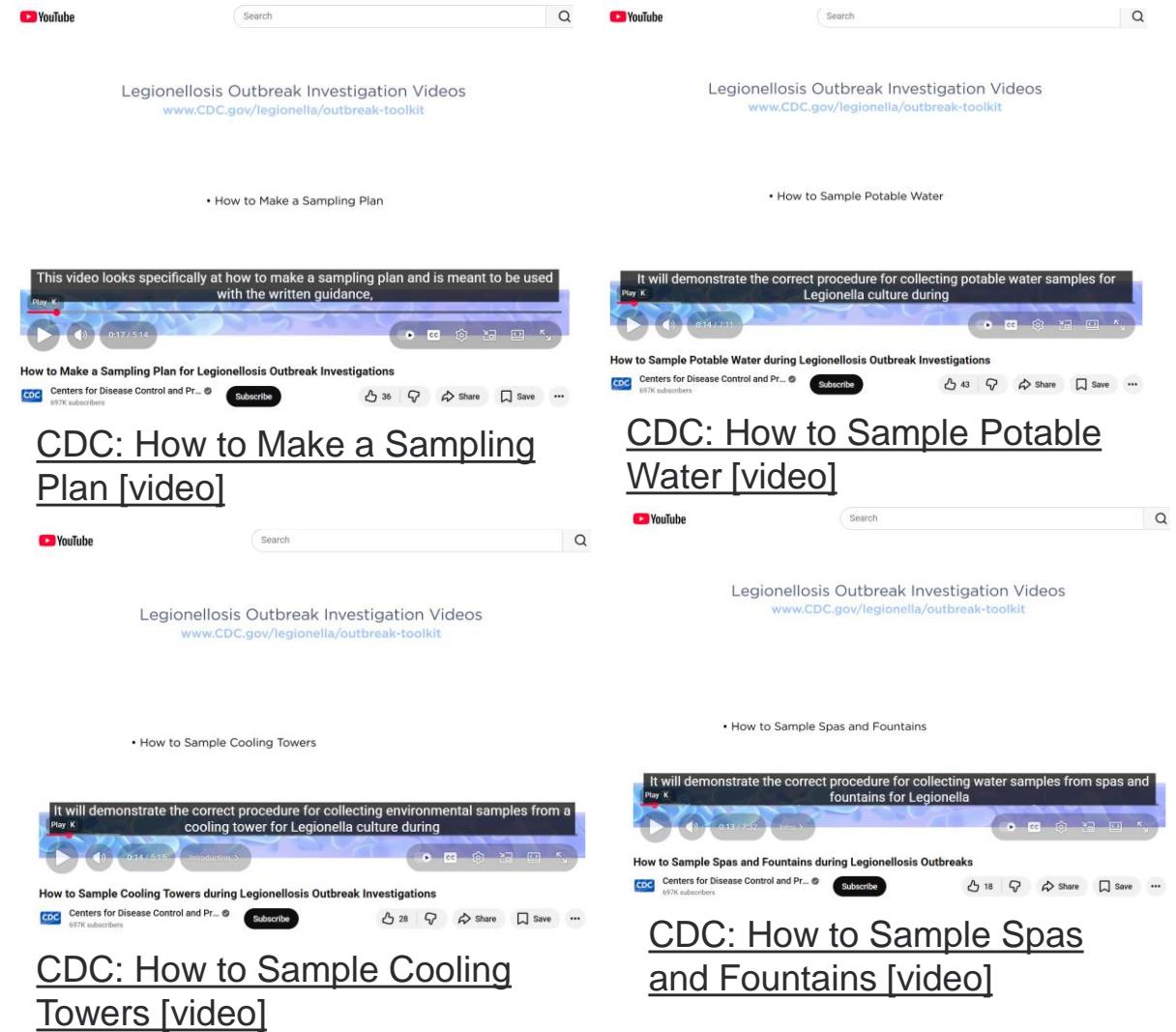
Protocol for collecting environmental samples for *Legionella* culture during a cluster or outbreak investigation or when cases of disease may be associated with a facility.

Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. This protocol describes how to take standard biofilm swab, bulk water, and filter samples from commonly sampled sites. This protocol may be used in conjunction with the following tools:

- LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM
- SAMPLE DATA SHEET
- LEGIONELLOSIS OUTBREAK INVESTIGATION VIDEOS:
  - Legionella Ecology and an Introduction to Environmental Health and Engineering
  - Conducting and Interpreting the Environmental Assessment
  - How to Make a Sampling Plan
  - How to Sample Potable Water
  - How to Sample Cooling Towers
  - How to Sample Spas and Fountains

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

## CDC: Sampling Procedure and Potential Sampling Sites



Legionellosis Outbreak Investigation Videos [www.CDC.gov/legionella/outbreak-toolkit](http://www.CDC.gov/legionella/outbreak-toolkit)

- How to Make a Sampling Plan
- How to Sample Potable Water
- How to Sample Cooling Towers
- How to Sample Spas and Fountains

**CDC: How to Make a Sampling Plan [video]**

**CDC: How to Sample Potable Water [video]**

**CDC: How to Sample Cooling Towers [video]**

**CDC: How to Sample Spas and Fountains [video]**



# Element 7: Document and Communicate All Response Activities

# Document and Communicate All Response Activities

-  Program team, including names, titles, contact information, and roles on the team.
-  Building description, including location, age, uses, and occupants and visitors.
-  Water system description, including general summary, uses of water, aerosol-generating devices (e.g., hot tubs, decorative fountains, cooling towers), and process flow diagrams.
-  Control measures, including points in the system where critical limits can be monitored and where control can be applied.
-  Confirmatory procedures, including verification steps to show that the program is being followed as written and validation to show that the program is effective.
-  Document collection and transport methods and which lab will perform the testing if environmental testing is conducted.



# Review Your WMP

## Review your WMP

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- Review your facility's WMP at least once a year and when:
  - Control measures are consistently outside of control limits.
  - There is a major maintenance or water service change (including new construction, equipment changes, disinfectant changes, changes in water usage, changes in municipal water supply).
  - 1 or more cases of healthcare-associated legionellosis are identified in the facility.
  - There are changes in laws, regulations, standards or guidelines.

# Review your WMP

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- You have a WMP, but how do you know if it sufficiently adheres to the key elements?
  - CDC Healthcare Facility Water Management Program Checklist
  - CSTE Evaluation Resources
    - CSTE: Water Management Program (WMP) Evaluation Tool
    - CSTE: Recommendations for Review of Water Management Programs to Reduce Risk of Legionella in Healthcare and Community Facilities
- \* These last 2 resources are geared towards State and Local Public Health but may also be helpful for WMP Teams evaluating their own WMP.



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# Water Exposure Focused ICAR

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- The OHA Healthcare-Associated Infections (HAI) program offers Water Exposure Focused Infection Control Assessment and Response (ICAR) consultations.
- You can request a Water Exposure Focused ICAR by scanning the QR code on this slide or by accessing the link below:

[https://rebrand.ly/OHA\\_ICAR](https://rebrand.ly/OHA_ICAR)



CDC ICAR Tool Module 11: Water Exposure Facilitator Guide  
CDC ICAR Tool Section 3: Observation Form - Water Exposure



# Healthcare-Associated Cases and Outbreaks

# Healthcare-Associated Case & Outbreak Investigations

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- LTCFs and other healthcare facilities are required to report individual cases and suspected outbreaks of legionellosis to the local public health authority (LPHA) or to OHA.
- A full public health investigation is recommended if there are:
  - 1 or more cases of presumptive healthcare-associated legionellosis at any time.
    - Presumptive healthcare-associated legionellosis: A case with  $\geq 10$  days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
  - 2 or more cases of probable healthcare-associated legionellosis within a 12-month period.
    - Probable healthcare-associated legionellosis: A case who spent some period of time  $<10$  days during the 14 days before date of symptom onset in one or more healthcare facilities.

Oregon Legionellosis Investigative Guidelines,

Oregon Legionella Investigation Toolkit,

CDC: Investigating Healthcare-associated Cases and Outbreaks,

HICPAC Guidance

## Key elements of a full public health investigation include:

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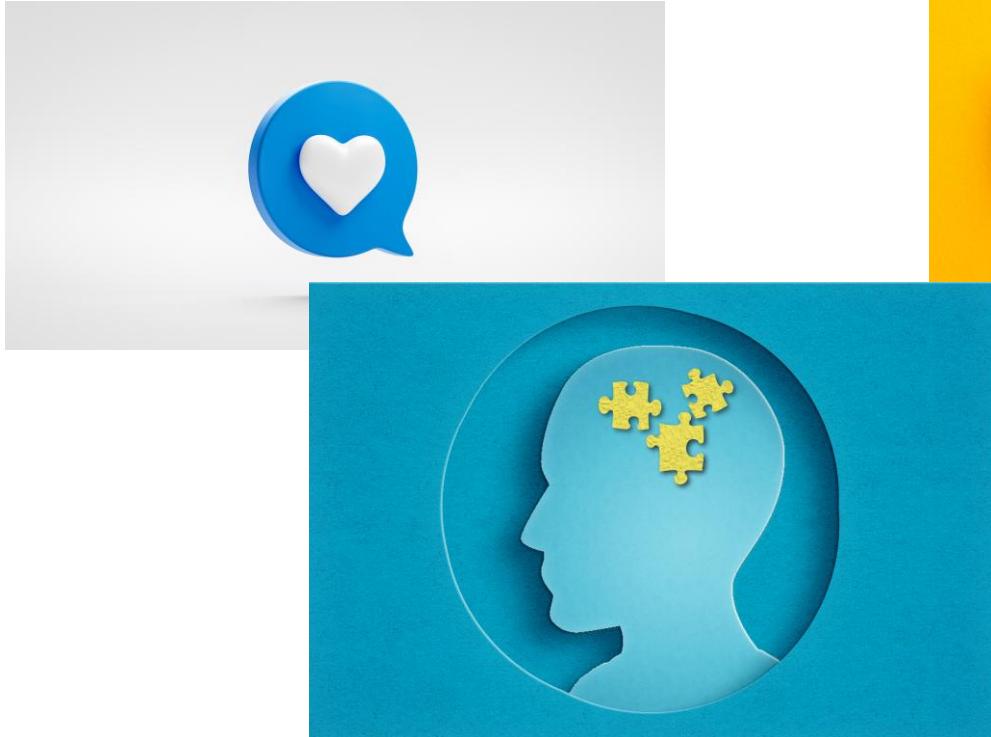
- Working with healthcare facility leaders\*
- Performing a retrospective review of cases in the health department surveillance database to identify earlier cases with possible exposures to the healthcare facility
- Developing a line list of possible and presumptive cases associated with the healthcare facility
- Working with infection control and clinical staff to actively identify all new and recent patients with healthcare-associated pneumonia and test them for *Legionella* using molecular testing or culture of lower respiratory secretions on selective media and the *Legionella* urinary antigen test
- Obtaining postmortem specimens, when applicable
- Considering recommendations for restricting water in the facility or other immediate control measures, such as point of use microbial filters.
- Performing an environmental assessment to evaluate possible environmental exposures
- Performing environmental sampling, as indicated by the environmental assessment
- Remediating possible environmental source(s)
- Subtyping and comparing clinical and environmental isolates, if available
- Working with healthcare facility leaders to determine how long heightened disease surveillance and environmental sampling should continue to ensure the outbreak is over
- Working with healthcare facility leaders to review and possibly revise the water management program, if indicated

[CDC Toolkit: Developing a Legionella Water Management Program](#),  
[CDC: Investigating Healthcare-associated Cases and Outbreaks](#),  
[HICPAC Guidance](#),  
[Oregon Legionella Investigation Toolkit](#)

Source: CDC

# Comments, Thoughts, Questions....

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Next Meeting:

**Date: Wednesday, February 18, 2025**

**Time: 1:00 pm – 2:00 pm**

**Session Topic: TBD**

# Please reach out with any questions!

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**Katie Cox, MS, MPH**

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