



Indiana
Department
of
Health

LEGIONELLA IN LONG TERM CARE

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OUR MISSION:

To promote, protect, and improve the health and safety of all Hoosiers.

OUR VISION:

Every Hoosier reaches optimal health regardless of where they live, learn, work, or play.



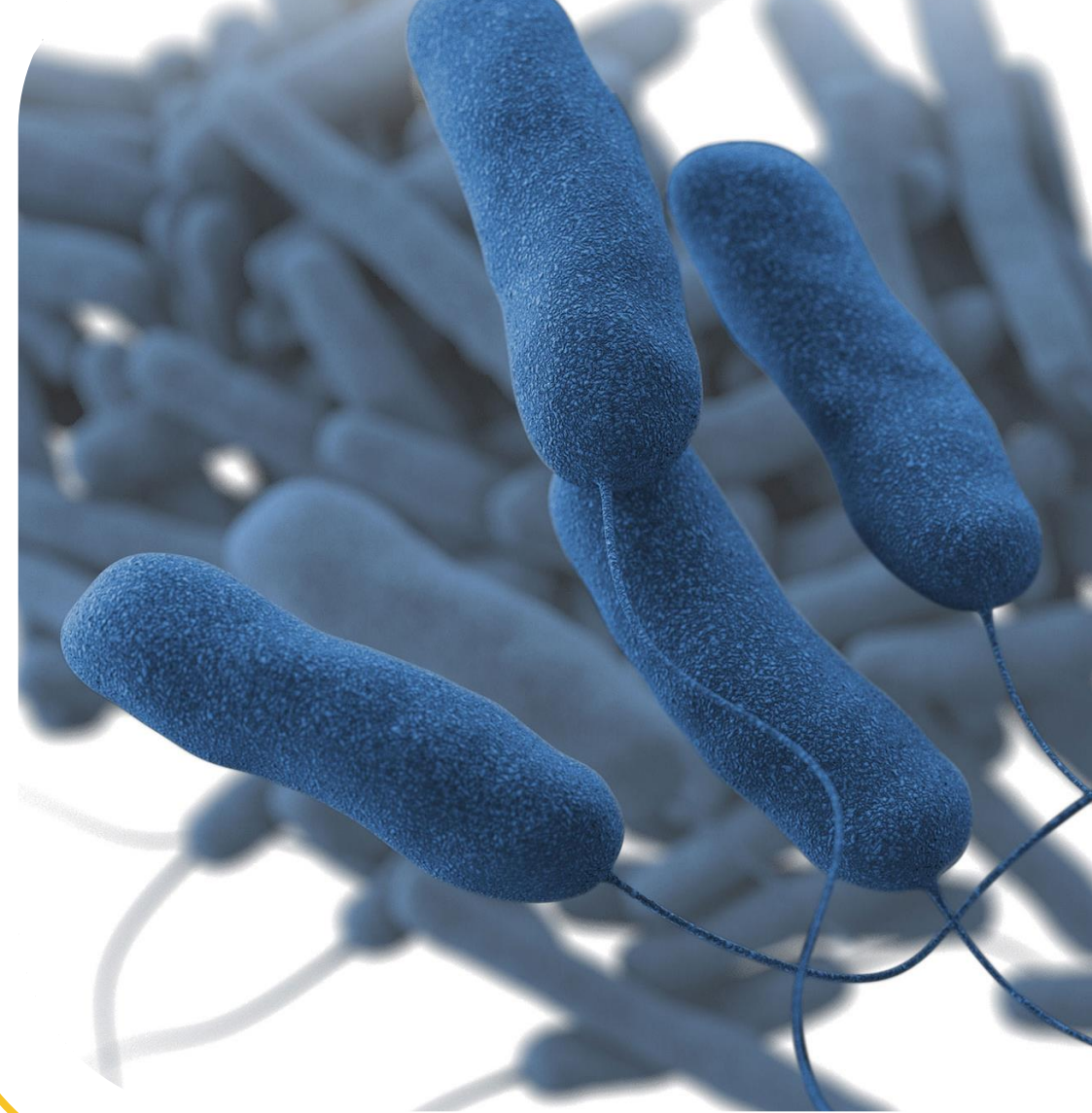
Overview

Legionella background

Possible vs Presumptive Cases

Healthcare outbreak response procedure

Preventing *Legionella* growth



- *Legionella* was discovered after a 1976 outbreak at an American Legion in Philadelphia, PA, leading to the term Legionnaires' disease (LD).
- The first Pontiac fever case was identified in 1968 in Pontiac, MI, among employees and staff of the city's health department.
- Reported LD cases in the US have grown almost nine times since 2000!

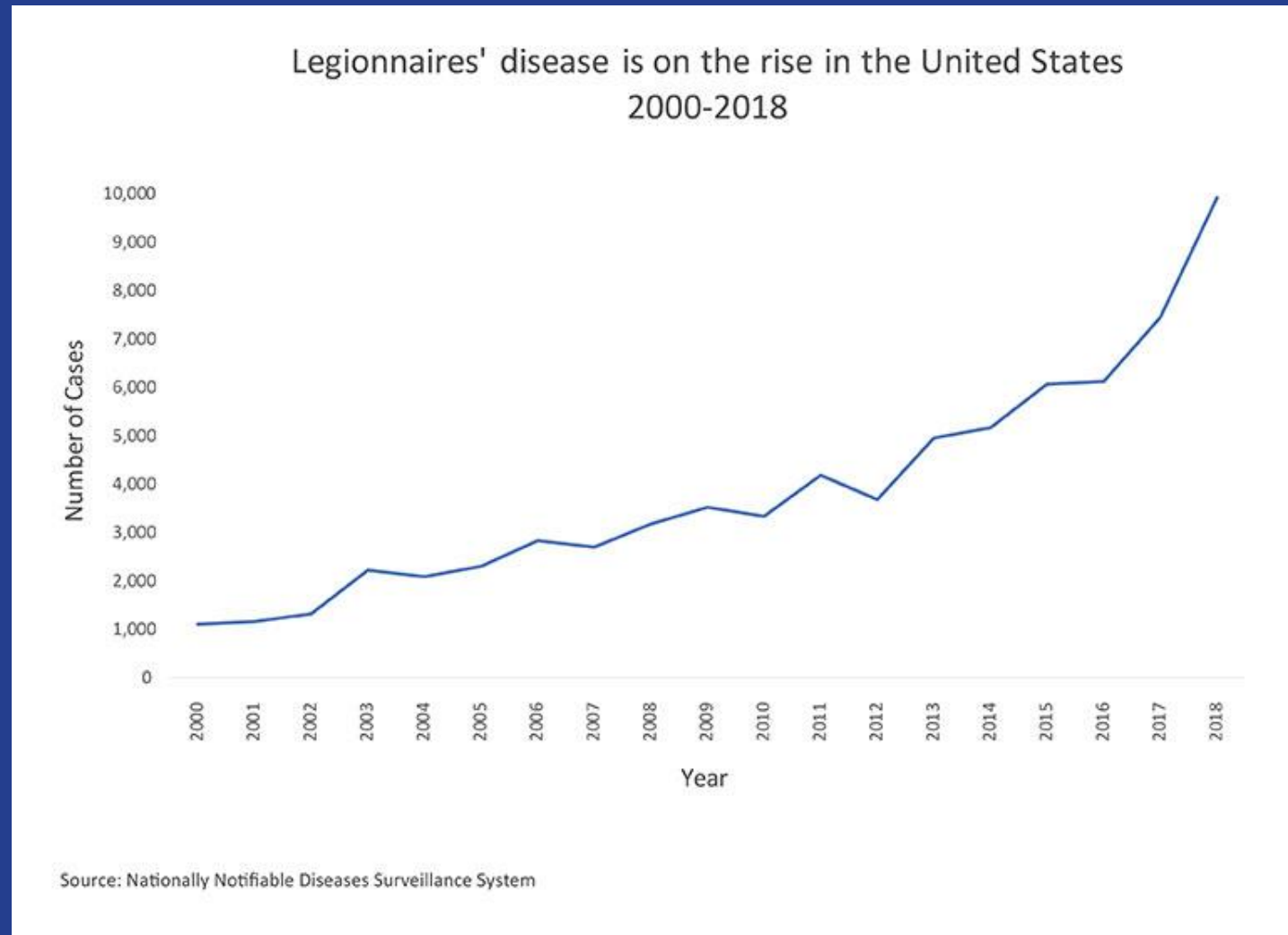
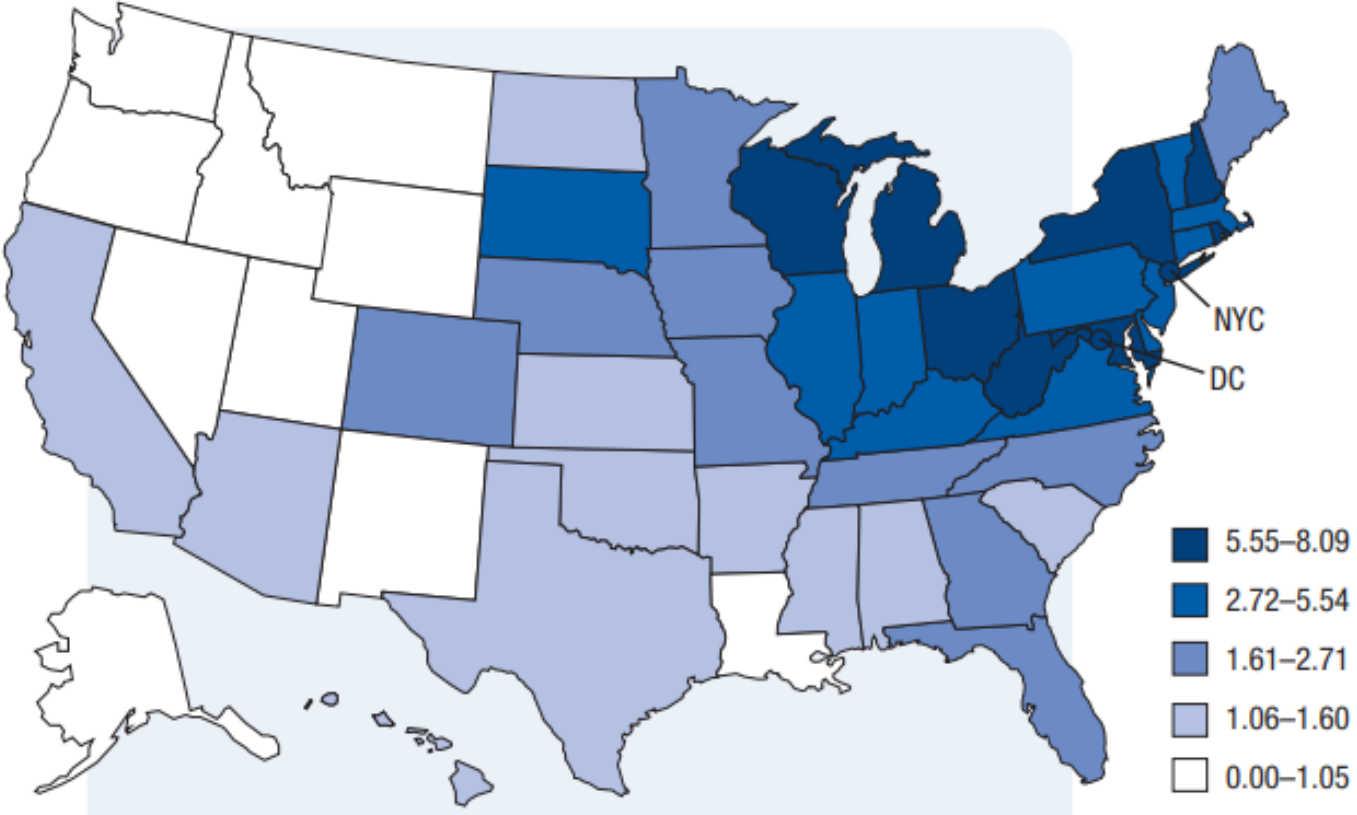


Figure 1. Source: CDC, 2021. <<https://cdc.gov/legionella/about/history.html>>

Incidence Rate by State

Figure 3a. Crude incidence^a rates of reported confirmed cases of Legionnaires' disease^b by jurisdiction of residence^c—NNDSS,^d United States, 2018.^{e,f}



Indiana's crude incidence rate was 3.72 cases per 100,000 population

Legionella basics



Gram-negative bacterium found naturally in freshwater sources at low levels



“Legionella” is a genus that encompasses many species!

NIH recognizes over 42 different species, of which the CDC has listed 10 in the 2018-19 US Surveillance Report₂

Legionella pneumophila is most likely to cause human illness, and it has 14 distinct serotypes₂



Types of Infection

Legionellosis

Legionnaire’s disease (LD),
Pontiac fever (PF), and
Extrapulmonary Legionellosis (XPL)



Transmission

Aspiration of aerosolized water containing the bacteria₂

Common sources:
showerheads, hot
tubs/whirlpool spas, fountains,
industrial cooling towers, etc.

Rare transmission person-to-person or through organ transplantation



Prognosis

LD has a 25% mortality rate for Long Term Care residents₁

Risk Factors



Water temperature

Both hot and cold loops
Variation in temperature



Low/no disinfectant residual

Filtering with activated carbon
Water softening



Water age

The longer the residence time of water, the greater the depletion of disinfectant residual and temperature fluctuation
Very important for large or complex systems and/or facilities with variable occupancy rates



Cross connections

Potable and non-potable water
Hot and cold mixing



Plumbing materials

Copper, brass, galvanized steel, range of plastics and elastomers
Can be negatively affected by treatment chemicals, may provide nutrients to bacteria, may promote biofilm formation



Accumulation of sediment

How does *Legionella* get into a system?

Water supply to building

- Even with applicable regulations, sometimes undetectable amounts of *Legionella* come from the municipal water supply

Disruptions to the water supply

- Water main breaks
- Water line construction
- Sudden water pressure change
- Firefighting use

Cross connections with fire-protection piping or other untreated water

Backflow from nonpotable water through fixtures





Healthcare Outbreaks: Where do we start?



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NBS

- A lab report positive for *Legionella* is reported through NBS
- The Indiana Department of Health (IDOH) team creates a case investigation for the lab report
- The Local Health Department (LHD) fills out the case investigation by contacting the hospital and patient, sometimes the patient's family or congregate setting
- Sometimes
 - The patient does not live in the same jurisdiction as the healthcare facility
 - The LHD can't reach the patient for any number of reasons
 - The permanent address for the patient is listed on the lab report as a Long-Term Care Facility (LTCF) and IDOH can reach out to the LHD to ask about prioritizing the case investigation



Possible v Presumptive Healthcare Cases

Possible Healthcare-Associated Case

- Length of stay
 - A laboratory confirmed case with <10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
 - Can be anywhere in that range, from a brief visit to 9 continuous days, or consecutive stay with frequent leaving (i.e. for dialysis, chemo treatment, town visits)
- Response
 - One case: partial outbreak response
 - Two or more cases in 12 months: full outbreak response

Presumptive Healthcare-Associated Case

- Length of stay
 - A laboratory confirmed case with ≥ 10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
- Response
 - One case: full outbreak response

DEFINITIONS

Healthcare location: a hospital, long-term care facility, clinic, or other location that the patient receives any medical care, including locations that provides skilled nursing.

Continuous: a stay in which a patient does not leave the grounds of the facility, even if they step outside

Full Investigation

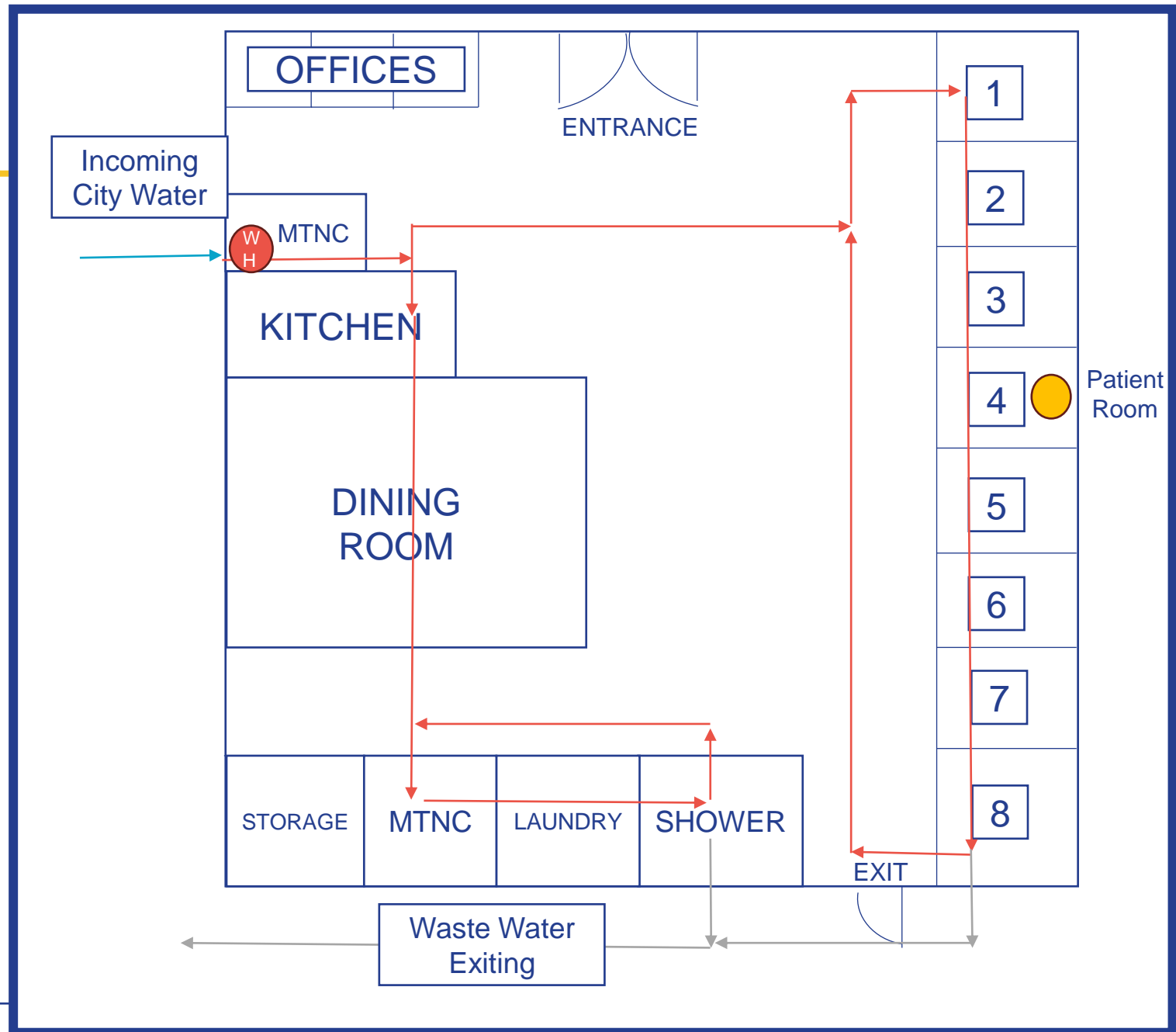
- Immediate steps
 - Monitoring and testing residents who are symptomatic
 - Types of *Legionella* tests (urine antigen, BAL & culture)
 - Immediate water precautions
 - Point-of-use filters globally with an effective pore size of 0.2 microns or less
 - N100 masks for staff in direct contact with water system (i.e. flushing, cleaning dialyzers, etc.)
 - Bottled water for drinking/bathing
 - Taking ice machines out of service
 - Notification letters to residents
 - Media statement
 - Gathering documents for IDOH

Common Questions

1. What if a Urine Antigen is negative?
2. What about water for cooking?
3. What about dialysis?

Sampling Plan

- Documents needed
 - *Legionella* Environmental Assessment Form (LEAF)
 - Water Management Plan (WMP)
 - Map of the facility
 - Patient room
 - Water flow
 - Copy of *Legionella* water results from the last year
- A snapshot of the entire water system
 - Incoming water, water heaters, holding tanks, representative outlets (proximal, distal) on each loop, cold and hot water loops
 - Including water parameters



Remediation

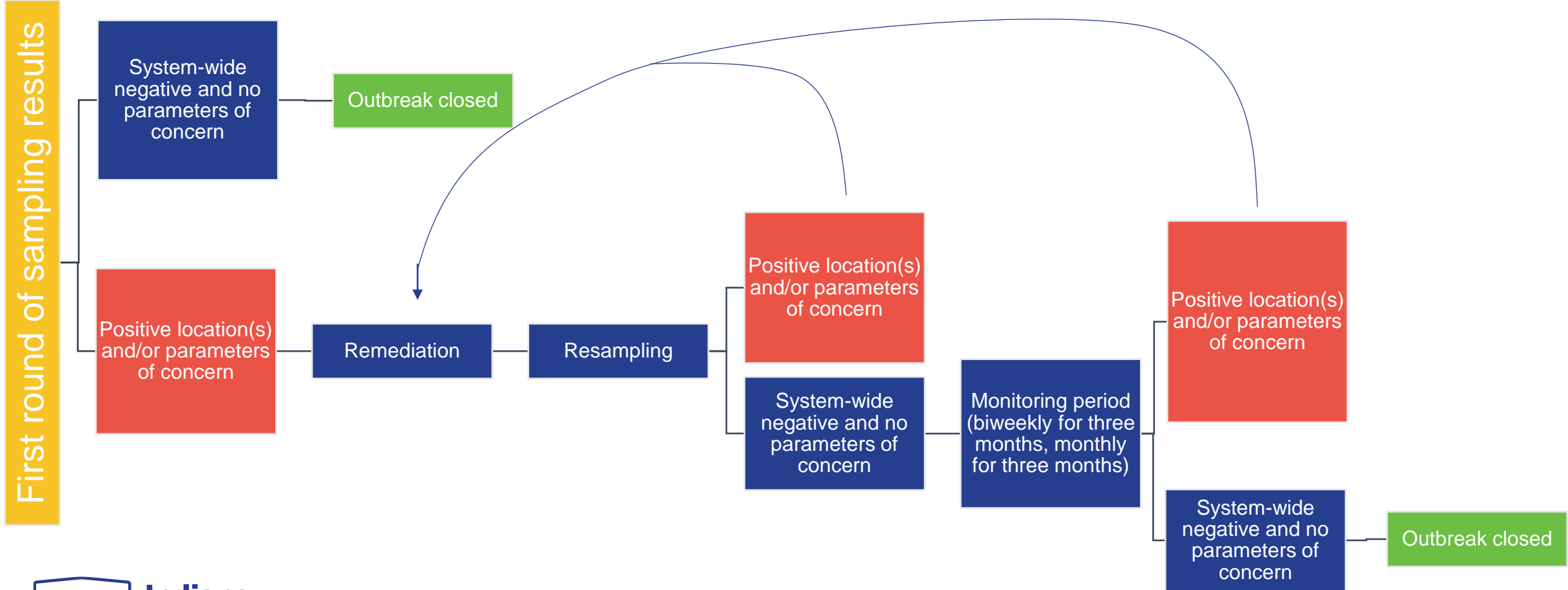
- The selection of the correct remediation for a specific facility is complex
 - Inappropriate selection or application can be ineffective, harmful to building occupants, damaging to plumbing and water system components, and could encourage resurgence of *Legionella*
- IDOH recommends facility hire a water consultant
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommendations
- Types of remediation
 - Chlorine
 - Chlorine dioxide
 - Monochloramine
 - Copper-silver ions
 - Hydrogen peroxide
 - Ozone
 - Peracetic acid
 - Thermal shock
 - Others

Thermal Shock

- The use of very-high-temperature water for remediation
- Involves flushing all fixtures (sinks, showers, drain valves, etc.) for 20 minutes with water at 158°F₃
- Downfalls
 - Frequently ineffective and often leads to rapid recolonization
 - Levels may rebound to levels higher than pretreatment
 - After water temp is restored, remaining bacteria may use the nutrients released by freshly killed bacteria
 - Water heaters are frequently not capable of achieving, maintaining, and delivering the temp and volume of water required
 - Significant scalding risk
 - Damage to plumbing components, including fixtures and seals
 - Water flushed to waste must still be within municipal temperature limits

**“Thermal shock cannot and must not be used to treat cold-water systems...thermal shock of the entire potable hot-water system has significant shortcomings.”
(ASHRAE, 2023)**

Follow Up





Preventing *Legionella*



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Methods to Prevent *Legionella*



- A robust Water Management Plan, including:
 - Analysis of building water systems
 - Control locations
 - Control limits
 - Monitoring
 - Corrective actions
 - Confirmation of program implementation
 - Documentation and record keeping
- Regular testing
- Planning for scheduled construction

CDC Resources

Information

- Legionnaires' disease one-pager
- Multiple podcasts

Toolkits/Guidance

- WMP Toolkit
- Training on WMP
- Sampling/Environmental Assessment videos
- Links to ASHRAE guidance
- Documents on preventing occupational exposures

Requirements

- Links to CMS requirements for water management plans

“Facilities must develop and adhere to policies and procedures that inhibit microbial growth in building water systems that reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in water.” (CMS, 2017).

IDOH Resources

- Education
- Outbreak assistance
- WMP assistance



Works Cited

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). (2023). *ASHRAE Standard 12-2023: Managing the Risk of Legionellosis Associated with Building Water Systems*.
2. Centers for Disease Control and Prevention. (March 2021). *Legionella (Legionnaires' Disease and Pontiac Fever)*. Accessed November 2023. <https://www.cdc.gov/legionella/index.html>.
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4. Centers for Medicare & Medicaid Services (CMS). (2017). *Requirement to Reduce Legionella Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)*. Accessed 2023. <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO17-30-HospitalCAH-NH-REVISED-.pdf>.

Questions?

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