Managing Water Risk in the “New Normal”

September 16, 2021 | 1:00 – 2:00 PM ET

This webinar is being recorded.
A copy of the presentation slides and recording will be sent to all webinar registrants.

Questions may be submitted/upvoted via the Q&A box.
Today’s Speakers

Elizabeth Hannapel, MPH
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Eric Myers
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Agenda

Preventing Legionnaire’s Disease through Partnership and Guidance – Elizabeth Hannapel & Jasen Kunz

Legionella Risk Management Strategies are Essential for Reopening Buildings as Increased Incidents Are Experienced Across the United States – Eric Myers

Questions & Answers
Preventing LD through Partnership and Guidance

Elizabeth Hannapel, MPH
CDR Jasen Kunz, MPH
Centers for Disease Control and Prevention

NACCHO
September 16, 2021
Presentation Overview

• Legionnaires’ disease (LD) background
• COVID-19 impacts on water systems
• New *Legionella* prevention and control tools
Legionnaires’ Disease
Background
Legionnaires’ Disease (LD) Each Year

- 11,000 US cases
- 1,000 deaths
- $402M in healthcare costs
- $835M lifetime economic burden


Legionnaires’ Disease

• First described following an American Legion convention in Philadelphia in 1976
• Infection with *Legionella* bacteria
• Acute onset of lower respiratory illness 2-14 days after exposure
• Characterized by severe pneumonia and usually requires hospitalization
  • Deadly for 1 in 10 people infected
  • Deadly for 1 in 4 who get it from a healthcare facility
• Other types of legionellosis:
  • Pontiac fever: milder respiratory illness which self-resolves
  • Extrapulmonary: rare, e.g., endocarditis or wound infection
From *Legionella* to LD

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

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

Water containing *Legionella* is aerosolized through devices.

Susceptible people contract LD by inhaling aerosolized water droplets or by aspiration of drinking water containing the bacteria.
Who Gets LD?

Persons at increased risk include those with:

- 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)
- Recent travel with an overnight stay outside of the home
- Recent stay in a healthcare facility
- Exposure to hot tubs
Increasing LD Incidence in the US

The rate of reported cases increased 9 times from 2000–2018

9,933 cases in 2018

It’s estimated that there were 2.3 cases for every one confirmed Legionnaires’ disease case in 2014.

## Changes in Epidemiology

<table>
<thead>
<tr>
<th>Potential to reduce LD incidence</th>
<th>Potential to increase LD incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduction in travel overall</td>
<td>• Changes in travel accommodation preferences</td>
</tr>
<tr>
<td>• Reduction in healthcare exposures</td>
<td>• Increases in recreational water exposure</td>
</tr>
<tr>
<td></td>
<td>• Increases in gardening and other activities</td>
</tr>
<tr>
<td></td>
<td>• <strong>Exposure to systems with stagnant water</strong></td>
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</tbody>
</table>
COVID-19 Pandemic Impacts on Water Systems
COVID-19 Pandemic Impacts on Building Water Systems and Devices

• Pandemic dramatically impacted building occupancy
  • Lodging industry suffered historically low occupancy rates for 2020 (44%) (-33.3% from 2019)
  • Office real estate impacted by enhanced teleworking
  • Some schools and universities shifted to online learning or offer in-person and online options

What Is Being Done to Address the Concern?

- Guidance issued to address reopening buildings after prolonged shutdown or reduced operation from
  - CDC and EPA
  - Numerous public health departments
  - Nongovernment organizations
  - Private sector

8 Steps to Minimize *Legionella* Risk Before Your Business or Building Reopens

- Step 1: Develop a comprehensive water management program (WMP)
- Step 2: Ensure your water heater is properly maintained and the temperature is correctly set
- Step 3: Flush your water system
- Steps 4–7: Clean and maintain
  - Decorative water features
  - Hot tubs
  - Cooling towers
  - Safety equipment
- Step 8: Maintain your water system

Legionella Prevention and Control Tools
Review of Building-Associated Outbreaks

- Inadequate water management programs can increase the risk of LD

CDC investigations show 9 out of 10 outbreaks were caused by problems preventable with more effective water management

What Do We Know about Source Attribution?

2021: CDC analyzed data from 41 building-associated outbreaks (2000–2019)\(^1,2\)

• Common settings
  – Hotels (37%)
  – Long-term care facilities (24%)
  – Hospitals (22%)
  – Other (e.g., industrial facility, resort cabins) (17%)

• Common sources
  – Showers and faucets
  – Cooling towers
  – Hot tubs
  – Decorative fountains
  – Industrial equipment

CDC *Legionella* Water Management Program Toolkit

- Translates ASHRAE Standard 188 into plain language for wider audiences
  - Public health professionals
  - Building managers
  - Healthcare facilities
- Is a step-by-step guide to creating a water management program
  - Control measures and corrective actions
  - Healthcare-specific guidance

www.cdc.gov/legionella/WMPtoolkit
PreventLD Training

• CDC WMP training on how to reduce risk for *Legionella* in facilities

• Helps WMPs align with ASHRAE 188

• Is free and available online
  • [www.train.org](http://www.train.org)

Includes templates and other practical resources
New: CDC Toolkit for Controlling *Legionella* in Common Sources of Exposure

- Help evaluate hazardous conditions associated with building water systems and devices
- Implement *Legionella* control measures per ASHRAE Guideline 12-2020
- Complement existing resources for WMPs
- Support environmental assessments conducted during public health investigations

New: Modules

- Five modules provide system-specific information
- Potable water, cooling towers, decorative fountains, hot tubs, and other devices
- One module has information about routine testing for Legionella
New: Modules Built Around Growth Factors

• Each system-specific module is built around key factors that affect *Legionella* growth:
  • Sediment and biofilm
  • Temperature
  • Water age
  • Disinfectant residuals
### Legionella Control Measures for Hot Tubs and Whirlpool Spas

<table>
<thead>
<tr>
<th>Water Parameter</th>
<th>Control Measure</th>
<th>Recommendations*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment and Biofilm</td>
<td>Cleaning frequency</td>
<td>Vigorously scrub all surfaces each time tub is drained</td>
</tr>
<tr>
<td>Temperature</td>
<td>Control limits</td>
<td>Hot tubs operate within Legionella's favorable growth range (77–113°F). Additional measures are required to control Legionella. Water should not exceed 104°F for health and safety reasons.</td>
</tr>
<tr>
<td>Age</td>
<td>Bather load, frequency of use</td>
<td>Water replacement frequency (days) = (Spa volume/3)/avg. # users per day†</td>
</tr>
<tr>
<td>Disinfectant Residual</td>
<td>Control limits</td>
<td>pH: 7.2–7.8†</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free chlorine: 3–10 ppm†</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bromine: 4–8 ppm†</td>
</tr>
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</table>
**New: Routine Testing Module**

- Contains practical information
  - Values for performance indicators
  - Multifactorial approach to understanding test results
  - Graphic to help assess how well-controlled a water system is for *Legionella* based on testing results
New: Routine Testing Module Continued

- Routine Testing Module
  - Concentration
  - Change in concentration over time
  - Extent of detection
  - Type of Legionella

<table>
<thead>
<tr>
<th>Extent indicates that Legionella growth appears:</th>
<th>Uncontrolled</th>
<th>Poorly Controlled</th>
<th>Well Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection in multiple locations AND a common source location</td>
<td>Detection in a common source location that serves multiple areas</td>
<td>Detection in a few of many tested locations within a water system</td>
<td>No Legionella detected in a single round of testing</td>
</tr>
<tr>
<td>OR Detection across many locations within a water system</td>
<td>OR Detection in more than one location within a water system</td>
<td>No Legionella detected in multiple rounds of testing</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No Legionella detected in multiple rounds of testing with methods that detect viable and non-viable bacteria of any Legionella species</td>
</tr>
</tbody>
</table>
Partnership Is Key to WMP Implementation

- Multistakeholder efforts are needed to reduce incidence and burden of Legionnaires’ disease

- Requires efforts of
  - Environmental health, epidemiology, and laboratory science
  - Building owners and managers
  - Industry
  - Risk managers and insurance companies
  - Legal counsel
Resources

- EPA Guidance for Maintaining or Restoring Water Quality in Buildings with Low or No Use: [https://www.epa.gov/coronavirus/information-maintaining-or-restoring-water-quality-buildings-low-or-no-use](https://www.epa.gov/coronavirus/information-maintaining-or-restoring-water-quality-buildings-low-or-no-use)
- Preventing Waterborne Germs at Home: [https://www.cdc.gov/healthywater/drinking/preventing-waterborne-germs-at-home.html](https://www.cdc.gov/healthywater/drinking/preventing-waterborne-germs-at-home.html)
- AWWA, IAPMO, Responding to Water Stagnation in Buildings with Reduced or No Water Use: [https://www.awwa.org/Portals/0/AWWA/Government/20201001FrameworkforBuildingManagersFINALDistCopy.pdf](https://www.awwa.org/Portals/0/AWWA/Government/20201001FrameworkforBuildingManagersFINALDistCopy.pdf)
Questions?

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MANAGING WATER RISK IN THE “NEW NORMAL”

*Legionella* risk management strategies are essential for reopening buildings as increased incidents are experienced across the United States.

**NACCHO**
September 16, 2021

**Eric Myers**
Sr. Technical Consultant
*Nalco Water, An Ecolab Company*
AGENDA

- Managing *Legionella* Risk During Low- or No-occupancy and Prior to Re-occupancy
  - Potable Water
  - Cooling Towers
  - Decorative Water Features

- Importance of Water Management Programs
QUESTIONS TO CONSIDER

As people return and we get “Back to Business”

- How have I managed my water systems while we’ve been in a low- to no-occupancy state?

- Which water management activities have I considered or perhaps overlooked?
Reduced Water Use Can Cause Water Age Conditions

- Cold Water Warms
- Hot Water Cools
- Chlorine Decays
CDC - Steps to Minimize *Legionella* Risk Before Your Business or Building Reopens ¹

- Develop a comprehensive water management program (WMP)
- Ensure your water heater is properly maintained and the temperature is correctly set
- Flush your water system
- Clean and maintain
  - Decorative water features
  - Hot tubs
  - Cooling towers
  - Safety equipment
- Maintain your water system

WATER TEMPERATURES

Water heaters set too low can allow *Legionella* growth

- General Growth range: 77 - 113°F (25 - 45°C)
- Optimum Growth Range: 85 - 108°F (30 - 42°C) | Peaks at 95-99°F (35-37°C)
- Growth slows and begin to die: 113 - 120°F (45 - 49°C)

Source: Image from ASHRAE Guideline 12-2020, Sec. 4.2.2.2 Growth, Figure 1.
WATER TEMPERATURES

**Recommendations**

- **“Keep it Hot”**
  - Store at or above 140°F (60°C)
  - Deliver up to the outlet at or above 120°F (49°C)
  - Implement scald control measures

- Ensure all maintenance is carried out per manufacturer’s instructions or by professionals

**Actions**

- Check and document system water temperatures weekly and adjust as necessary

- Contact your engineering support for proper next steps if system parameters appear to be out-of-range.

POTENTIAL ISSUES

Water Heaters
- Water Temps too low:
  - Low water storage or supply temp.
  - Low thermostatic mixing valve set point
  - Low return water temp **
- Redundant circulation pumps not on

** Proper water balance is essential to maintain a return temperature at or above 120°F (49°C).

Branch Lines
- Unbalanced flow **

Stagnation
- Rooms used as storage or closed areas

Bathrooms
- Limited use due to low occupancy or use of infrared (motion sensing) faucets

Why?

- Stagnant water can allow *Legionella* growth
- Especially if sections of the building have been closed
Flush hot and cold water through all end points (e.g., showers, sink faucets, toilets) ¹

Good = Bi-Weekly  |  Best = Weekly

- Faucets, tubs, showers heads, shower wands
  - Cold 5 minutes at full flow
  - Hot 5 minutes at quarter flow

- Drinking water fountains 5-10 minutes; and change filters if installed

- Toilets (1x = Good; 2-3x = Best); depends on pipe run / GPF

Target 3-10 fps

- Public restroom sinks and toilets
- Fitness centers
- Associate locker rooms
- Utility closets
- Kitchens/pantries
- Meeting spaces

Flush water outlets to avoid water age conditions:
  - Easy for anyone to flush
  - Complicated to schedule/track

Follow your WMP guidance

Consult your WMP provider to discuss when it’s appropriate to stop flushing

HEALTH & PERFORMANCE STRATEGY

performance
based strategy

health + performance
based strategy

Scale
Corrosion
Microbiological

Maximizing asset life cycle and operating efficiencies

Follow a WMP
Monitor Legionella
On-Line Disinfection
Off-line Clean & Disinfect

Managing health risks associated with owning and operating an “at risk” water system
COOLING TOWER SYSTEM

Potential Issues

- Scale and mineral sludge
- Corrosion
- Micro-bio (biofilm/slime)
- High energy costs (poor heat transfer)
- Water treatment & equipment difficulties
- Water quality testing problems
COOLING TOWER CLEANING & DISINFECTION

On-line Tower Disinfection
- Once a year (Mid-Season)
- Proactive biocide adjustments to ensure disinfection

Off-line Tower Cleaning & Disinfection
- Twice a year
- Comprehensive with pre & post disinfection

Dangerous – Use safety trained service technicians
(PPE, confined space, following OSHA guidelines etc.)
DECORATIVE WATER FEATURES
CLEAN & MAINTAIN

Why?

- Features can allow the right conditions for *Legionella* growth (stagnation & temperature)
- Water becomes aerosolized when the feature is flowing

Recommendations

- Follow recommended manufacturer guidelines for cleaning and disinfection \(^1\)
- Ensure the feature is free of visible slime or biofilm \(^1\)

Actions

- If feature is shut-down:
  - Keep it shut-down until a decision is made to resume ‘normal’ operation
- If feature is running:
  - Maintain water treatment (like a swimming pool) and document

WATER MANAGEMENT PROGRAMS

REDUCES RISK
WATER MANAGEMENT PROGRAMS

Inadequate WMPs can increase the risk of Legionnaires’ Disease

CDC – Investigations show that 9 out of 10 outbreaks were caused by problems preventable with more effective water management

Outbreaks have occurred because of

- Process failures 28%
- Human errors 22%
- Equipment failure 15%
- External conditions 15%
- Combination of these 20%
- Process failures 28%

A trusted water treatment provider can assist with these deficiencies

Sources: CDC - Garrison LE et al. MMWR. 2016;65(22):557-61
Consult an expert like Nalco Water to help you develop a water management program

- Review ASHRAE Standard 188-2021 for elements of a plan
- Start with a site risk assessment to identify at risk water systems and determine where control measures can be applied and monitored
- Review ASHRAE Guideline 12-2020 to help develop the strategies to manage risk
- Implement a consistent standard of care across your organization (e.g., Corporate wide & site level plans)
OTHER STRATEGIES

Testing has proven to be extremely important upon reopening and during low occupancy. Additional considerations if traditional WMP practices have not reduced Legionella risk (i.e., positives)

- **Hyperchlorination**
  - Quick remediation step
  - Inject high dose of chlorine, soak and flush
  - Facility site personnel required to support flushing measures

- **Short-Term Chlorination**
  - Continuous low-level water treatment with chlorine
  - No disruption in water service for occupants

- **Supplemental Disinfection**
  - Long term option
  - Multiple option types available
  - Leverage automation for monitoring and control
FINAL TAKEAWAYS

Properties are going through a tremendous amount of change and challenges (regulations, insurance, labor)

Need to stay focused on managing Legionella risk as people return
- Domestic Water: “Keep it Hot” & “Keep it Moving”
- Cooling Towers: Start-Up Protocols, On-line Disinfection, Off-line Cleaning & Disinfection
- Decorative Water Features: Clean & Maintain

Water Management Programs are important now and long-term, where you should consider partnering with a trusted advisor or expert.
Questions?

Submit your question(s) for the panelists using the Q&A box!

Thank you for attending today’s webinar!

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