Healthcare-associated Legionnaires' Disease: Current Strategies for Response and Prevention

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Centers for Disease Control and Prevention

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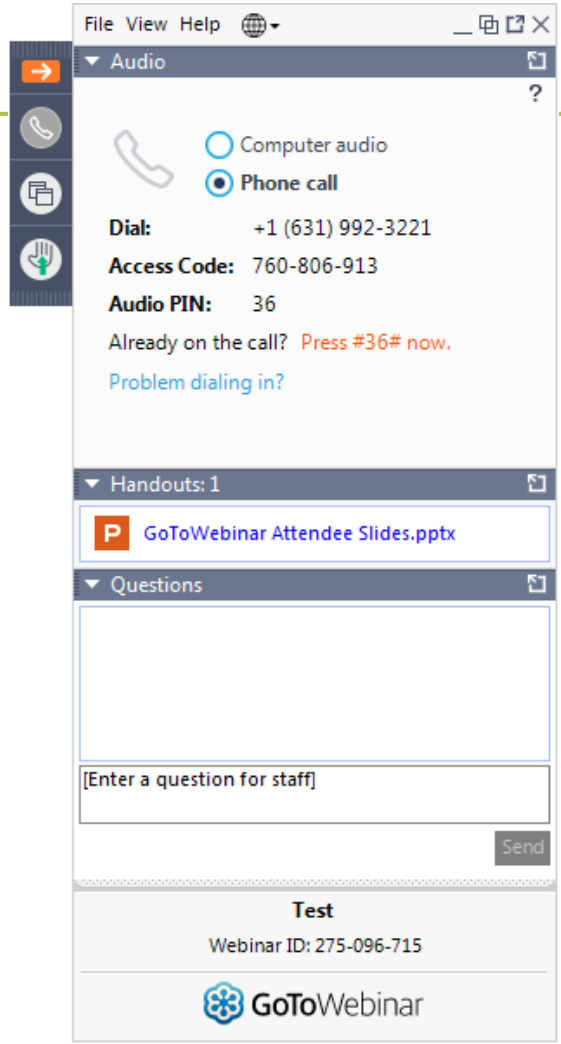

Today’s presenter

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

Polls: Tell us a little about yourself!

Disclosures

- Nothing to disclose

- *The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry.*

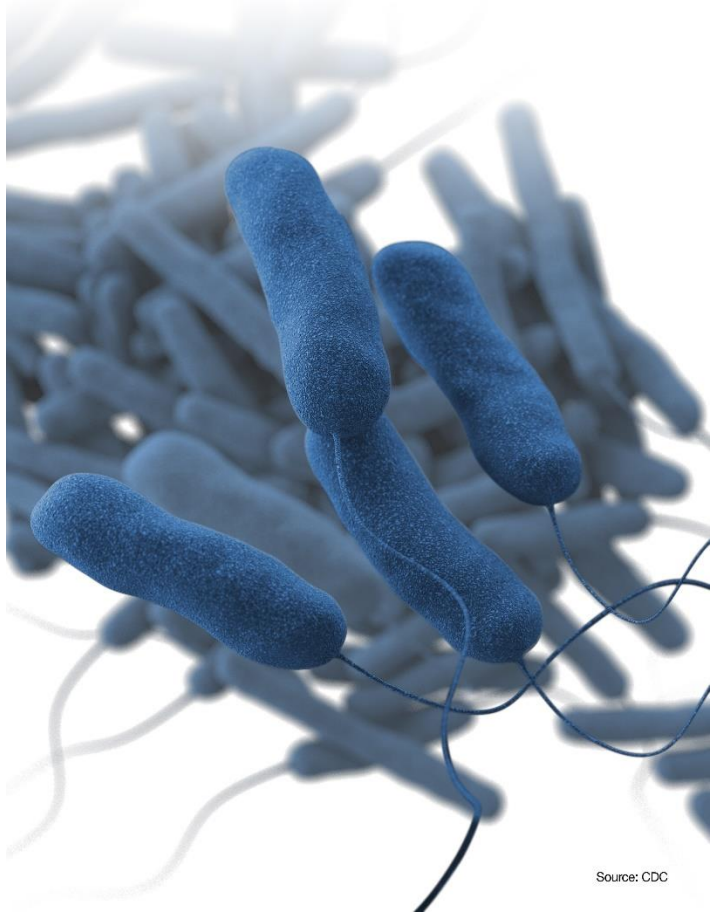
Objectives

- Describe Legionnaires' disease trends
- Identify risk factors for Legionnaires' disease
- Understand proper specimen collection and how it relates to case surveillance and outbreak response
- Identify elements of a comprehensive water management program

Background

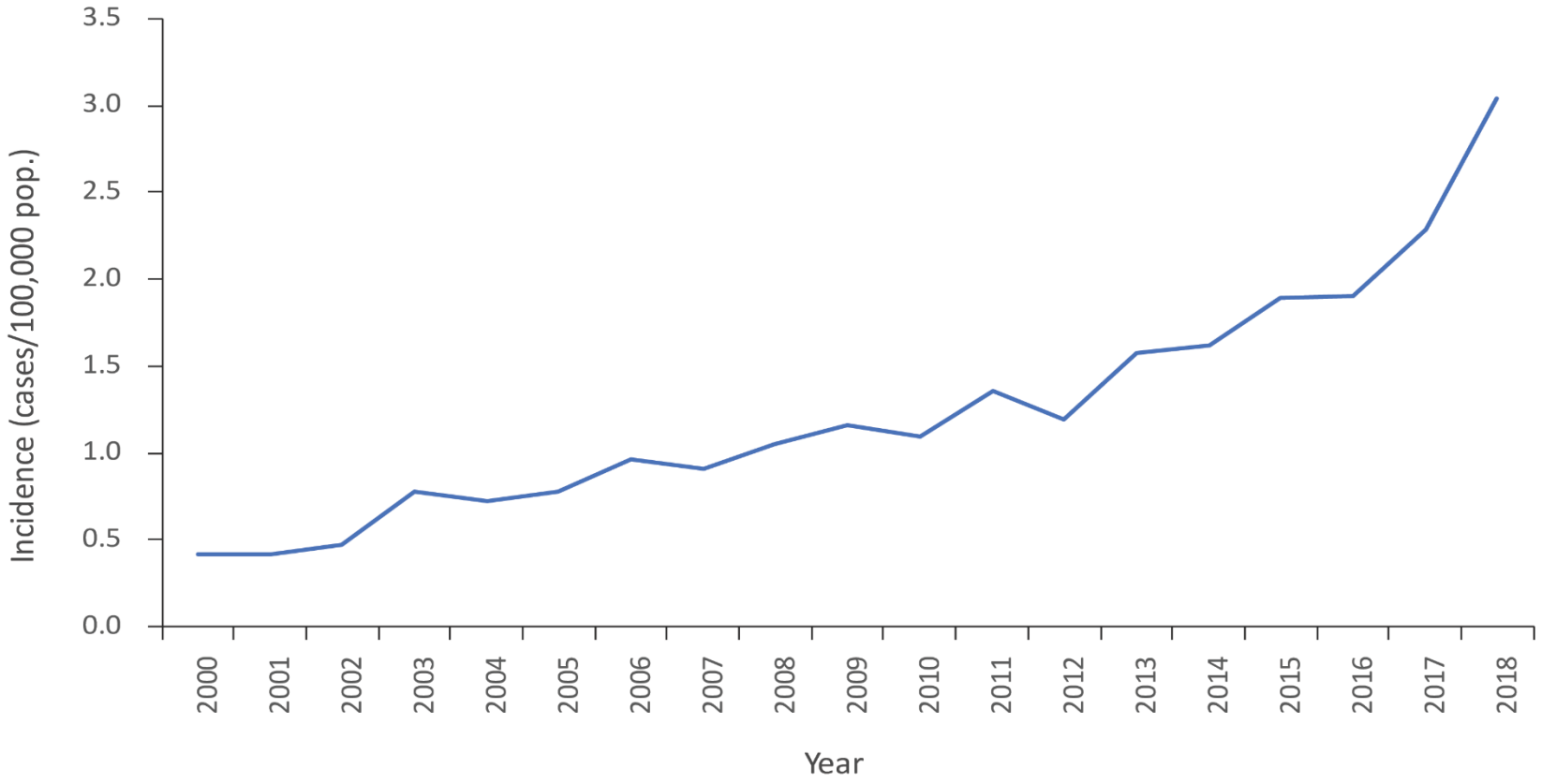
Legionella

- Gram-negative bacillus
- Intracellular parasite of free-living protozoa primarily found in freshwater
- More than 60 species
- *L. pneumophila*: ~90% of reported US cases[1]



[1] Fields BS et al. *Clin Microbiol Rev*. 2002;15(3):506–26.

Legionnaires' disease is on the rise in the US

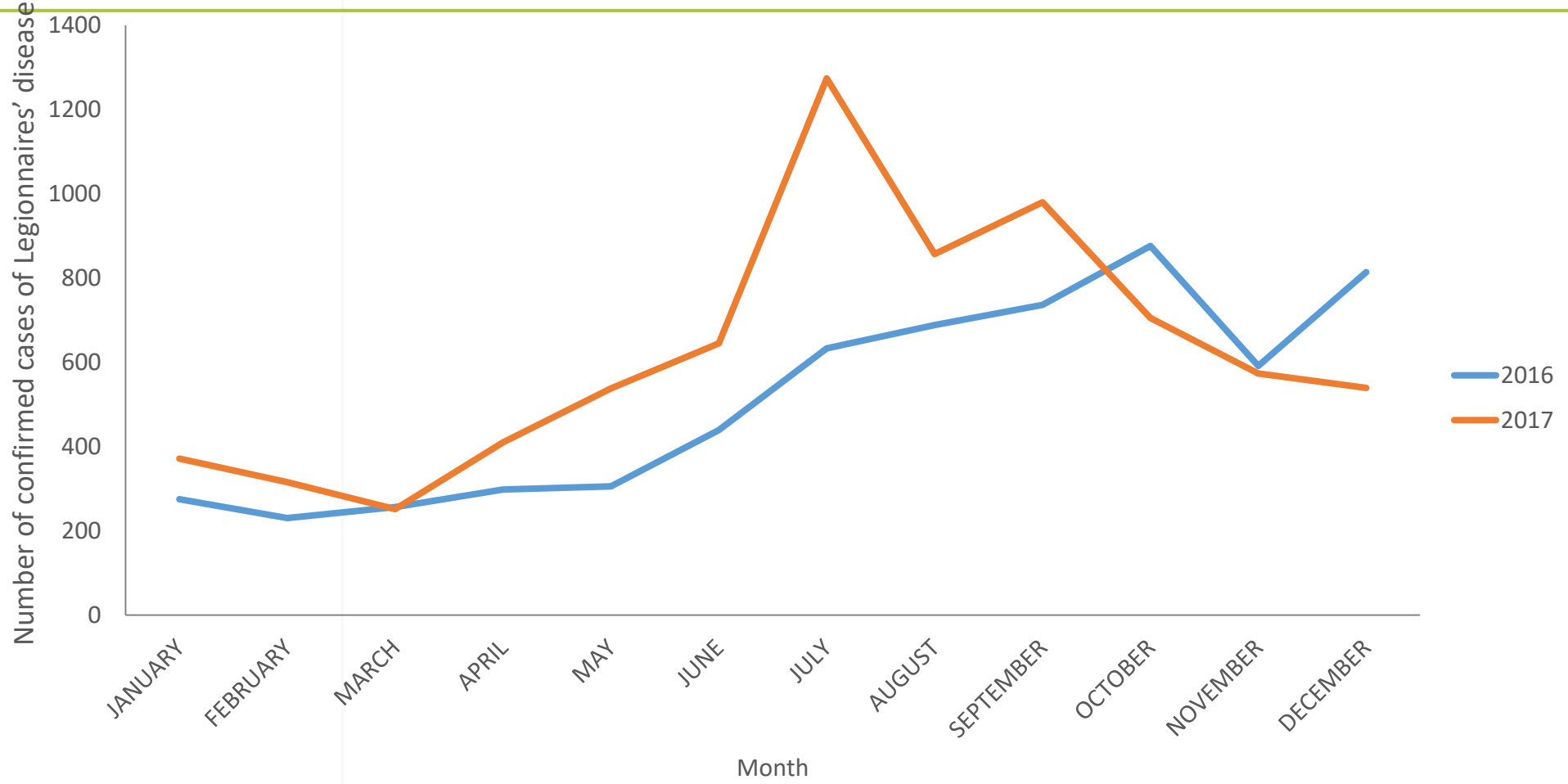


9,933 cases in 2018

Rate of reported cases increased 9 times from 2000–2018

Source: National Notifiable Diseases Surveillance System

Seasonality of Legionnaires' disease — US, 2016 and 2017



Source: National Notifiable Diseases Surveillance System

From *Legionella* to Legionnaires' disease

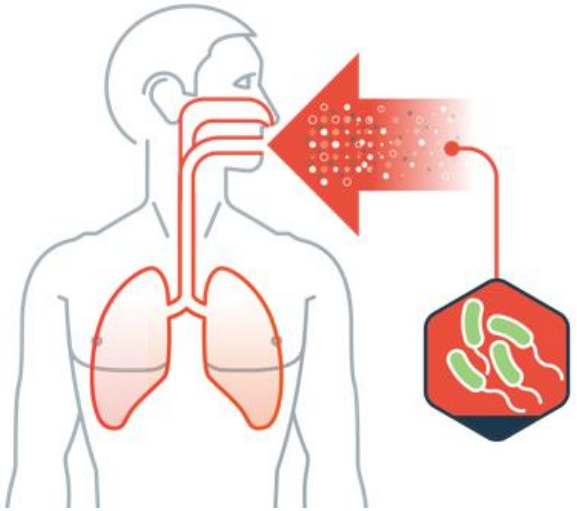
Internal and external factors can lead to *Legionella* growth in building water systems

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

From *Legionella* to Legionnaires' disease

Water containing *Legionella* is aerosolized through devices

Susceptible people contract Legionnaires' disease by inhaling aerosolized water droplets or by aspiration of drinking water containing the bacteria



Clinical features: Legionnaires' disease (and Pontiac fever)

	Legionnaires' disease	Pontiac fever
Clinical features	Acute onset of lower respiratory illness with fever and/or cough (additional symptoms may be present)	A milder, self-limiting illness without pneumonia
Pneumonia (clinical or radiographic)	Yes	No
Pathogenesis	Replication of organism	Possibly an inflammatory response to endotoxin
Incubation period	2–14 days after exposure (most commonly 5–6)	24–72 hours after exposure
Attack rate	Less than 5%	Greater than 90%
Treatment	Antibiotics	Supportive care (because illness is self-limited)
Isolation of the organism	Possible	Never demonstrated
Hospitalization	Common	Uncommon
Case-fatality rate	10% (25% for healthcare-associated)	Extremely low

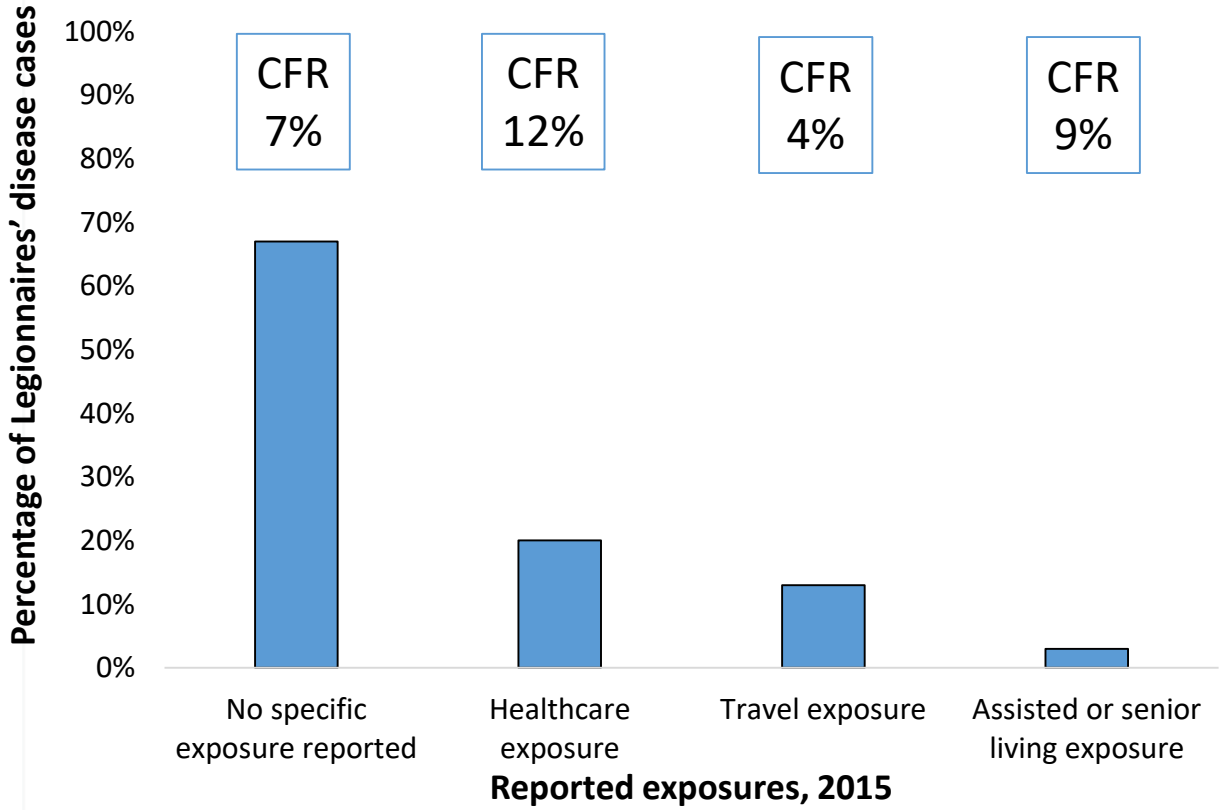
Source: https://www.cdc.gov/legionella/clinicians/clinical-features.html

A third of land-based Legionnaires' disease outbreaks investigated by CDC during 2000–2014 were associated with healthcare facilities

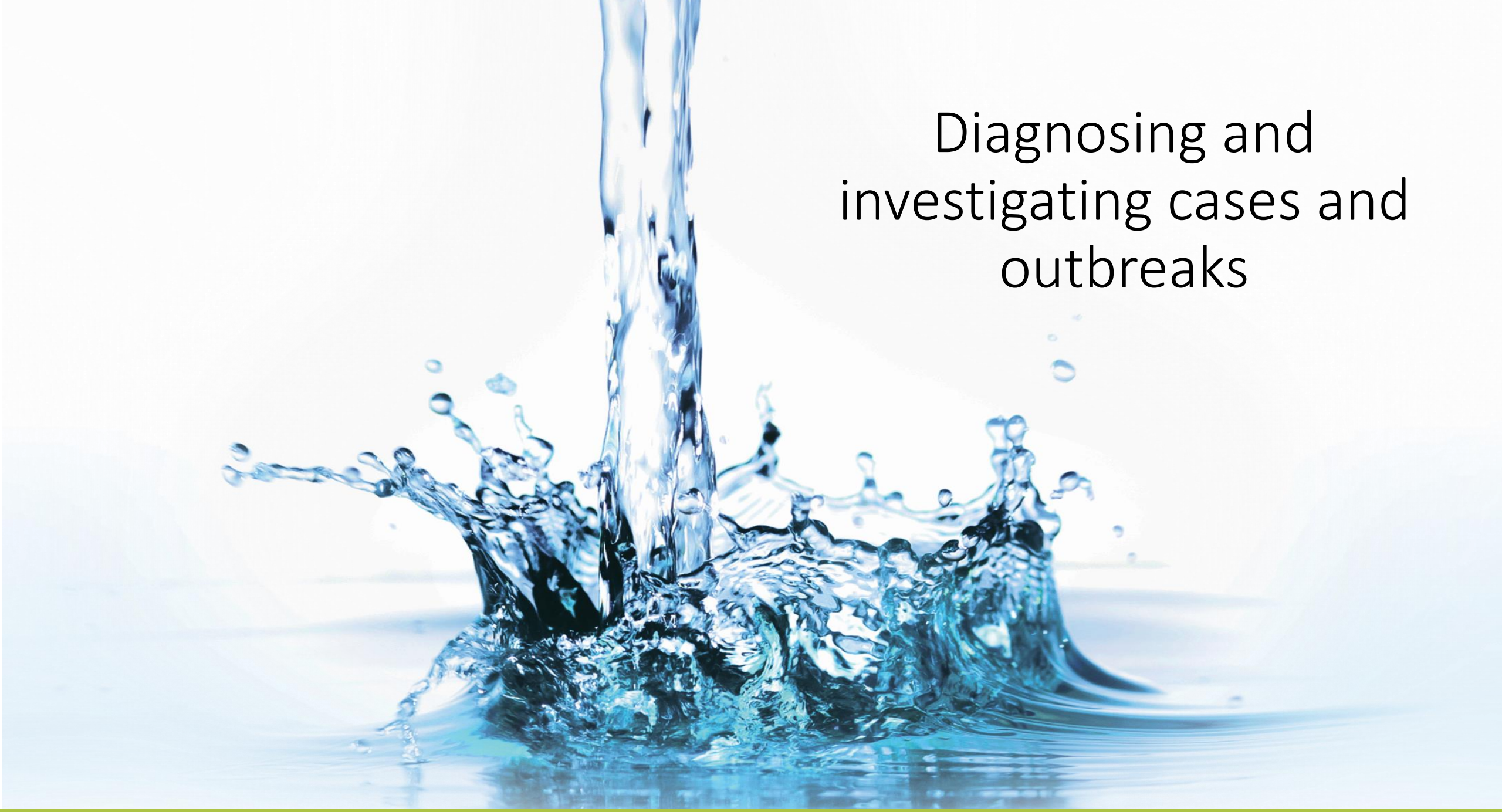
- **Common settings**
  - Hotels
  - Long-term care facilities
  - Hospitals
- **Common sources**
  - Showers and faucets
  - Cooling towers
  - Hot tubs
  - Decorative fountains and water features

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

A fifth of Legionnaires' disease cases reported exposure to a healthcare facility during the 10 days before date of symptom onset in 2015



Percentages are not mutually exclusive
CFR: case fatality rate
From 24 complete reporting jurisdictions (those that report additional epidemiologic data for at least 90% of confirmed cases)
Source: Supplemental Legionnaires' Disease Surveillance System



Diagnosing and investigating cases and outbreaks

Risk factors for Legionnaires' disease

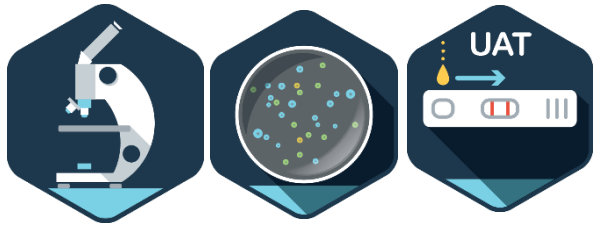
- Age ≥50 years
- Smoking (current or historical)
- Chronic lung disease (e.g., emphysema or COPD)
- Immune system disorders due to disease or medication
- Systemic malignancy
- Underlying illness (e.g., diabetes, renal failure, or hepatic failure)

Who should be tested for Legionnaires' disease?

Adults with pneumonia who:

- Are immunocompromised (or have other known risk factors)
- Require intensive care
- May have healthcare-associated pneumonia
- Failed outpatient antibiotic therapy for community-acquired pneumonia
- Traveled away from their home within 2 weeks before onset

All adults with pneumonia in the setting of an outbreak



UAT and culture are preferred for diagnosing Legionnaires' disease

- *Legionella* UAT is rapid and detects Lp1, the most common cause of disease

- Culture detects all species and serogroups and allows for comparison of clinical and environmental isolates during outbreak investigations

Urinary antigen test (UAT)

Legionella growing on buffered charcoal yeast extract (BCYE) plate

Healthcare exposure categories for surveillance purposes

- **Presumptive** healthcare-associated: A case with **≥10 days** of continuous stay at a healthcare facility during the 14 days before onset of symptoms *(formerly known as definite healthcare-associated)*
- **Possible** healthcare-associated: the patient spent **a portion of the 14 days** before date of symptom onset in one or more healthcare facilities

When should healthcare-associated Legionnaires' disease be investigated?

Perform a full investigation for the source of *Legionella* when:

- 1 case of presumptive healthcare-associated Legionnaires' disease at any time
- ≥2 cases of possible healthcare-associated Legionnaires' disease within 12 months of each other at the same facility

*The interval may be shorter under certain circumstances
Source: www.cdc.gov/legionella/WMPtoolkit

Immediate control measures can reduce the risk of ongoing *Legionella* transmission

- Examples include:
  - Restrict showers; avoid therapy pools and spas
  - For transplant patients, use sterile water for tooth brushing, drinking, and flushing feeding tubes; for other vulnerable patients, use bottled water
  - Do not use water from faucets in patient rooms
  - Do not use non-sterile ice from facility ice machines
  - Consider installing 0.2 micron biological point-of-use filters
  - Consider halting new admissions or temporarily closing the building, affected area, or device
  - Ensure that contingency responses and corrective actions are implemented
  - Consider notification letters to the appropriate audience(s)

Source: https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines.pdf

What is a full investigation?

- Perform a retrospective review of cases in the health department surveillance database to identify earlier cases with possible exposures to the healthcare facility
- Develop a line list of possible and presumptive cases ever associated with the healthcare facility
- Work with healthcare facility staff to identify all new and recent patients with healthcare-associated pneumonia and test them for *Legionella*
- Obtain post-mortem specimens, when applicable
- Consider water restrictions and/or implementation of point-of-use filters
- Develop a risk communications plan

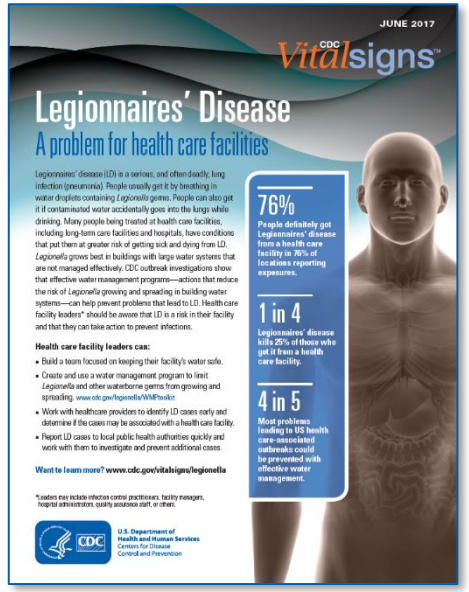
What is a full investigation?

- Conduct an environmental assessment
- Conduct environmental sampling, as indicated by the environmental assessment
- Remediate possible environmental source(s), if indicated
- Determine how long active clinical surveillance and environmental sampling should continue to ensure the outbreak is over
- Work with healthcare facility staff to develop or review and possibly revise the water management program
- Subtype and compare clinical and environmental isolates, if available
- Follow up to assess the effectiveness of implemented measures to control the hazard

Preventing cases and outbreaks

2017 CDC *MMWR* and *Vital Signs* Report

- Definite healthcare-associated Legionnaires' disease is deadly for 1 in 4 people who get it
- Legionnaires' disease prevention and response in healthcare facilities requires multidisciplinary input
- Most problems leading to healthcare-associated outbreaks could be prevented with effective water management



Access report at www.cdc.gov/vitalsigns/legionella

Centers for Medicare & Medicaid Services (CMS) issued a requirement for water management programs in healthcare facilities in June 2017 (updated in July 2018)

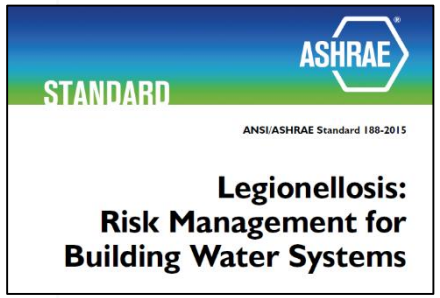
- *Requirement to Reduce Legionella Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks Of Legionnaires' Disease*
- Applies to
  - Hospitals
  - Skilled nursing facilities
  - Critical access hospitals
- Surveyors will review policies, procedures, and reports documenting water management program implementation

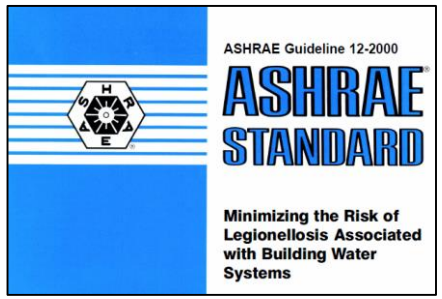
Access memo at https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO17-30-HospitalCAH-NH-REVISED-.pdf

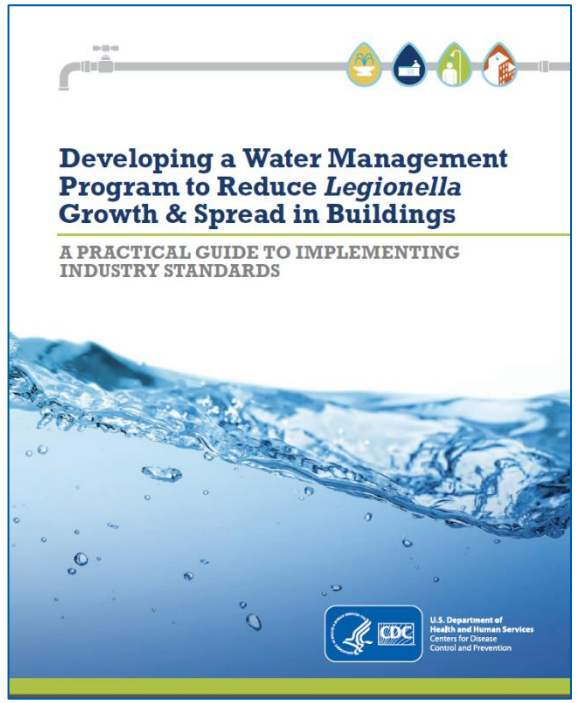
CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

CDC water management program toolkit

- Translates ASHRAE 188 into plain language for wider audiences
- Step-by-step guide to creating a water management program
- ASHRAE 12 2020 completed

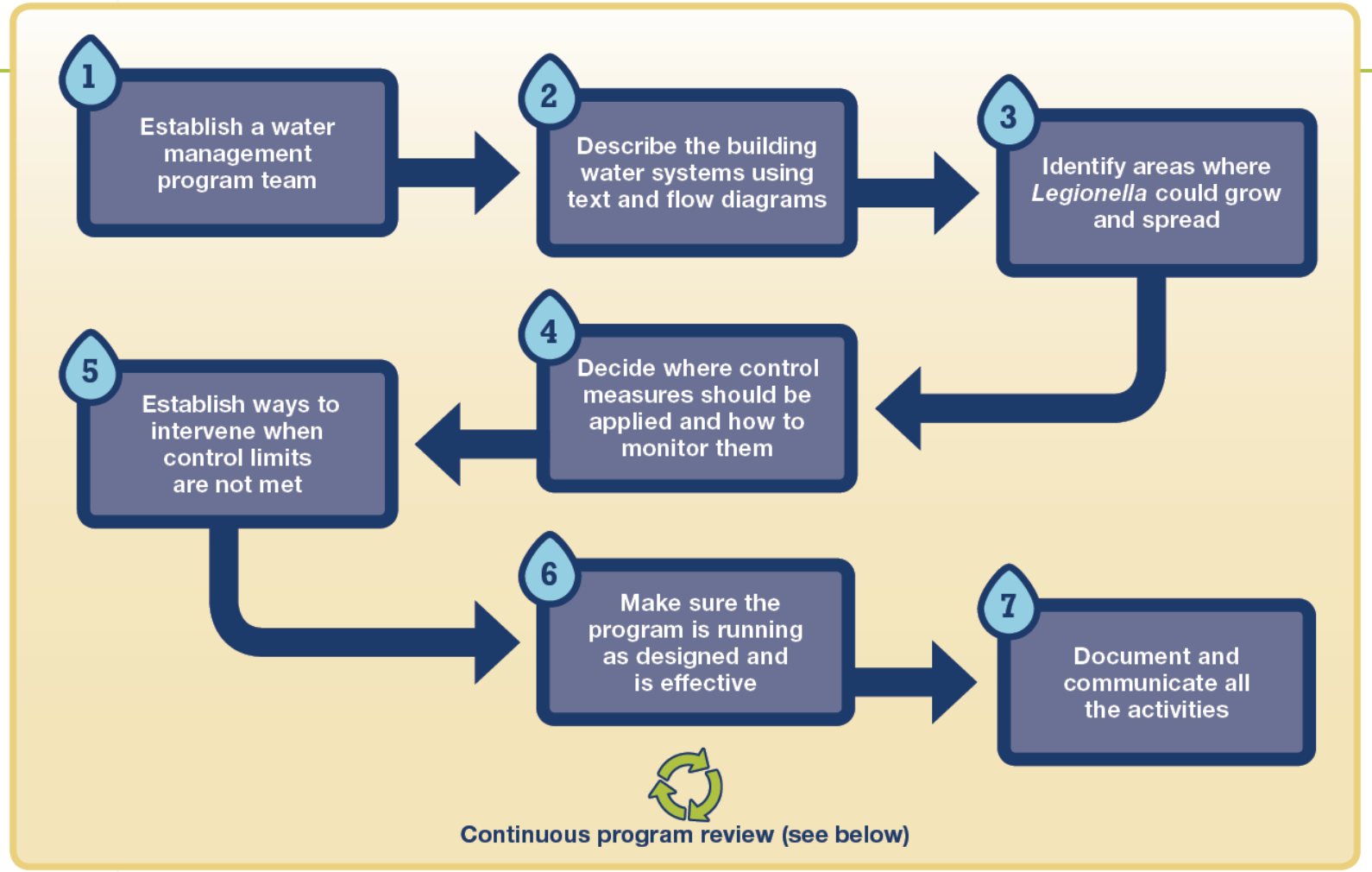






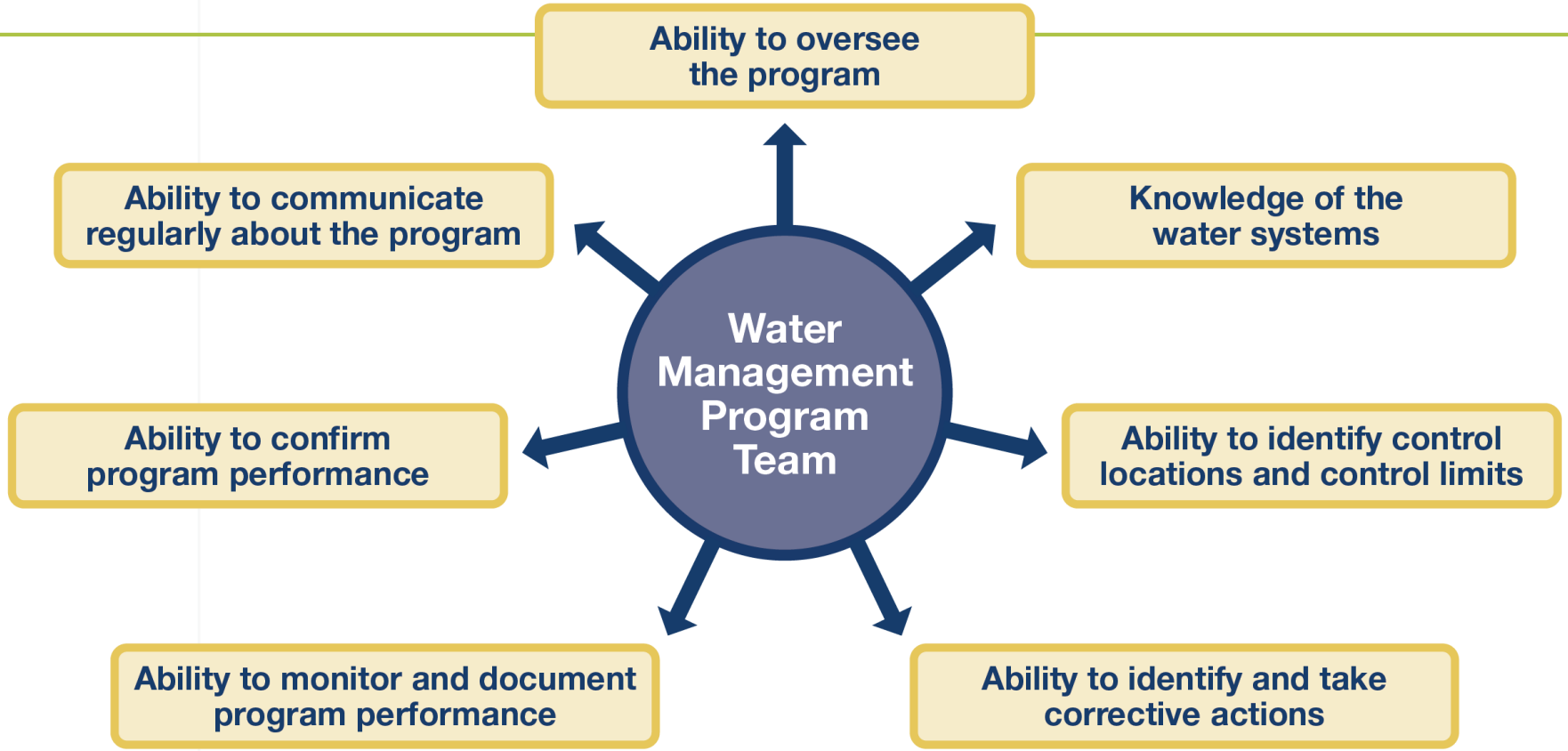
ASHRAE Standard 188–2015. Legionellosis: Risk Management for Building Water Systems. ASHRAE; 2015. https://www.ashrae.org/
ASHRAE Guideline 12-2000. Minimizing the Risk of Legionellosis Associated with Building Water Systems; 2000. https://www.ashrae.org/
Access toolkit at www.cdc.gov/legionella/WMPtoolkit

Create a water management program



www.cdc.gov/legionella/WMPtoolkit

1 Establish a team



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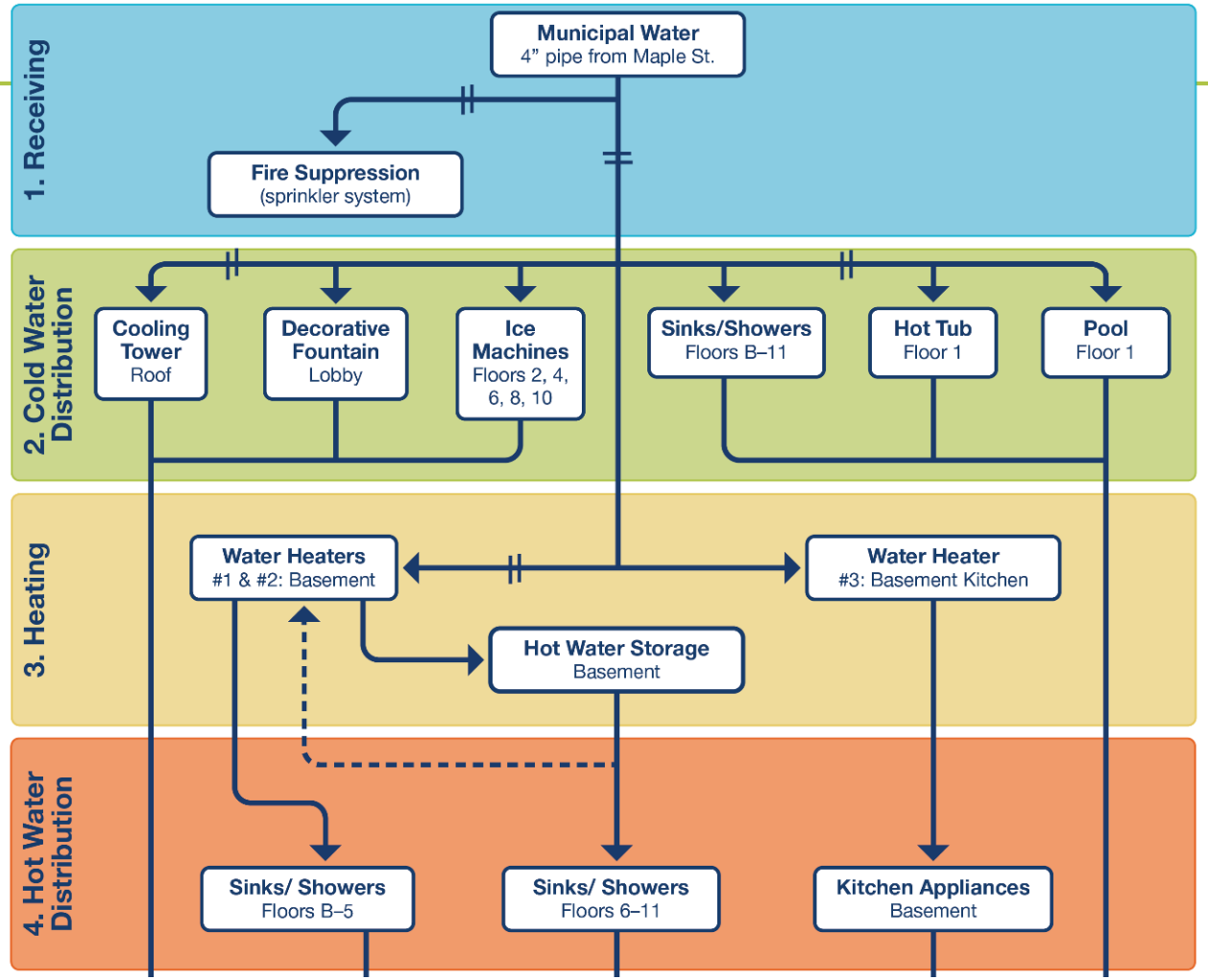
2 Describe the building water system



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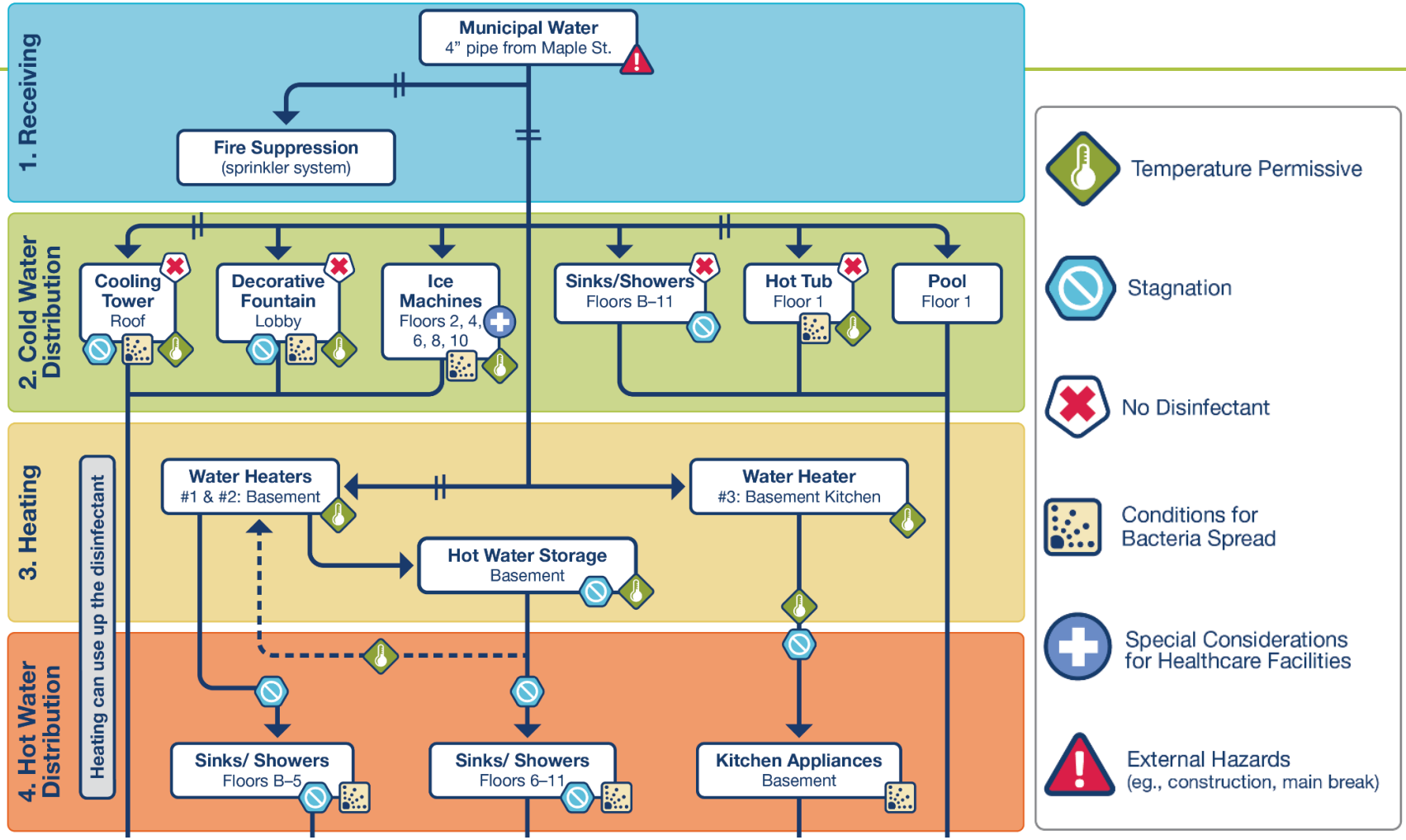
3 Identify areas of *Legionella* growth risk



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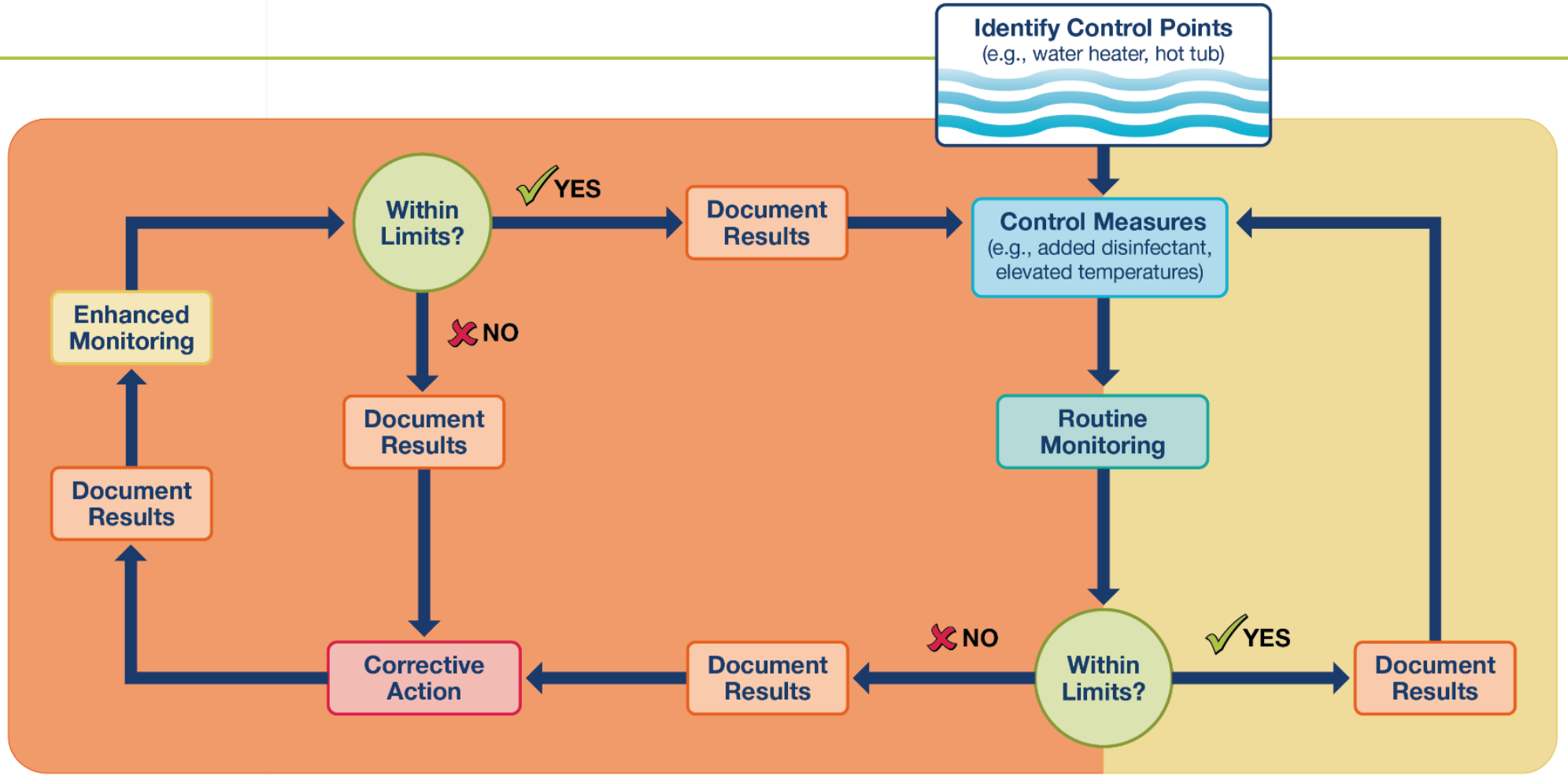
4 Identify controls points and how to monitor them



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5 Identify actions in response to control limit breaches

Example 1—Biofilm growth in the decorative fountain

1. During her weekly inspection of the fountain in the first floor lobby, Michelle Patterson notes that the fountain walls have accumulated a slimy growth.

2. As dictated by her water management program, Michelle immediately shuts off the fountain, drains it to the sanitary sewer, and scrubs it with a detergent recommended by the manufacturer.

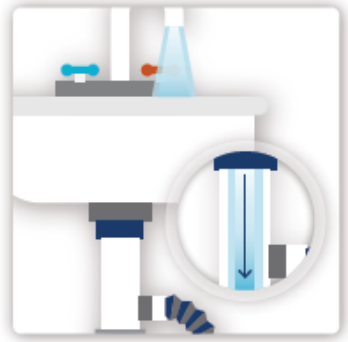
3. She then follows the program's start up procedure to refill the fountain with water and checks the residual disinfectant levels to make sure that they are within control limits.

4. Michelle documents her observations and the performance of interim cleaning in her log book. She informs her supervisor.

Disclaimer: Example content is provided for illustrative purposes only and is not intended to be relevant to all buildings.

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.



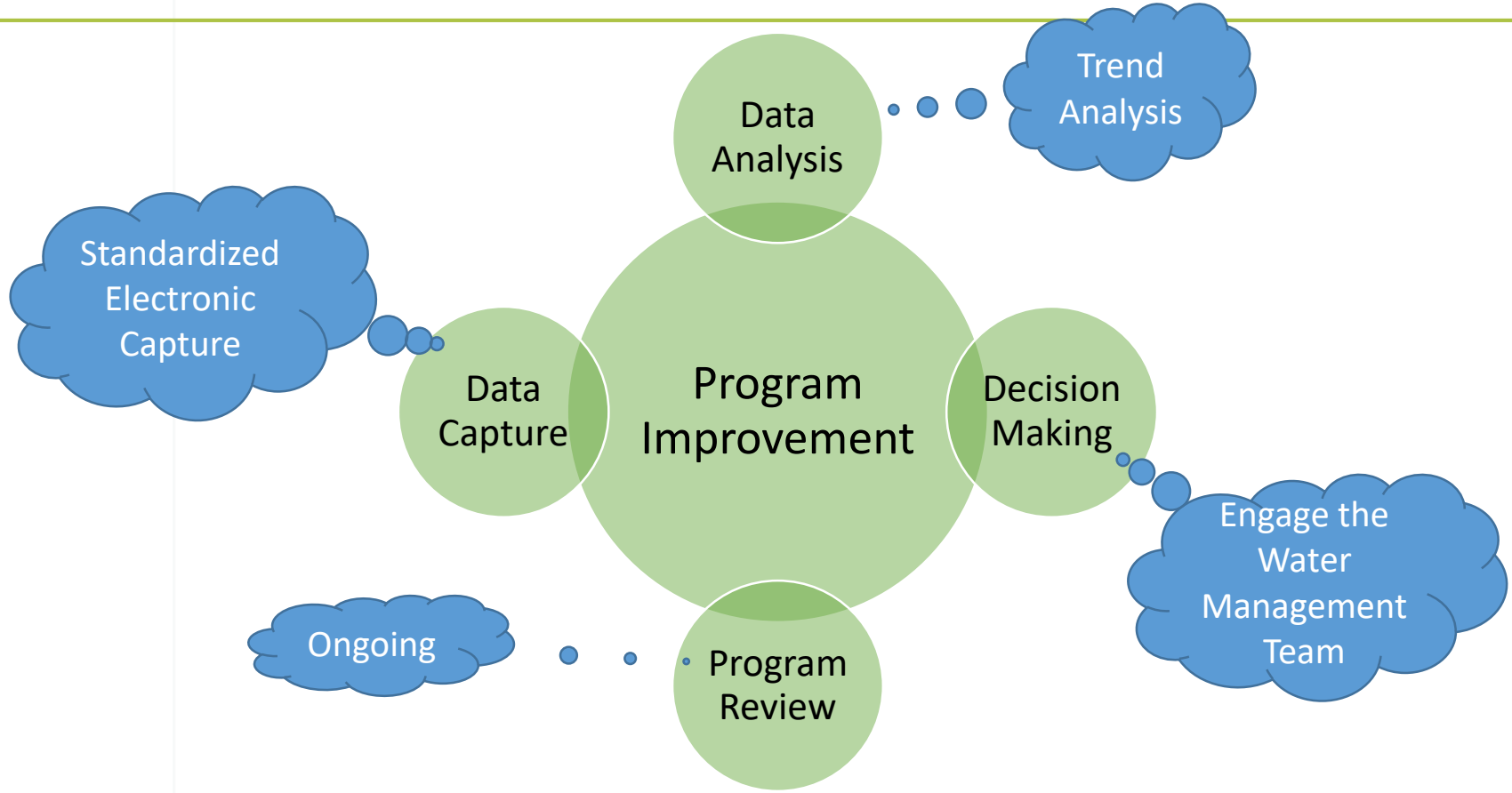
2. After discussing the issue with his supervisor, Jason counteracts the potential for stagnation by daily flushing of the sinks and fixtures with hot and cold water in several rooms including those at the end of the hall, which are farthest from the vertical pipe serving that floor (riser).

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.

www.cdc.gov/legionella/WMPtoolkit

6 Make sure your program is running as designed

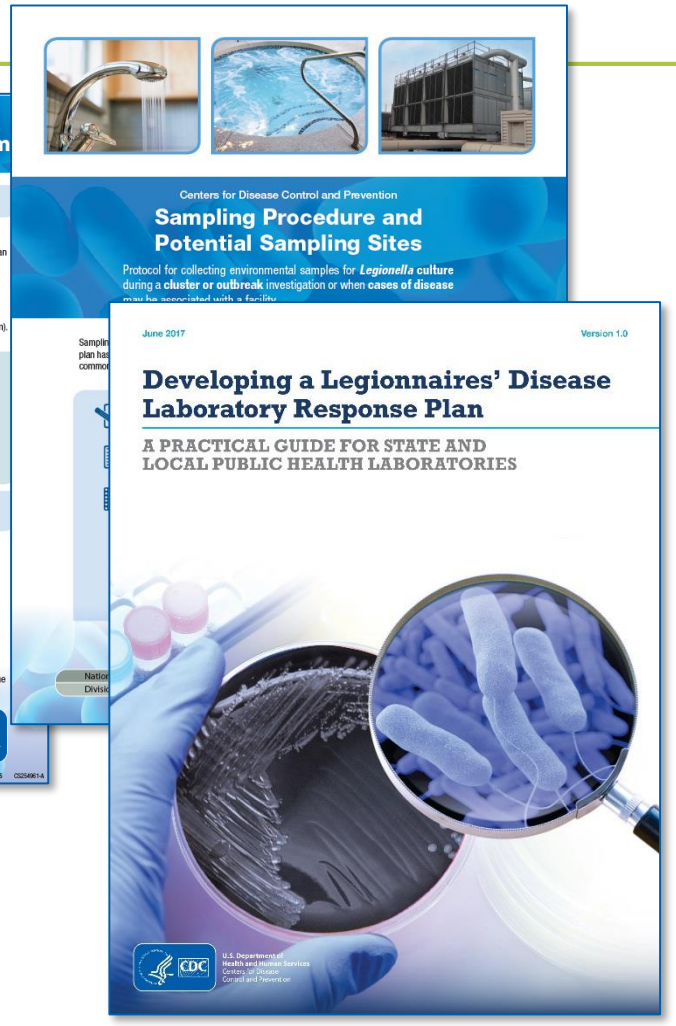


www.cdc.gov/legionella/WMPtoolkit

7 Document and communicate all activities

www.cdc.gov/legionella/WMPtoolkit

Additional response and prevention tools on CDC's website



Access tools at www.cdc.gov/legionella/

Environmental investigation videos

Conclusions

- Legionnaires' disease is on the rise in the United States
- A fifth of Legionnaires' disease cases reported exposure to a healthcare facility in 2015
- Definite healthcare-associated Legionnaires' disease is deadly for 1 in 4 people who get it
- It is important to encourage clinicians to order tests (urinary antigen test and lower respiratory culture) for patients with severe pneumonia or healthcare-associated pneumonia
- Legionnaires' disease prevention and response in healthcare facilities requires a multidisciplinary response
- Implementing a water management program is critical for controlling disease

www.cdc.gov/legionella/

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.

Questions?

Dr. Chris Edens

Thank you!

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www.phf.org/immunization

Questions or comments?

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