Massachusetts Department of Public Health

Introduction to *Legionella* Case Investigation

May 14, 2024

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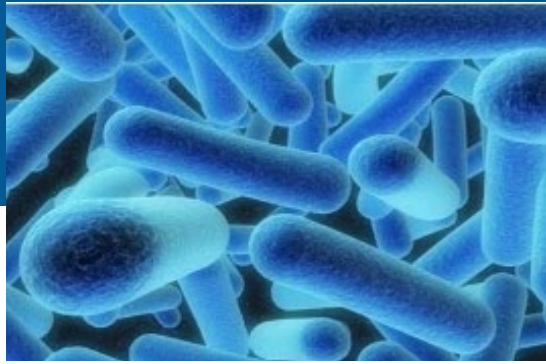
Division of Epidemiology, Bureau of Infectious Disease and Laboratory Sciences

Overview

- Overview of *Legionella*
  - Transmission
  - Common Sources of Infection
- Overview of Legionnaires' Disease
  - Signs, Symptoms, and Diagnosis
  - Risk Factors
  - Epidemiology
- Case Investigation Basics
  - Essential Clinical and Risk History Information
- Investigating Healthcare-associated Legionnaires' Disease
- Outbreaks
- Prevention
- Q & A

Overview of *Legionella*

Overview of *Legionella*

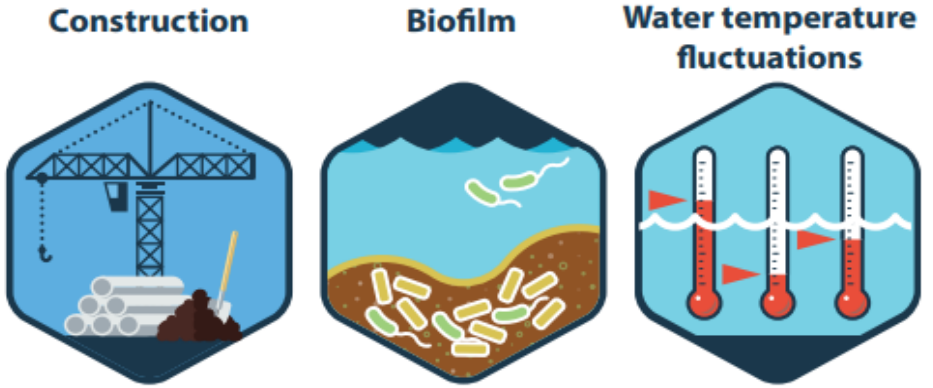


- *Legionella* is a bacterium naturally found in freshwater environments (ex. lakes and streams).
  - There are 15 different species of *Legionella pneumophila*; majority of disease is caused by serogroup 1.

- Transmission occurs through inhalation of aerosolized water containing *Legionella* bacteria.
  - Can be found in water systems like showerheads, sink faucets, cooling towers, hot tubs, and decorative fountains.
  - Thrives in warm, stagnant water.
    - Grows best 77°F-113 ° F, so it is important to keep cold water cold and hot water hot
  - Legionella generally does NOT pose a health risk if a person drinks water (unless aspirated)

How *Legionella* affects building water systems and people

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

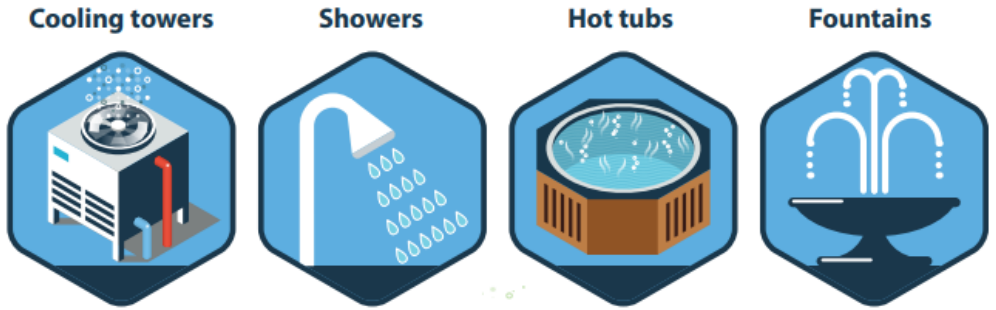


2. *Legionella* grows best in large, complex water systems that are not adequately maintained.

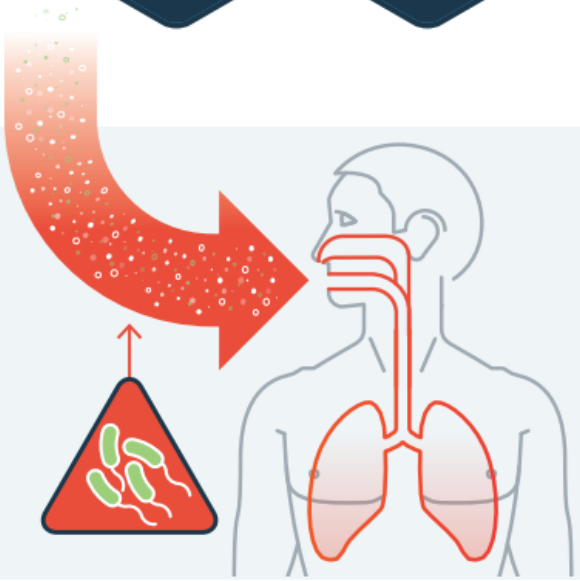
- How Legionella Affects Building Water Systems and People (cdc.gov)

How *Legionella* affects building water systems and people

3. Water containing *Legionella* is aerosolized through devices.



4. People can get sick when they breathe in small droplets of water or accidently 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

03/30/21

Interesting Facts about *Legionella* Transmission

- Home or car air-conditioning units are not a source of transmission
  - They do use water to cool the air, do not aerosolize water
- *Legionella* can grow in windshield wiper fluid tank of a vehicle, particularly if the tank is filled with water and not genuine windshield cleaner fluid.
- The *Legionella* bacterium got its name after the 1976 outbreak at an American Legion convention in Philadelphia.
- Although rare, recurrent infection is possible either through reinfection or relapse of prior infection.

Politi J, Queralt A, Valero N, et al. Vehicle Windshield Wiper Fluid as Potential Source of Sporadic Legionnaires' Disease in Commercial Truck Drivers. *Emerging Infectious Diseases*. 2022.
Buchholz U, Reber F, Lehfeld AS, et al. Probable reinfection with Legionella pneumophila - A case report. Int J Hyg Environ Health. 2019.

Overview of Legionnaires' Disease

Illness Presentation

Legionella infection (legionellosis) can present as **Legionnaires' Disease** or **Pontiac Fever**.

Legionnaires' Disease (LD):

- Most reported cases are LD
- **Severe pneumonia**
- Additional symptoms: fever, cough, shortness of breath, muscle aches and/or headache.
- Most cases are hospitalized.
- Incubation Period – most commonly 5-6 days (range 2-14)

Pontiac Fever:

- Less common
- **No pneumonia**
- Milder, self-limiting illness of fever, headache, weakness, and/or muscle aches.
- Incubation period – a few hours to 3 days

Given the incubation range, all cases should be asked about exposures in the 14 days prior to symptom onset as documented in the Risk/Exposure Question Package in MAVEN.

Legionellosis is a generic term describing **both** the pneumonic and non-pneumonic forms of infection with *Legionella.*

Testing & Treatment

- Preferred Testing:
  - Culture of a lower respiratory specimen secretion (ex. sputum, tracheal aspirate, broncheoalveolar lavage (BAL) fluid), lung tissue, pleural fluid, or a normally sterile site.
- Most Common Testing Reported:
  - Urine antigen test (UAT): Detects only serogroup 1.
  - Should be used in combination with culture, but often is not
- Additional Testing Options (less common and not always confirmatory):
  - PCR on lower respiratory specimen
  - Direct Fluorescent Antibody (DFA) stain
  - Paired serology

- Treatment of Legionnaires' Disease is antibiotic therapy.

People at Increased Risk

- People at increased risk of infection include those who are:
  - Aged 50 or older;
  - Current or former smokers;
  - People with chronic lung disease (ex. COPD);
  - People who are managing weakened immune systems, or those who take medicines that weaken their immune system;
  - People with illnesses such as diabetes, kidney failure, or liver failure.

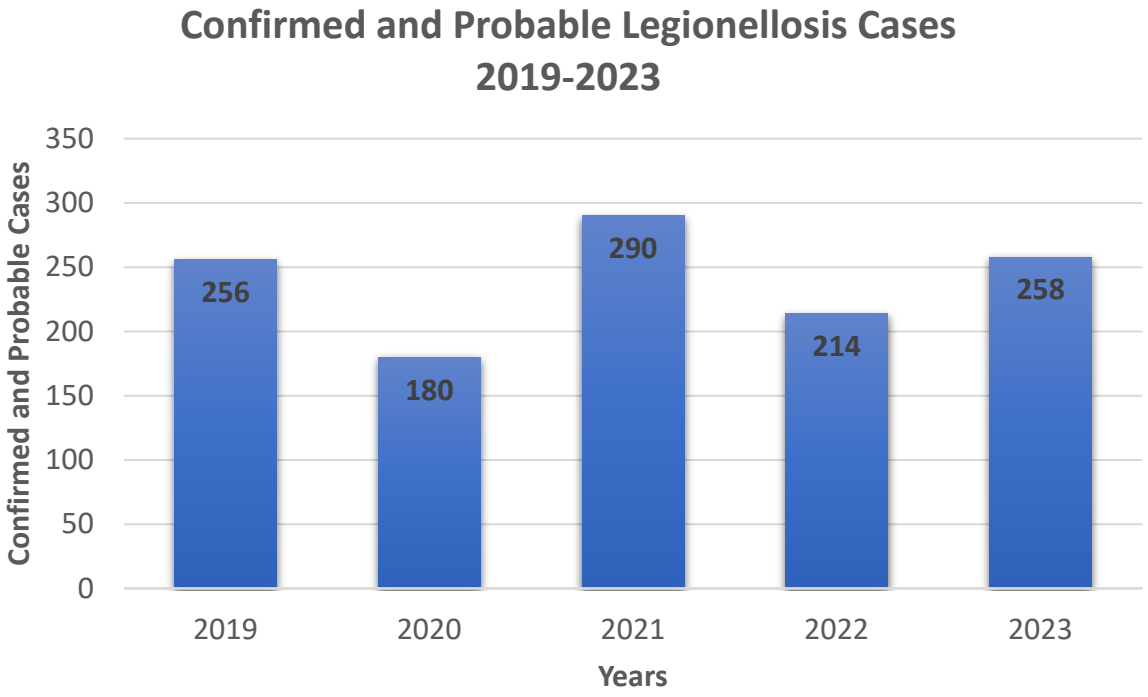
- About 1 out of 10 people who become sick with Legionnaires' disease will die due to complications from their illness.

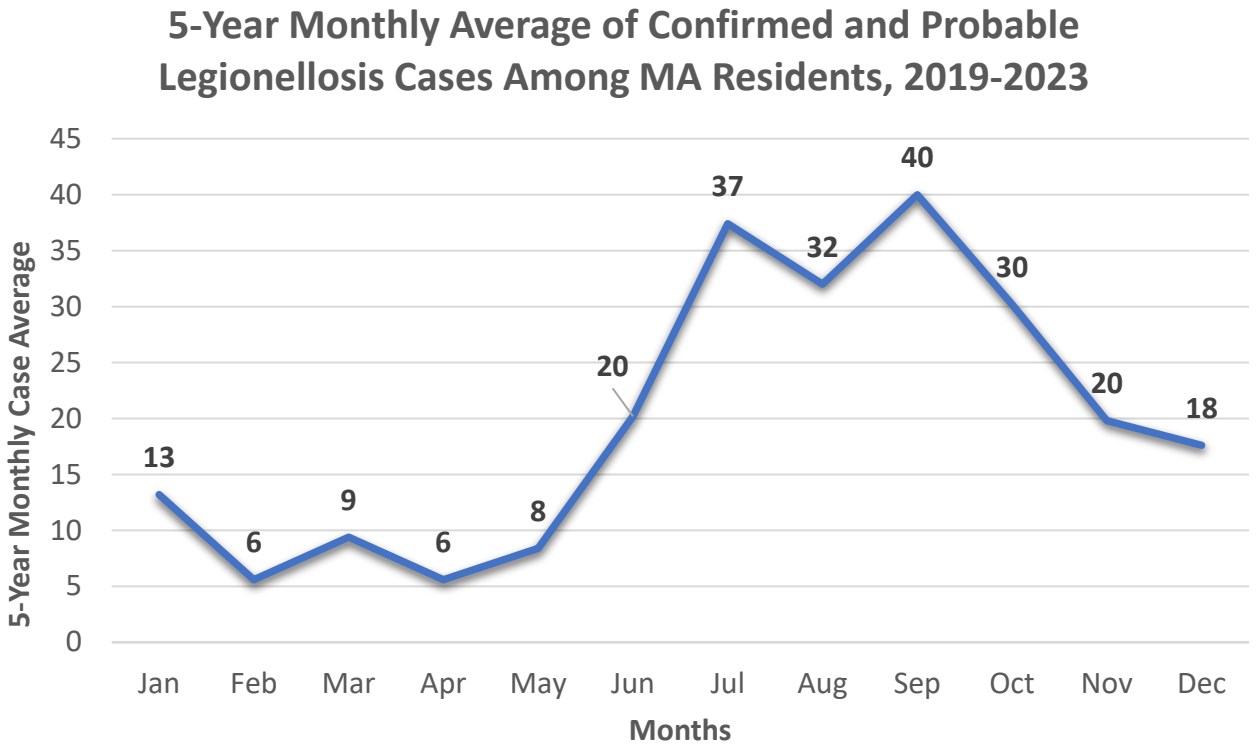
Risk Factors

- Recent travel with an overnight stay outside of the home (ex. resort/hotel);
  - Over the past 5 years, the range of Legionnaires' Disease cases with a travel exposure ranged from 10-17%.
- Recent care at a healthcare facility (ex. hospital, long term care facility);
  - In 2019 and 2018, 18% of national Legionnaires' disease cases had a healthcare exposure.
- Exposure to hot tubs/whirlpools;
- Individual factors like CPAP, BiPAP, and nebulizers

CDC Legionnaires' Disease Surveillance Summary Report, United States—2018 and 2019
Traveler's Health: Legionnaires' Disease & Pontiac Fever

Epidemiology of Confirmed and Probable Cases of Legionellosis in MA





Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences.
Data current as of 4/11/2024 and may be subject to change.

Increase of Sporadic Cases

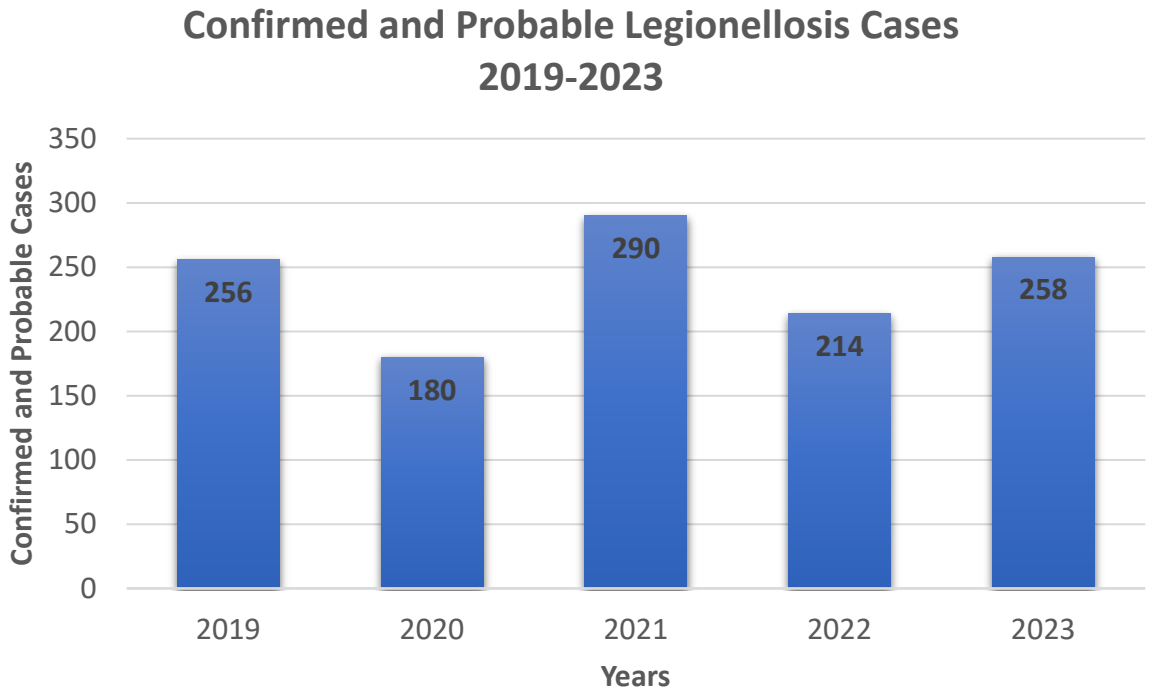
- An estimated 60-65% of cases in the US are sporadic and acquired in community settings where the environmental source is never identified.
  - Not associated with a known cluster or outbreak;
  - Not associated with travel or healthcare exposure.

- Potential explanations for increase in incidence:
  - Increased testing and urinary antigen test usage;
  - Aging population;
  - **Precipitation ("high" quality evidence & "major" magnitude of impact);**
  - Humidity;
  - Temperature;
  - Older housing and urbanization.

Moffa et al. Legionellosis on the rise: A scoping review of sporadic, community-acquired incidence in the United States. Epidemiol Infect. 2023

Weather and Climate

- Several studies have examined the role of weather and climate on the increasing incidence of sporadic, community-acquired *Legionella* infections.
- Evidence was found that increased precipitation, elevated temperature, and humid weather were drivers of incidence and risk factors for community-acquired disease.
- More research is needed in this area



Moffa et al. Legionellosis on the rise: A scoping review of sporadic, community-acquired incidence in the United States. Epidemiol Infect. 2023

Legionella Case Investigation Follow-up Steps

Case Assignment

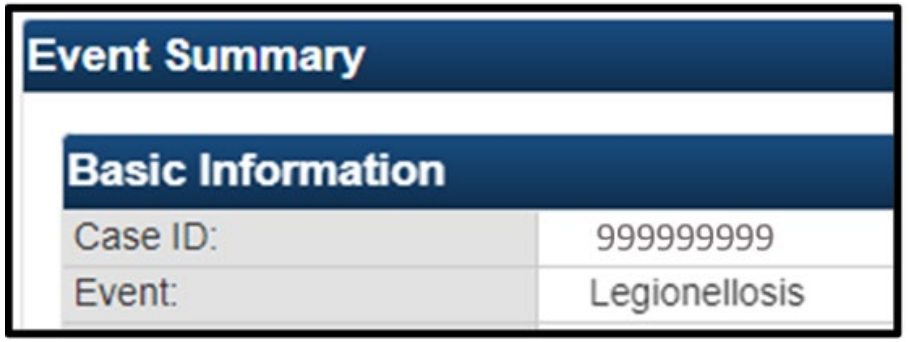
- Local Boards of Health (LBOHs) have primary responsibility to investigate cases of legionellosis in their jurisdiction.
  - New cases will flow into your “LBOH Notification for Routine Disease” workflow.
- An MDPH epidemiologist will be assigned to assist LBOHs for suspected outbreaks and healthcare-associated cases warranting further investigation.

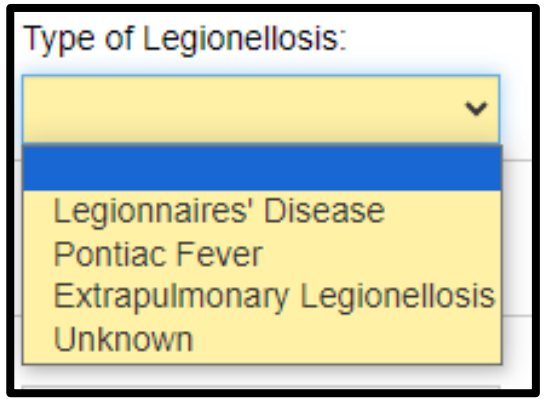
Legionellosis Events in MAVEN

- Infection with *Legionella* will appear as a **Legionellosis** event in MAVEN.

- LBOH case investigation and completing the Clinical Question Package (particularly the presence of pneumonia) will help DPH Epis to appropriately assign the correct type of **Legionellosis, per the Surveillance Case Definition.**

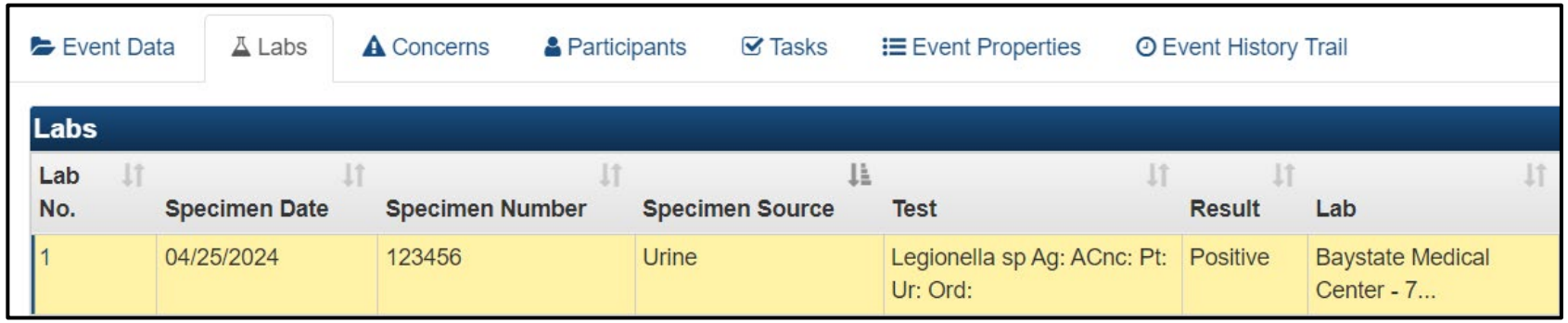
  - Following the local health investigation, the DPH Epi will complete the **Type of Legionellosis** Variable in the Admin Question Package during case review.



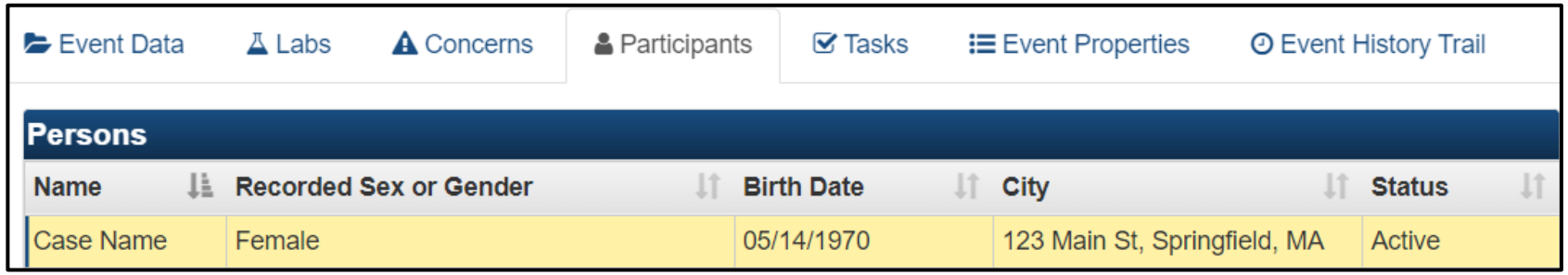


Get Prepared

- Familiarize yourself with *Legionella*: MDPH Fact Sheets, MDPH Guide to Surveillance, MDPH *Legionella* Tip Sheet, and the *Legionella* Section of Maven Help.
- Review the Demographic Question Package (QP) and Laboratory Tab to review information available in MAVEN for the case.



- Reviewing address is helpful to determine if the case is associated with a healthcare setting such as a long-term care facility (LTCF).



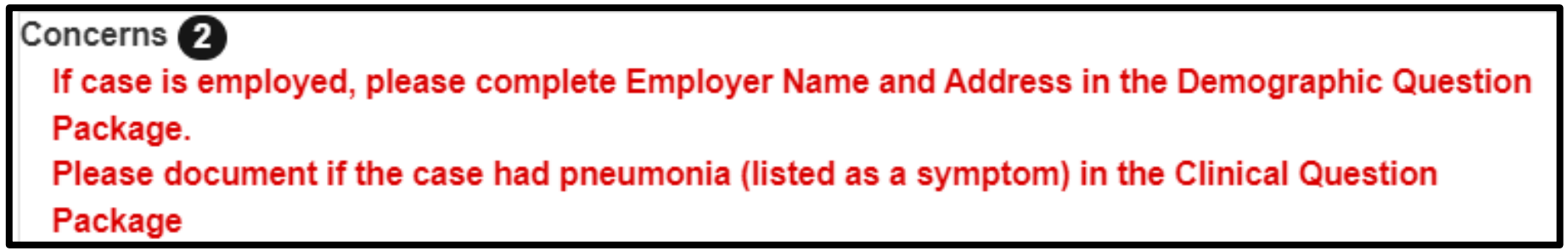
Contact Hospital Infection Preventionist (IP) or Ordering Provider

- The name and facility of the ordering provider can be found in the lab tab in the case's MAVEN event.
- Reach out to the hospital IP to obtain the following:
  - Symptom onset date, clinical presentation, and dates of hospitalization;
    - Determine whether the case was clinically or radiographically diagnosed with pneumonia;
  - Collect information on any potential exposures;
    - Travel, hot tub, healthcare exposures including if the individual is a resident of a LTCF;
  - Request case's occupation and employer, if available.

Details	
Last Update:	05/08/2024
Specimen Date:	04/25/2024
Specimen Number:	123456
Specimen Source:	Urine
Test:	Legionella sp Ag: ACnc: Pt: Ur: Ord:
Result:	Positive
DSAI Received Date:	05/02/2024
Result Date:	05/01/2024
Lab Facility:	Baystate Medical Center - 759 Chestnut Street, Springfield, MA 01199, 413-794-0000
Lab Facility:	Baystate Medical Center - 759 Chestnut Street, Springfield, MA 01199, 413-794-0000
Name:	Ordering Provider Name
Facility:	Baystate Medical Center
Address:	759 Chestnut St
City:	Springfield
State:	MA
Zip:	01199
Phone:	(413) 123-4567

Contact the Case

- Introduce yourself, why you are calling, what you will use information for, and who has access to the information they provide.
- Confirm information obtained from the hospital IP and complete missing information in the Demographic and Clinical QPs.
- Complete all questions in the Risk/Exposure QP for the **14 days prior to symptom onset**.

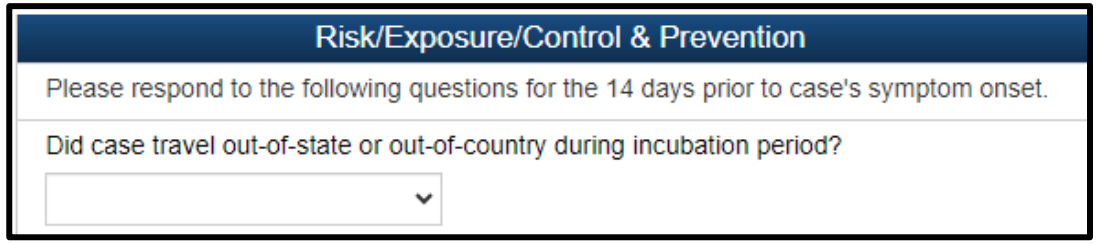


MAVEN Reminder

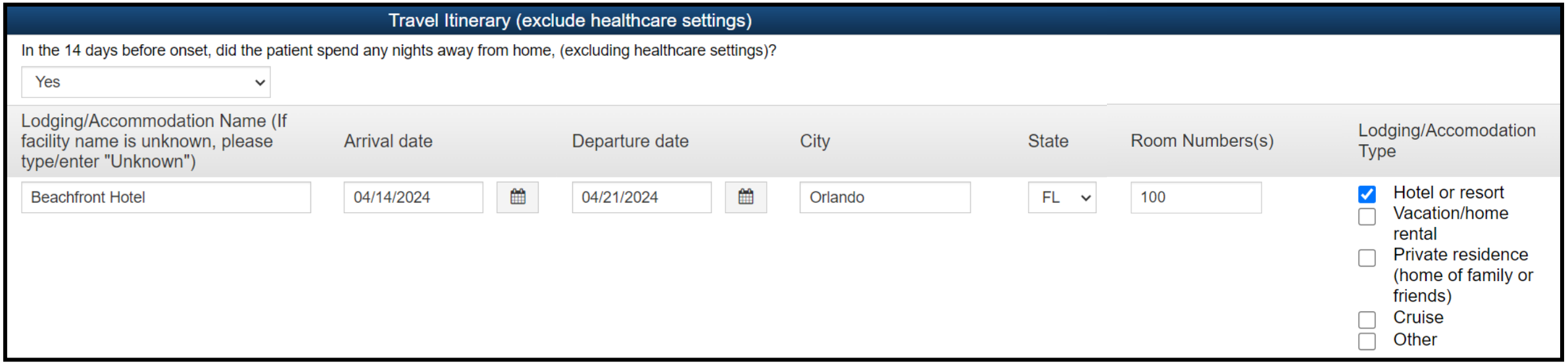
Concerns indicate event-specific reminders/ requirements and will disappear once completed.

Risk/Exposure Question Package – Travel

- All travel out-of-state OR out-of-country travel should be documented below (even if the case did not stay overnight):



- If the case spent any nights away from home during the 14 days prior to symptom onset, obtain:
  - Name, address, dates of stay, and <u>room #</u> of the lodging/accommodation.
  - If the case stayed at a rental property (AirBNB, VRBO), an address should be obtained.

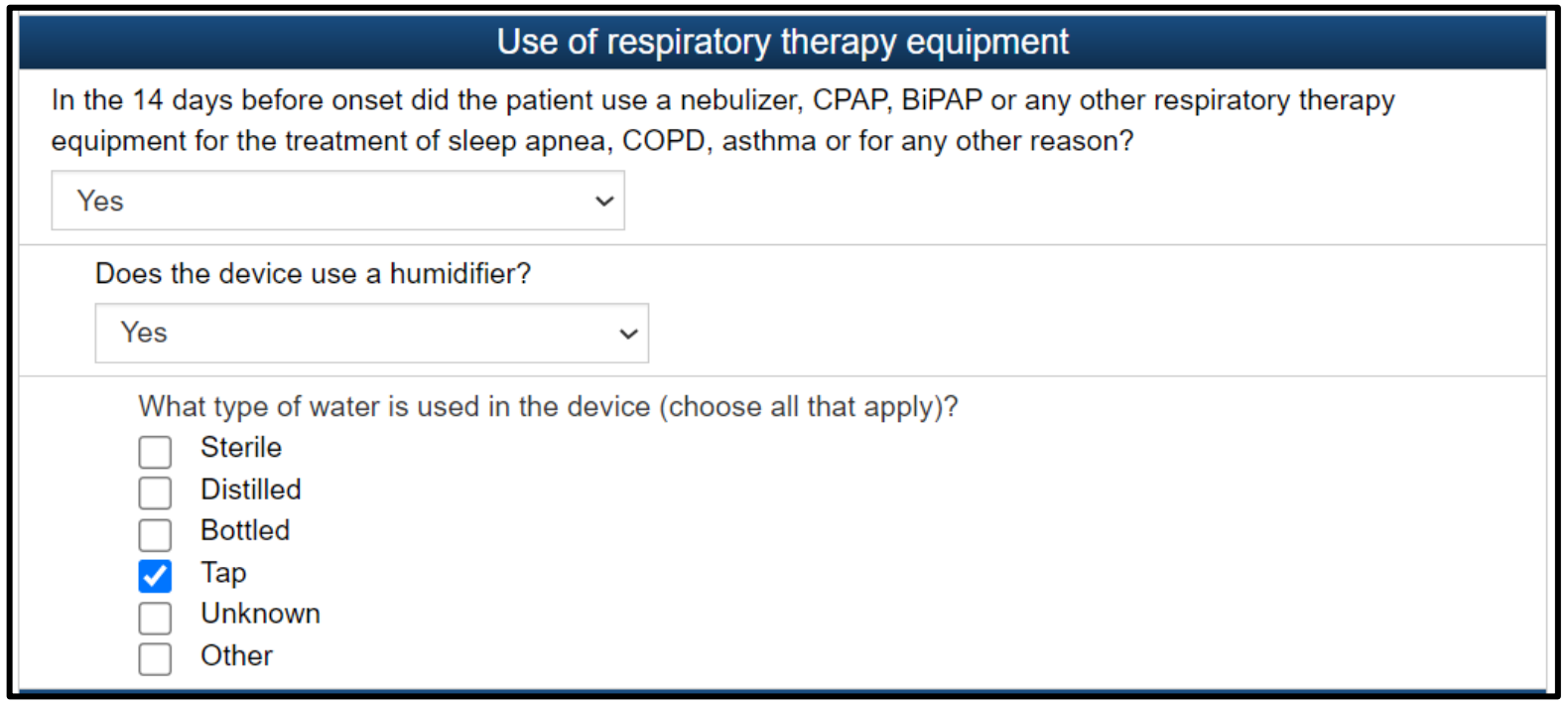


Risk/Exposure Question Package – Hot Tub Use

- Cases should be asked about hot tub use during their incubation period and documented below:

Risk/Exposure Question Package – Respiratory Therapy Equipment

- Cases should be asked about any use of respiratory equipment and documented below:



Educational Opportunity!

- Use of sterile or distilled water is recommended for respiratory equipment – not tap water
- Clean regularly per manufacturers recommendations
- Any device that uses non-sterile water can grow *Legionella*.

Defining Exposure Settings

- There are three setting types captured in the Risk/Exposure Question Package:
  - **Healthcare Facility –** hospital, long term care facility, or clinic;
  - **Assisted Living/Senior Living –** NOT considered to be healthcare facilities but are captured due to housing at-risk populations and facilities tending to have large/complex water systems;
  - **Congregate Care –** jails/correctional facilities, shelters, group homes, etc.

Risk/Exposure Question Package - Healthcare

- If you receive information that the case received healthcare and/or stayed in healthcare facility during the 14 days prior to symptom onset, complete all questions in the Risk/Exposure Question Package including:
  - Name of facility, address, type of exposure, and room number(s) where the case stayed.
- It is important to identify which dates during the case's incubation period were spent at the facility AND if they left at all during that time.
- Detailed and complete information is essential to determine healthcare-associated cases.

Healthcare setting exposures

In the 14 days before onset, did the patient visit, stay, or work in a healthcare setting (e.g. hospital, long term care/rehab/skilled nursing facility, clinic)? (check one)

- [x] Yes
- [ ] No
- [ ] Unknown

Name of Facility (If facility name is unknown, please type/enter "Unknown")	Type of Healthcare Setting/Facility (check one)	Type of Exposure (check one)	Start date	End date	Room Number
Restful Rehab Center	[ ] Hospital [x] LTC [ ] Clinic [ ] Other	[x] Inpatient [ ] Outpatient [ ] Visitor or Volunteer [ ] Empolyee	01/01/2024	05/01/2024	100

Additional Investigation Tips

- Given cases are often hospitalized, consider calling the nursing station, asking if the case is well enough to talk, and ask to be transferred to the case's room.
  - You may need to speak with a healthcare proxy if the case is unable to be interviewed.
- You can consider texting or emailing a case requesting a call back if they are not responsive.
  - Can try obtaining additional contact information from MIIS.
- Completion of all exposure questions in the MAVEN Risk QP is essential for detecting outbreaks and preventing further transmission.
- Reach out to the Division of Epidemiology with questions: (617) 983-6800

Notifying MDPH

- Call the Division of Epidemiology at (617) 983-6800 if:
  - An **outbreak** is identified or suspected;
  - A case reports an overnight stay:
    - At a **healthcare** facility or
    - While **traveling** (e.g., hotel, motel, rental, cruise ship).

Steps in a “Full” Outbreak Investigation

When is a “Full” Investigation Warranted

“Full” investigations are usually warranted for:

- Outbreaks consisting of two or more individuals with legionellosis who are exposed to *Legionella* in the same place, around the same time
- A single presumptive healthcare-associated case

Key Steps in "Full" Investigations Across Settings

- **Case finding and heightened surveillance**
  - Perform a retrospective review of cases in surveillance database, develop a linelist of current cases, work to identify additional cases and facilitate testing
- **Consider recommendations for immediate control measures**
  - Actions taken to reduce the possibility of ongoing transmission to susceptible individuals. Can include restricting water use, installing point-of-use microbial filters, or temporarily closing an affected area
- **Environmental assessment**
  - Multi-step process to understand a building's water system and assess external building factors (e.g., construction, water main breaks) to identify possible sources of *Legionella* and minimize risk factors for *Legionella* growth
- **Environmental sampling**
  - The collection of water samples from a building's water system
- **Remediation**
  - Steps taken to minimize the risk of *Legionella* growth and transmission; can include hyperchlorination, flushing, or superheating a water system
- **Develop or revise Water Management Program (WMP)**
  - Identify hazardous conditions and take steps to minimize growth and transmission of *Legionella* and other pathogens in building water systems.
- **Validate effectiveness of control measures**
  - Monitor to ensure outbreak is over, remediation was successful, and any new control measures implemented are effective at controlling *Legionella* growth

CDC Legionnaires' Disease: Outbreak Investigations

Environmental Investigations

- MDPH does not have capacity to conduct environmental assessments or collect or test environmental samples

- During outbreak investigations, facilities are advised to hire a consultant with *Legionella*-specific environmental expertise
  - Consultants conduct environmental assessments and perform sampling
  - Samples are submitted for testing at a private laboratory

- The LBOH/MDPH should remain in communication with the facility and be informed of assessment findings and environmental sample results

- Legionella Environmental Assessment Form (LEAF) & Marking Guide – designed for public health officials

Investigation of Healthcare-associated Cases

Defining Healthcare-associated Legionnaires' Disease

- Exposure Categories for Surveillance Purposes:
  - A ***presumptive healthcare-associated case*** is defined as a case with ≥10 days of continuous stay at a healthcare facility during the 14 days before onset of symptoms.
  - ***A possible healthcare-associated case*** is defined as a case that spent a portion of the 14 days before date of symptom onset in one or more healthcare facilities but does not meet the criteria for presumptive healthcare-associated Legionnaires' disease.

Defining a Healthcare Facility

- For legionellosis investigations, a healthcare facility is defined as a **hospital**, **long-term care facility**, or **clinic**.
  - This does not include assisted living facilities, senior living facilities, prisons or group homes.

Hospitals	Long-term care facilities	Clinics[1]
• Acute care hospitals (general or specialty) • Long-term acute care hospitals • Critical access hospitals • Children's hospitals • Psychiatric hospitals	• Skilled nursing facilities • Nursing homes • Inpatient hospice • Rehabilitation hospitals • Psychiatric residential treatment facilities	• Outpatient clinics[2]: general and specialty • Ambulatory (same day) surgery centers[2] • Outpatient rehabilitation clinics • Dialysis centers • Dental clinics

Defining Healthcare Facilities and Associated Cases | LD Investigations | CDC

Healthcare-associated Cases & Outbreaks in MA in 2023

- Among the 258 cases of confirmed and probable *Legionella* infection in 2023:
  - 9 presumptive healthcare-associated cases of Legionnaires' disease were investigated.
  - Two outbreaks consisting of two or more healthcare-associated cases were investigated in LTCFs.

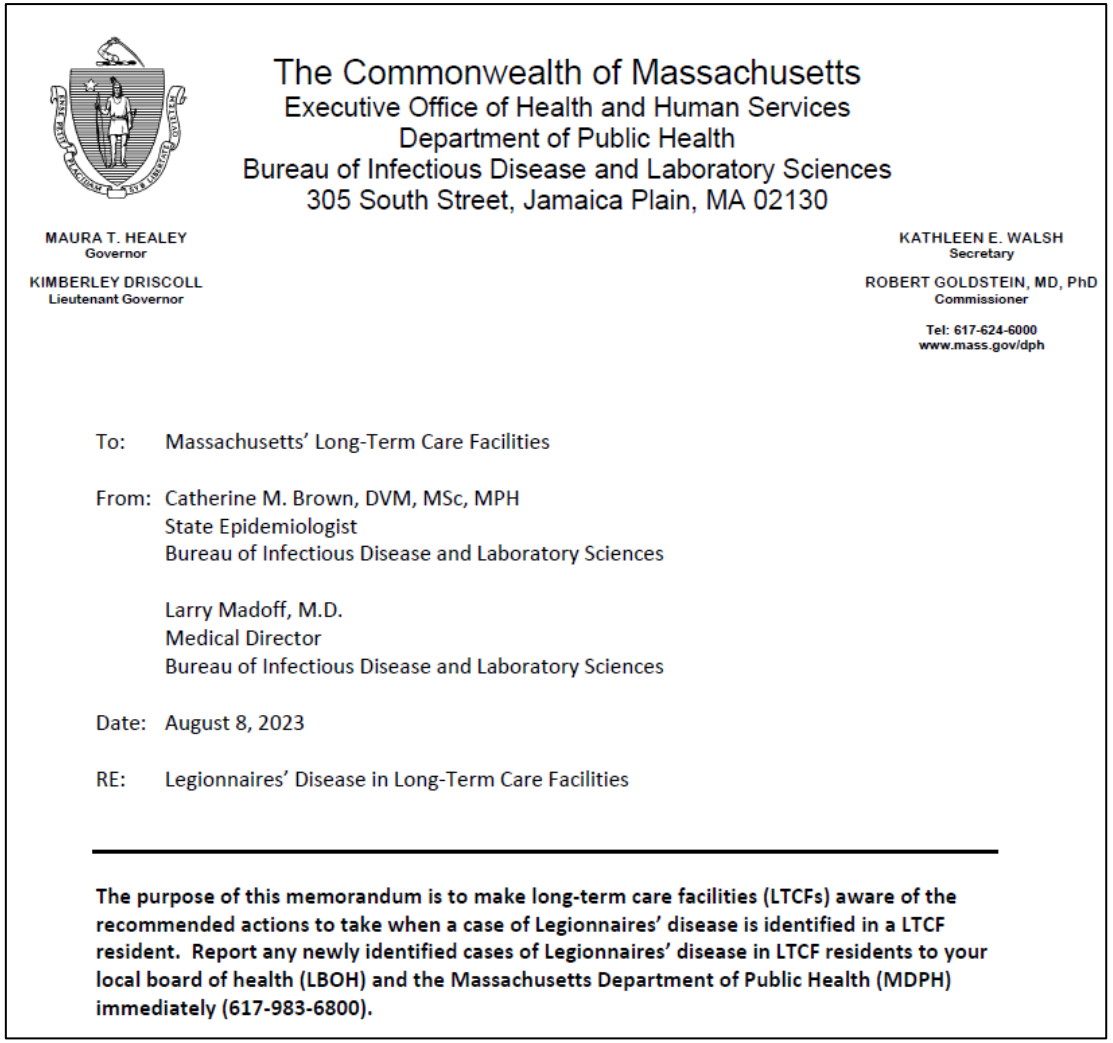
- There were 29 possible healthcare-associated cases of Legionnaires' disease in 2023.

- One important distinction to make is that only a single presumptive health-care associated case is needed to trigger an outbreak investigation.

LTCF Exposures

If the case meets the definition of a presumptive health-care associated case OR two cases of possible healthcare-associated infection, the facility should be advised to follow guidance outlined in the LTCF *Legionella* Memo.

- Memo was created to provide LTCFs with information to prevent *Legionella* infections in LTCFs and provide appropriate guidance when transmission is suspected or identified.



The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Bureau of Infectious Disease and Laboratory Sciences
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To: Massachusetts' Long-Term Care Facilities

From: Catherine M. Brown, DVM, MSc, MPH
State Epidemiologist
Bureau of Infectious Disease and Laboratory Sciences

Larry Madoff, M.D.
Medical Director
Bureau of Infectious Disease and Laboratory Sciences

Date: August 8, 2023

RE: Legionnaires' Disease in Long-Term Care Facilities

The purpose of this memorandum is to make long-term care facilities (LTCFs) aware of the recommended actions to take when a case of Legionnaires' disease is identified in a LTCF resident. Report any newly identified cases of Legionnaires' disease in LTCF residents to your local board of health (LBOH) and the Massachusetts Department of Public Health (MDPH) immediately (617-983-6800).

Control Recommendations in LTCF settings

- When a single presumptive case or two possible cases of healthcare-associated *Legionella* infection(s) occur within a 12-month period, the following recommendations are made:
  - Hire a consultant with *Legionella*-specific environmental expertise.
  - Review facility's water management plan to ensure it is being followed.
  - Conduct retrospective case finding.
  - Conduct active surveillance for symptomatic residents and ensure *Legionella*-specific testing is performed.
  - Report any newly identified cases of Legionnaires' disease to LBOH and MDPH immediately (617-983-6800).
  - Evaluate trends in infections due to other water-related pathogens.
  - Report to facility's licensing agency.
- In the event of an outbreak in a LTCF-setting, the LBOH and MPDH should work together to schedule a meeting with the facility and their environmental consultant to discuss next steps as a group.
  - The Bureau of Healthcare Safety and Quality (licensing agency) would be involved in the discussion.

One week after providing recommendations, follow up with facility to ensure they are working with a consultant and steps are underway.

Outbreaks of Legionnaires' Disease in Non-Healthcare Settings

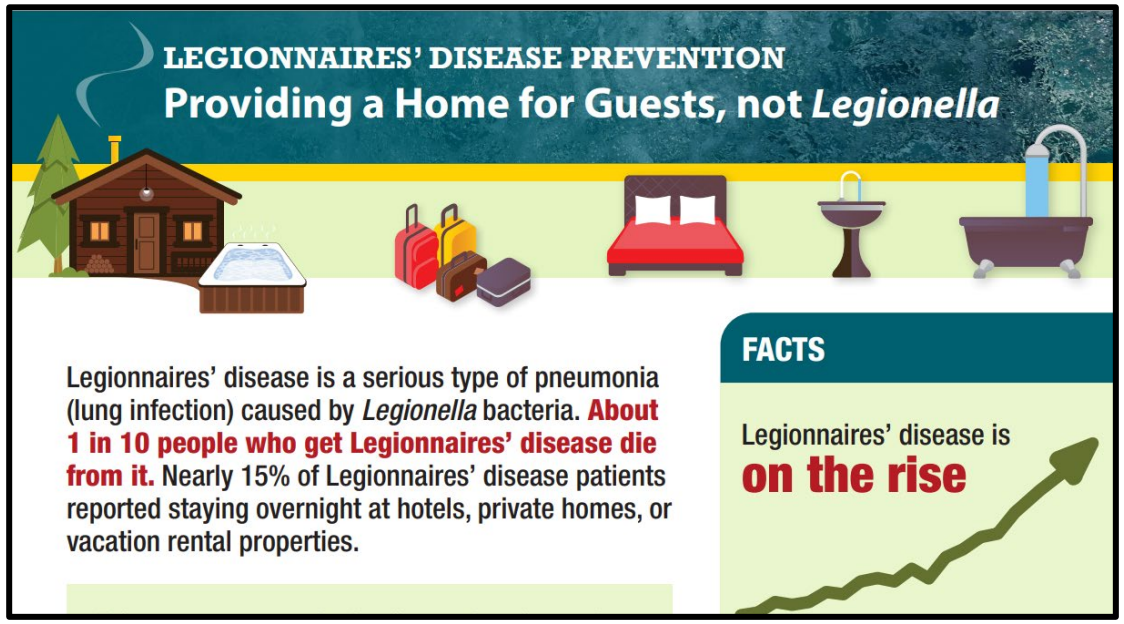
Defining and Investigating Outbreaks

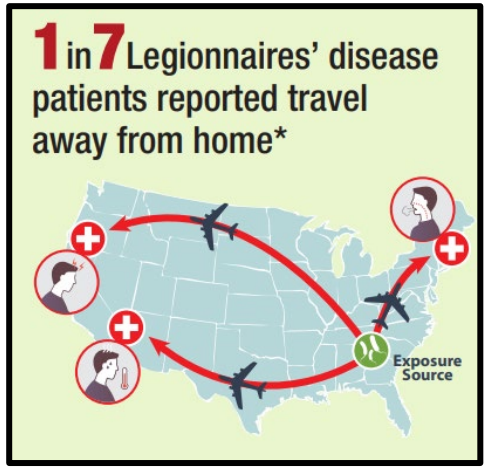
- An outbreak is defined as two or more individuals with diagnosed Legionnaires' disease or Pontiac Fever who are exposed to *Legionella* in the same place, around the same time.
  - For outbreaks involving travel or potable water systems, an outbreak period of 12 months is used.
- Outbreaks are commonly associated with buildings or structures that have complex water systems such as hotels, hospitals, or apartment complex buildings.
- To identify outbreaks across state lines, it is essential that LBOHs notify the Division of Epidemiology of suspected travel or healthcare-associated cases: (617) 983-6800

CDC Legionnaires' Disease Surveillance Summary Report, United States—2018 and 2019

Defining Travel-associated Legionellosis

- **A travel-associated case** is defined as a diagnosed case of Legionnaires' disease or Pontiac Fever who spent at least one night away from home (in MA, another state, or another country) in the 14 days before symptom onset, not including nights spent in a healthcare facility.
  - MDPH reports deidentified information on MA residents with out-of-state travel to other health jurisdictions via CDC.
  - CDC notifies MA of out-of-state cases of Legionnaires' disease that had overnight travel in MA.
    - MDPH reviews available surveillance data to see if there are other cases associated with the hotel/resort/facility in the past 12 months and notifies the LBOH for awareness.





Collaboration

- The LBOH has the jurisdiction to take the lead in case investigations and outbreak investigations.
  - MDPH can become involved at the request of the LBOH.
    - All suspected outbreaks should be reported to the Division of Epidemiology: (617) 983-6800.
  - A facility's licensing agency should be notified and included in outbreak investigations.
  - Additional state agencies may be involved depending on the situation:
    - MDPH Bureau of Healthcare Safety & Quality;
    - MDPH Bureau of Climate & Environmental Health;
    - MA Department of Environmental Protection.

How MDPH Monitors for Clusters and Outbreaks

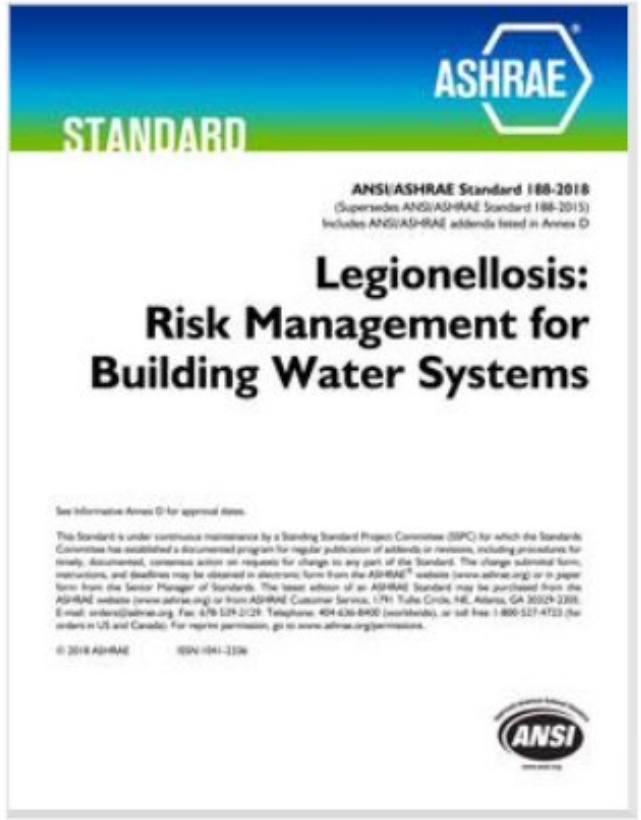
- Internal monthly reports to monitor for cases who reported recent travel or healthcare exposure.
- Routine review of investigations completed by LBOHs (case report form review).
  - We appreciate the support of LBOHs flagging anything unusual that they notice (either via calling or emailing).
- Follow-up on notifications from CDC re: exposures in MA.
- SaTScan: software used to identify cases clustered geographically and temporally

Outbreaks of legionellosis in non-healthcare settings are uncommon in Massachusetts. In the past 5 years, non-healthcare outbreaks have occurred in the following settings: hotel, apartment building, and a home rental with a hot tub.

Prevention

Prevention Resources - ASHRAE 188

- ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Standard 188 establishes minimum legionellosis risk management requirements for building water systems.
  - Legionellosis: Risk Management for Building Water Systems



Prevention Resources – Water Management Programs

- Many buildings need a water management program to reduce the risk for *Legionella* growing and spreading within their water system and devices.
- Per federal CMS requirements (June 2017), all healthcare facilities should have a water management plan, including policies and procedures to reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in building water systems.
- Additional Guidance on Water Management Programs:
  - CDC Water Management in Healthcare Facilities
  - CDC Federal Requirement to Reduce Legionella Risk
  - Toolkit: Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings

What Are *Legionella* Water Management Programs?

Legionella water management programs identify hazardous conditions and include taking steps to minimize the growth and spread of *Legionella* in building water systems. Having a water management program is now an industry standard for large buildings in the United States.

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

A PRACTICAL GUIDE TO IMPLEMENTING INDUSTRY STANDARDS

Prevention Resources – Hot Tubs

- CDC: Controlling *Legionella* in Hot Tubs
- CDC: Protecting yourself from Legionella in Hot Tubs

Legionella and Hot Tubs/Spas

Legionella is a germ that can cause a severe type of pneumonia (lung infection) called Legionnaires' disease. *Legionella* can also cause Pontiac fever, a milder illness without pneumonia. Make sure disinfectants in hot tubs/spas (like chlorine) are kept at the level and pH needed to reduce the risk of spreading germs like *Legionella*. If you have symptoms of Legionnaires' disease or Pontiac fever, such as cough, shortness of breath, fever, or muscle aches, see your healthcare provider right away. Be sure to tell your healthcare provider if you used a hot tub/spa in the last two weeks.

Hot tubs/spas can spread *Legionella*

People can get Legionnaires' disease or Pontiac fever when they breathe in small droplets of water (mist) that contain *Legionella*. *Legionella* is found naturally in freshwater environments, like lakes and streams. It becomes a health concern when it grows and spreads in human-made water systems. For example, *Legionella* can grow and multiply in hot tubs/spas that are not disinfected and cleaned properly.

Legionella can also be found in other human-made water systems such as cooling towers, plumbing systems, and decorative fountains.

Protect yourself and others

Below are steps you can take to test hot tub/ spa water and find out if it is being properly maintained.

- Buy test strips at your local retailer or pool supply store. Be sure to check the expiration date.
- Use the test strips to check these levels:
  - Free chlorine level should be 3–10 parts per million
  - Bromine level should be 4–8 parts per million
  - pH should be 7.2–7.8
- Tell the hot tub/spa operator or owner if you find improper chlorine or bromine levels or pH.

Questions to ask your hot tub/spa operator

- What was the most recent health inspection score for the hot tub/spa?
- Are the disinfectant levels and pH checked at least twice per day?
- Are the disinfectant levels and pH checked more often when the hot tub is being used by a lot of people relative to its size?
- Are the following maintenance activities performed?
  - Daily removal of the slime or biofilm layer by scrubbing and cleaning
  - Replacement of the hot tub/spa water filter according to the manufacturer's recommendations
  - Replacement of hot tub/spa water as often as required by the health department or recommended by the manufacturer

www.cdc.gov/healthyswimming

Additional Resources for Controlling Spread in Common Source Exposure

- CDC Toolkit for Controlling *Legionella* in Common Sources of Exposure available at the following link:
  - https://www.cdc.gov/control-legionella/php/toolkit/control-toolkit.html
- CDC *Legionella* in Other Devices at the following link:
  - https://www.cdc.gov/control-legionella/php/toolkit/other-devices-module.html
- CDC *Legionella* Environmental Investigation Resources, including the *Legionella* Environmental Assessment Form (LEAF) available at the following link:
  - https://www.cdc.gov/investigate-legionella/php/resources/environmental.html

Additional Resources related to Healthcare Facility Investigations

- CDC Things to Consider: Healthcare-associated Cases and Outbreaks available at the following link:
  - https://www.cdc.gov/investigate-legionella/php/healthcare-resources/healthcare-facilities.html
- CDC Water Management Programs Special Considerations for Healthcare Facilities available at the following link:
  - https://www.cdc.gov/control-legionella/php/healthcare/
- CDC Federal CMS Requirement to Reduce *Legionella* Risk available at the following link:
  - https://www.cdc.gov/control-legionella/php/healthcare/federal-requirement.html
- CDC Considerations When Working with *Legionella* Consultants available at the following link:
  - https://www.cdc.gov/control-legionella/php/wmp/consultants-considerations.html

Q&A