

Legionnaire's disease

Connecticut Environmental Health Association Meeting

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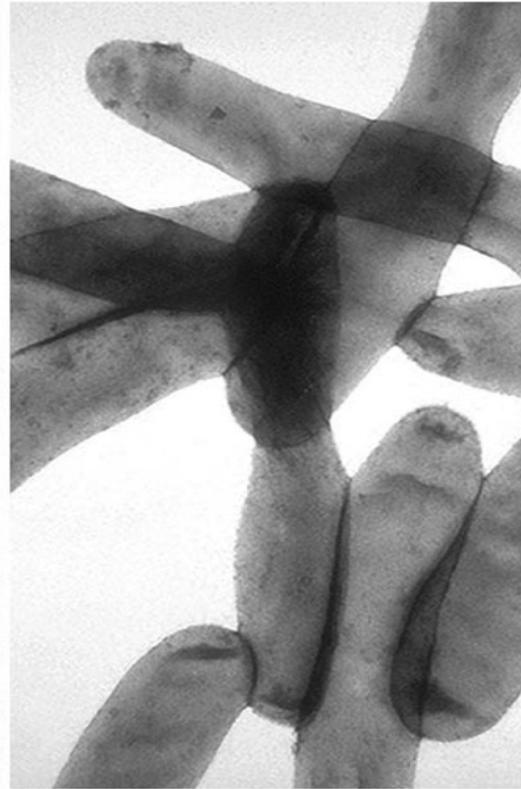
Connecticut Department of Public Health

Legionellosis Website - <https://portal.ct.gov/DPH/Infectious-Diseases/EEI/Legionnaires-disease>



Connecticut Department of Public Health

Legionellosis, *Legionella*, Legionnaires Disease



From left, The Bellevue-Stratford; pneumophila, responsible for over 90% of Legionnaires' disease cases; Jim Feeley, examining culture plates upon which the first environmental isolates of Legionella pneumophils had been grown. All public domain.

What is Legionella?

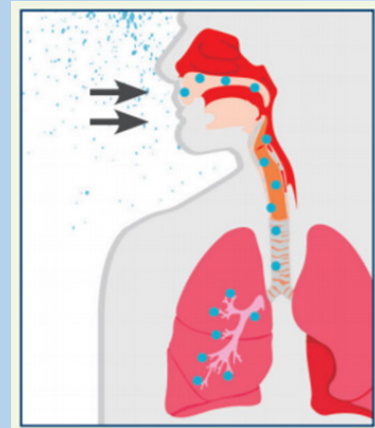
- Legionella is a bacteria that occurs naturally in fresh water environments
 - The bacteria grows best within a certain temperature in water (rivers, lakes, streams, reservoirs) at warm temperatures (range 77°F-108°F)
- Can be found in not properly maintained building plumbing systems, cooling towers, decorative fountains, spas, and misters
- There are over at least 60 species of Legionella
 - Vast majority of human disease is caused by *Legionella pneumophila*
 - All species and serogroups of *Legionella* are potentially pathogenic

What is Legionellosis?

- Legionella bacteria can cause three distinct syndromes:
 1. Legionnaires' Disease (LD), which is characterized by pneumonia
 - incubation period is 2-10 days
 2. Pontiac Fever, a self-limited flu-like illness.
 - incubation period is days 1-3 days
 3. Extrapulmonary legionellosis, legionella infection at a site outside the lungs (endocarditis or wound infections).
- All are know collectively as legionellosis
- For this presentation will focus primarily on Legionnaires' Disease

What is Legionnaires' Disease?

- Illness in susceptible people can occur by breathing in tiny water droplets (mist or vapor) contaminated with Legionella bacteria, or by aspiration (ice chips/water)
- Less than 5% of people exposed to the bacteria will go on to develop Legionnaires' disease
- Symptoms – pneumonia, fever, cough, diarrhea, muscle pain,
- Duration: Few weeks
- Case Fatality: 5- 30% , depending on setting/comorbidities
- No person-to-person transmission



Legionellosis in Connecticut 1980-1997

Nosocomial Legionnaires Disease Associated with Exposure to Respiratory Therapy Equipment, Connecticut

ELLEN JONES, PATRICIA CHECKO, ANECIA DALTON, JOHN COPE, JAMES BARBAREE,
GEORGE KLEIN, WILLIAM MARTIN, AND CLAIRE BROOME

*Centers for Disease Control, Atlanta, Georgia 30333, and State Department of Health Services, Hartford,
Connecticut 06010*

Numerous investigators have suggested a role for potable water in outbreaks of nosocomial Legionnaires disease (LD) (1, 2, 3). An investigation of an outbreak of nosocomial LD has allowed us to extend previous observations concerning the role of contaminated potable water among immunosuppressed patients receiving respiratory therapy.

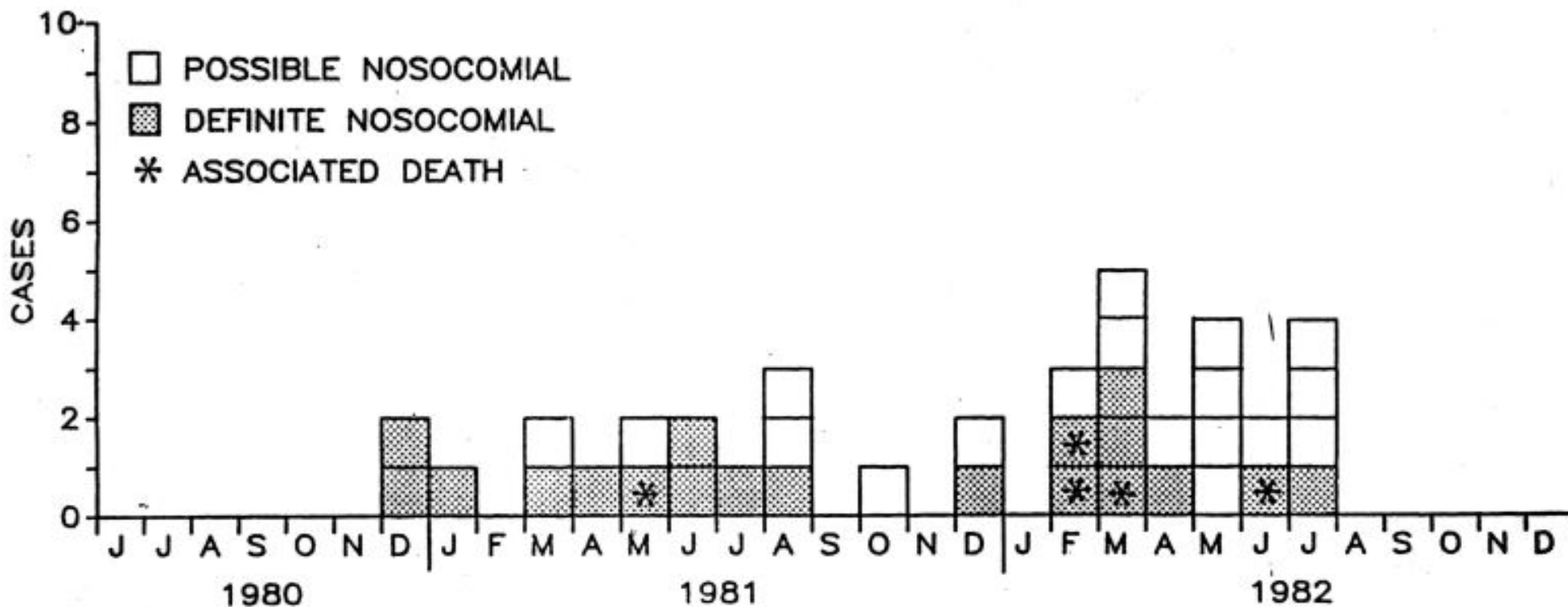
Between December 1980 and December 1982, 36 cases of nosocomial LD occurred in a 400-bed Connecticut hospital. However, only 18 of these patients had been hospitalized continuously during the 10 days before onset of illness, so only

correlated and it was difficult to evaluate them as independent variables. Further analysis of the relationship between steroids and antacids, nebulizers and steroids, and antacids and nebulizers also was limited by the small number of cases. However, examining the data in an unmatched fashion was useful in examining trends among variables.

Among those receiving steroids, antacid use increased the risk of illness (88 versus 17%) (Table 1). However, among those not being treated with steroids, antacid therapy did not appear to have an effect (20 versus 17%).

Legionella : proceedings of the 2nd international symposium (1984)

CASES OF NOSOCOMIAL LEGIONNAIRES' DISEASE BY MONTH OF ONSET, HOSPITAL A, CONNECTICUT, JUNE 1980–DECEMBER 1982



Legionnaires' Outbreak Killed Five but Went Unreported

By NANCY PAPPAS
and DIANE LAMBERT
Courant Staff Writers

At least 18 and possibly as many as 36 people contracted Legionnaires' disease at St. Vincent's Medical Center in Bridgeport in 1980 and 1982. Five of them died.

Neither the hospital nor the state reported the outbreak to the public. After information on the outbreak was obtained, the state refused to

identify the hospital involved.

Now, more than two years later, St. Vincent's has been identified as the site of the outbreak only because a federal freedom of information action forced disclosure. The outbreak of Legionnaires' disease illustrates two serious problems:

- Patients' picking up infections while in the hospital to be treated for unrelated ailments is one of the most common complications of medical care.

- Dissemination of information about outbreaks such as the one at St. Vincent's is a tricky business in which the public's right to certain information must be balanced against a hospital's desire to protect its reputation.

In the St. Vincent's case, the public interest was sacrificed.

As a result of the freedom of information action, St. Vincent's was identified this week by the federal

Centers for Disease Control in Atlanta.

Officials from the hospital and the state health department Friday defended their failure to report the outbreak to the public. The hospital believes its only responsibility was to report the outbreak to the state, which it did.

William Roots, the hospital's director of public information, said Thursday, that the health depart-

ment has been "entrusted with public health for the state. For an individual institution ... to make that arbitrary decision [to make the outbreak public] would be very wrong."

For the state's part, Patricia Checko, an epidemiologist who spent months investigating the outbreak, said, "We investigate 30 to 40 disease outbreaks a year in all kinds of places. If we believe there is public risk, we inform the public."

Checko also said, "Once publicity

is out there, it's frequently difficult to save the reputation of the hospital, who may have just built a new wing and is very concerned people are not going to come [there] if people think they are doing something terrible."

In the St. Vincent's case, she said, "We did not feel the risk was such that the public should be informed. We'd have created more panic than

See Legionnaires', Page A8

20 JOURNAL INQUIRER THURSDAY, DECEMBER 27, 1984

Editorials and Comment

Connecticut betrayed by its Health Department

For whom is the state Health Department working, the public or the health-care industry?

That question is raised by newspaper disclosure that the department concealed outbreaks of Legionnaires' disease at St. Vincent's Medical Center in Bridgeport in 1980 and 1982 that affected as many as 36 people, killing five.

The department maintains that there wasn't enough public risk to warrant publicity that would have damaged the hospital's reputation and business. Yet there can be no doubt that the hospital's prospective clients would have wanted to know. And how well a hospital keeps infections from spreading among patients is legitimately a matter of public concern and inquiry.

By concealing the problem the department took it upon itself to decide how many lives a

hospital's reputation was worth — the lives of ignorant innocents, not, of course, the lives of the decision makers themselves. The department decided that people should not be entitled to make their own decisions, right or wrong, about their own health care.

This is bureaucratic and medical arrogance at its worst. It casts doubt on more

The totalitarians and abortion

Two totalitarian countries, Romania and China, offer a lesson about the politics of abortion.

Romania is staggering economically under the weight of an aging population. So the government has prohibited abortion and is using taxation to penalize people who don't marry and have large families.

China, meanwhile, is staggering

than the hospital in question but on the general competence of the Health Department as a public agency.

Governor O'Neill and the General Assembly should investigate the department's failure to protect the public here, assign responsibility, and consider new policies and legislation that will prevent such abuse of

economically because of overpopulation, and is requiring couples to get permission to have children and requiring abortion for women who have more than two children.

So again it seems that there is much more to fear from a government that intervenes brutally in personal reproductive matters than from a government that is merely indifferent and leaves them to individual decision.

discretion by state regulators who, like many regulators, may be too close to the people and institutions they regulate.

Outbreaks of disease may happen under even the best circumstances at hospitals, and the hospital here may be blameless, or no worse than most other hospitals. To explain that, if it is the case, is the Health Department's responsibility, not to keep the public ignorant.

Indeed, if such outbreaks are going to happen occasionally, only regular publicity about them would prevent panic and assure a fair understanding.

But here the Health Department has broken what should be if it isn't already the first canon of ethics in medicine as well as government: to be loyal first to its clients, the people who pay the bill, the public.

A RECURRENT OUTBREAK OF NOSOCOMIAL LEGIONNAIRES' DISEASE DETECTED BY URINARY ANTIGEN TESTING: EVIDENCE FOR LONG-TERM COLONIZATION OF A HOSPITAL PLUMBING SYSTEM

Lisa A. Lepine, MD; Daniel B. Jernigan, MD, MPH; Jay C. Butler, MD; Janet M. Pruckler, BA; Robert F. Benson, MS; Grace Kim, MD; James L. Hadler, MD; Matthew L. Cartter, MD; Barry S. Fields, PhD

ABSTRACT

BACKGROUND: In 1994, a hospital reported an increase in nosocomial legionnaires' disease after implementing use of a rapid urinary antigen test for *Legionella pneumophila* serogroup 1 (Lp-1). This hospital was the site of a previous nosocomial legionnaires' disease outbreak during 1980 to 1982.

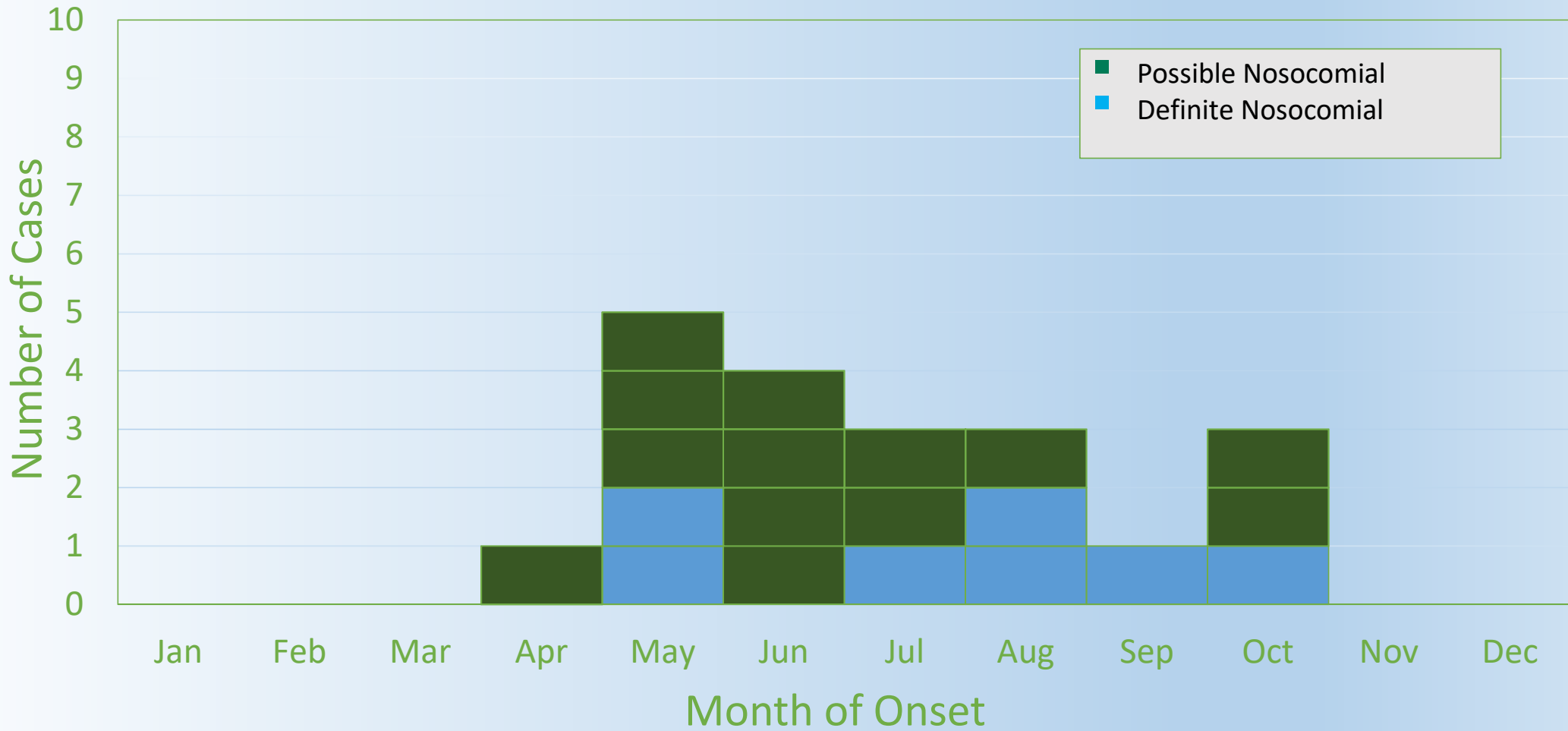
METHODS: Infection control records were reviewed to compare rates of nosocomial pneumonia and the proportion of cases attributable to legionnaires' disease during the 1994 outbreak period with those during the same period in 1993. Water samples were collected for *Legionella* culture from the hospital's potable water system and cooling towers, and isolates were subtyped by monoclonal antibody (MAb) testing and arbitrarily primed polymerase chain reaction (AP-PCR).

RESULTS: Nosocomial pneumonia rates were similar from April through October 1993 and April through October 1994: 5.9 and 6.6 per 1,000 admissions, respectively (rate ratio [RR], 1.1;

$P=.56$); however, 3.2% of nosocomial pneumonias were diagnosed as legionnaires' disease in 1993, compared with 23.9% in 1994 (RR, 9.4; $P<.001$). In 1994, most legionnaires' disease cases were detected by the urinary antigen testing alone. MAb testing and AP-PCR demonstrated identical patterns among Lp-1 isolates recovered from a patient's respiratory secretions, the hospital potable water system, and stored potable water isolates from the 1980 to 1982 outbreak.

CONCLUSIONS: There may have been persistent transmission of nosocomial legionnaires' disease at this hospital that went undiscovered for many years because there was no active surveillance for legionnaires' disease. Introduction of a rapid urinary antigen test improved case ascertainment. *Legionella* species can be established in colonized plumbing systems and may pose a risk for infection over prolonged periods (*Infect Control Hosp Epidemiol* 1998;19:905-910).

Legionnaires' Disease, Hospital A, 1994



Nosocomial Legionnaires' Disease Outbreaks Acute Care Hospitals, CT, 1980 - 1995

Hospital	Year(s)	Number of Cases		Serogroups	Source
		Confirmed	Probable		
A	1980-1982	19	18	1,4,5	Water
B	1986	2	2	1	Water
A	1994	7	13	1	Water
C	1995	4	1	3	Water

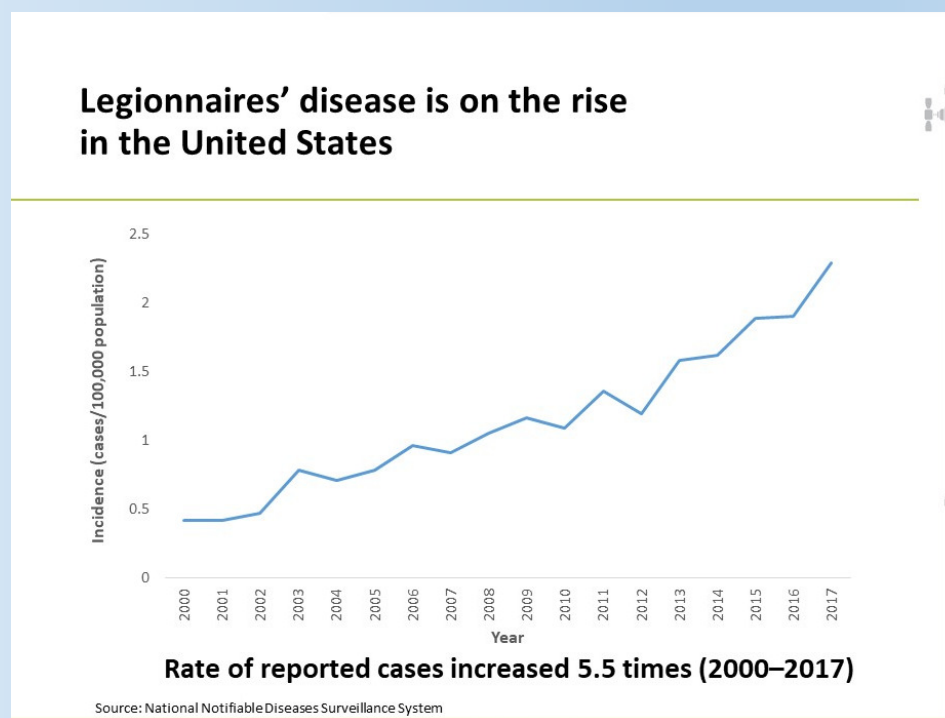
Legionellosis Surveillance Overview

Legionellosis Surveillance in Connecticut

- Legionellosis was added to the list of physician and laboratory reportable diseases in 1997
- Laboratories and healthcare providers are required to report any diagnosed case to the DPH, Epidemiology Program.
- Between 1999-2018, the median number of cases reported annually was **55** (range 14-201 cases)
- Follow-up is conducted all cases-patients by Epidemiology and Emerging Infections Program staff.
 - Health care providers are asked provide clinical illness information
 - Case-patients are interviewed obtain travel history, water exposures, and recent medical or dental visits (to assess healthcare associated infection)

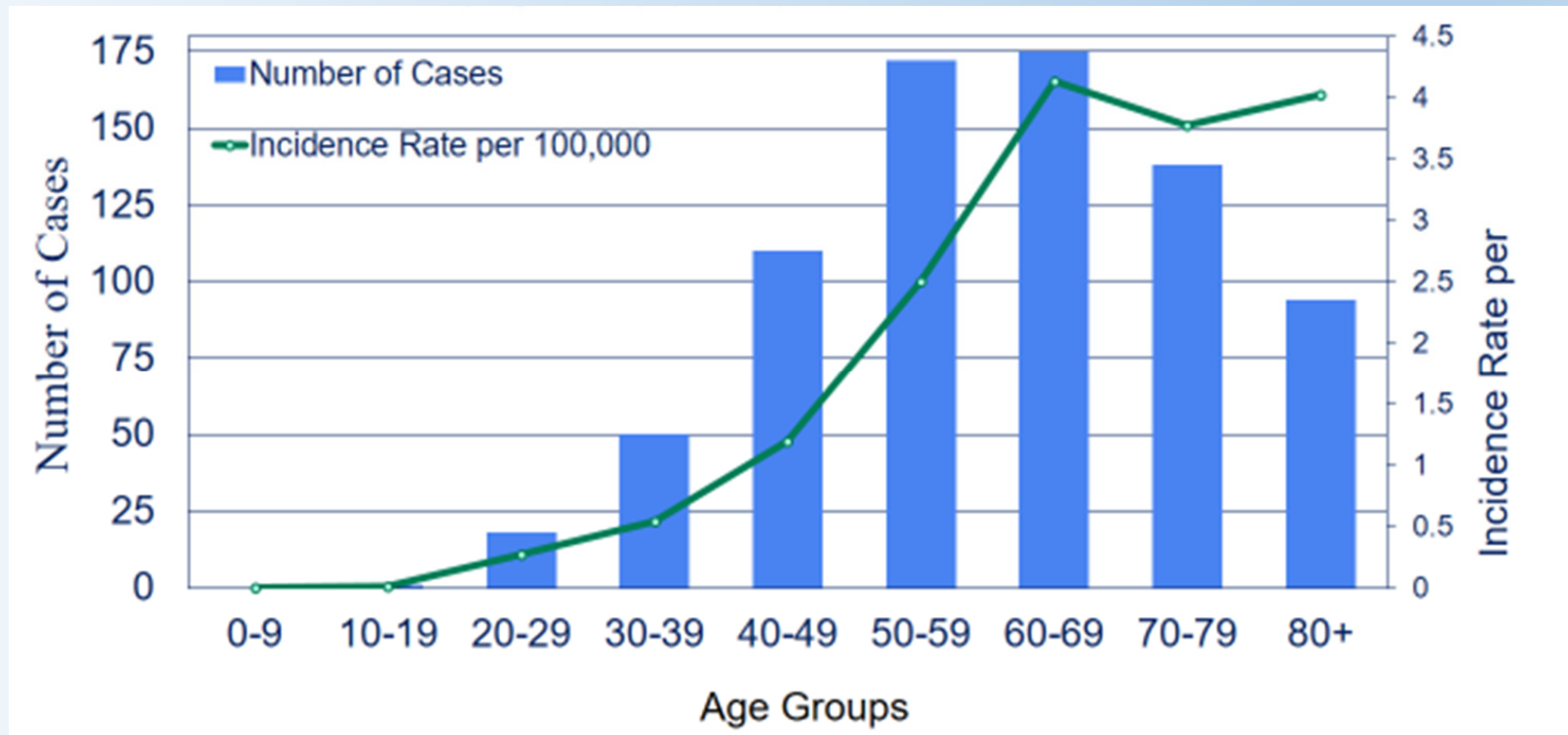
The Incidence of Legionnaires' Disease Nationally Is on the Rise

- Incidence legionnaires' disease has grown by nearly 5.5 times from 2000 to 2017
- Cases increased from 5,166 to > 7,500 from 2014-2017
- Unofficial case counts for 2018 is over 10,000
- Illness is thought to be underdiagnosed

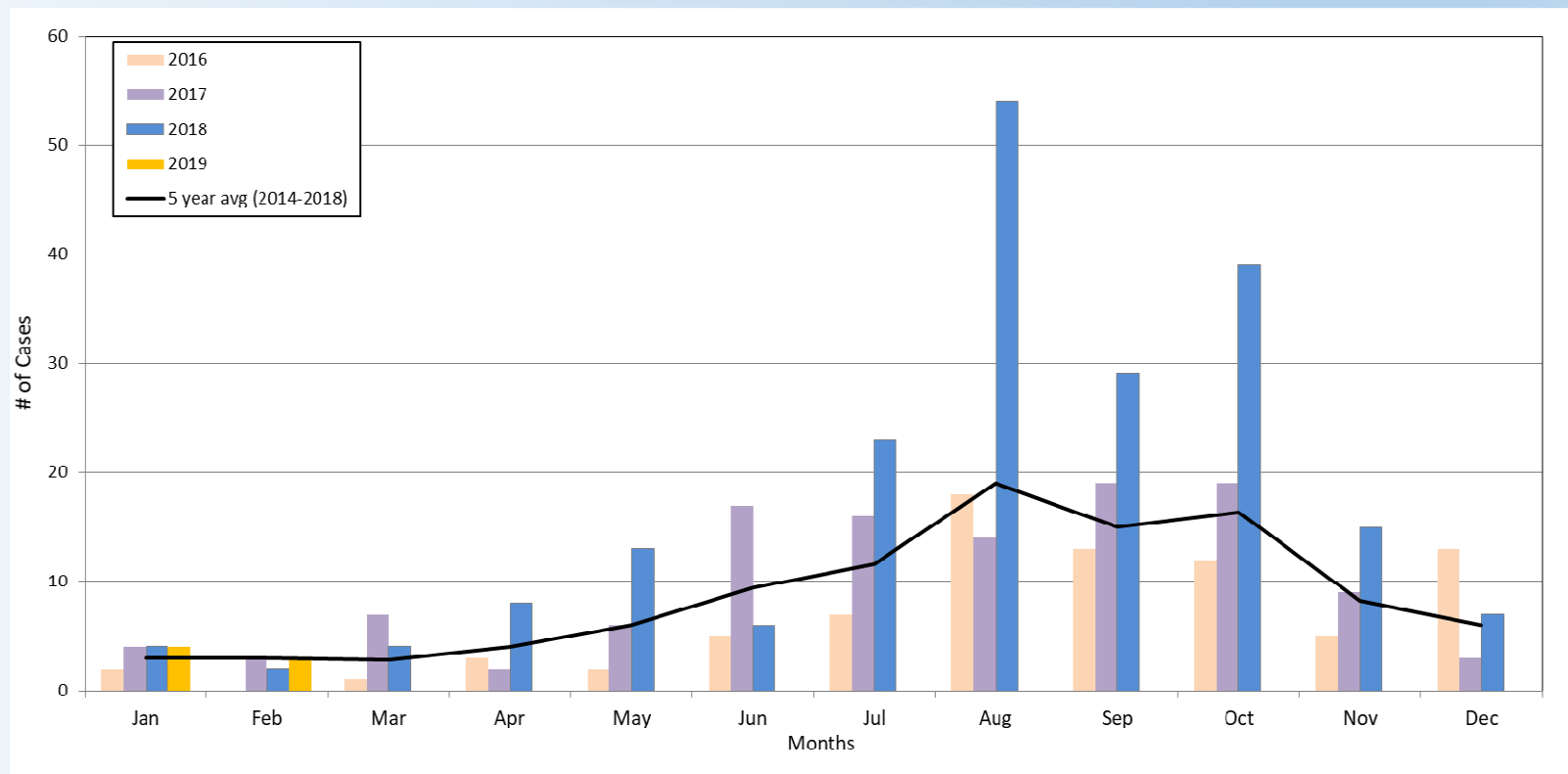


Garrison LE et al. *MMWR*. 2016;65(22):557–61.

Number and Annual Average Incidence of Confirmed Legionellosis Cases by Age Group, Connecticut, 2000-2016



Confirmed Legionellosis Cases by Month of Onset, Connecticut, January 2015 – December 2018



Legionellosis Smoothed Incidence Rate in Connecticut, 1999-2015

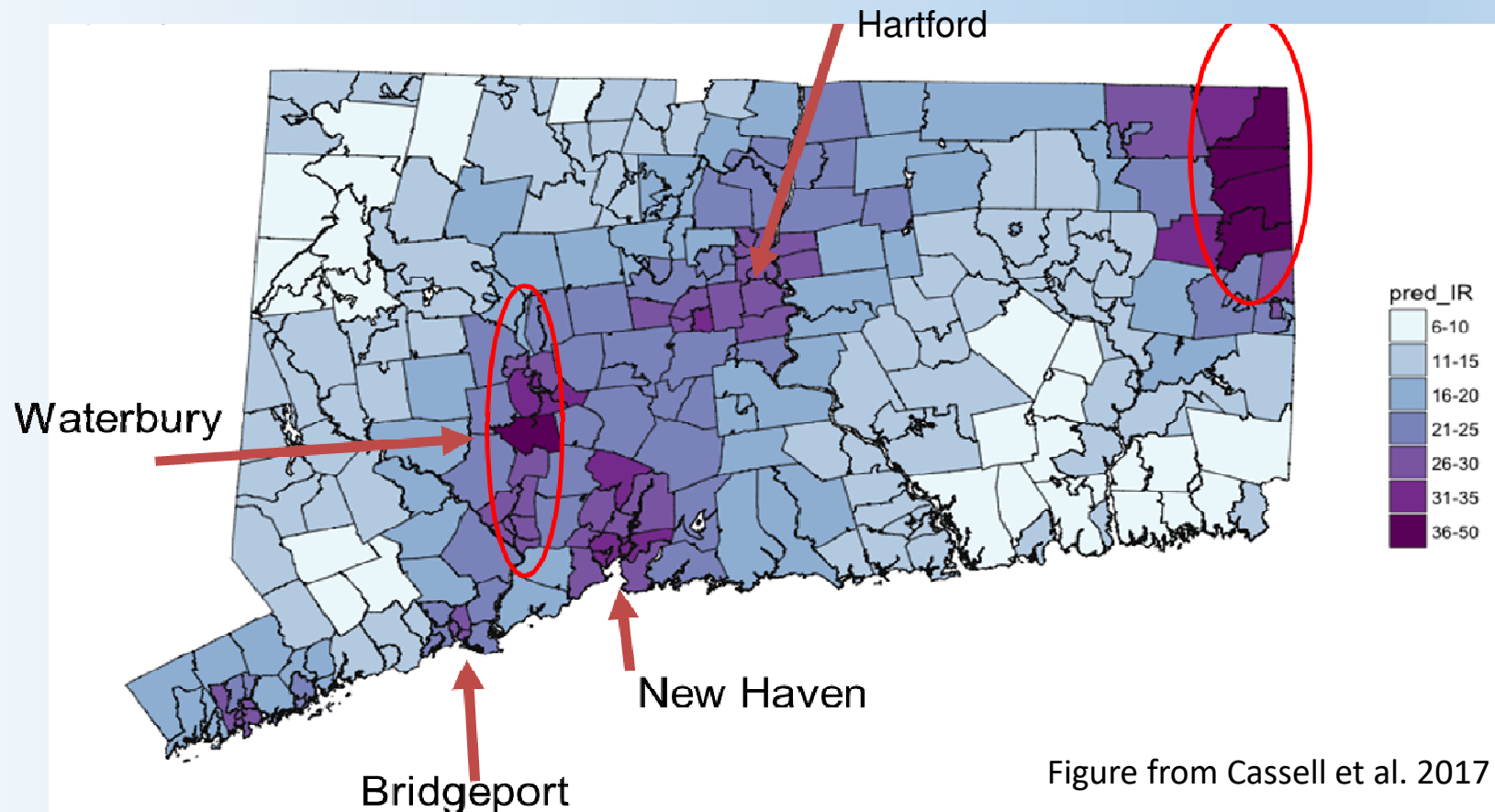
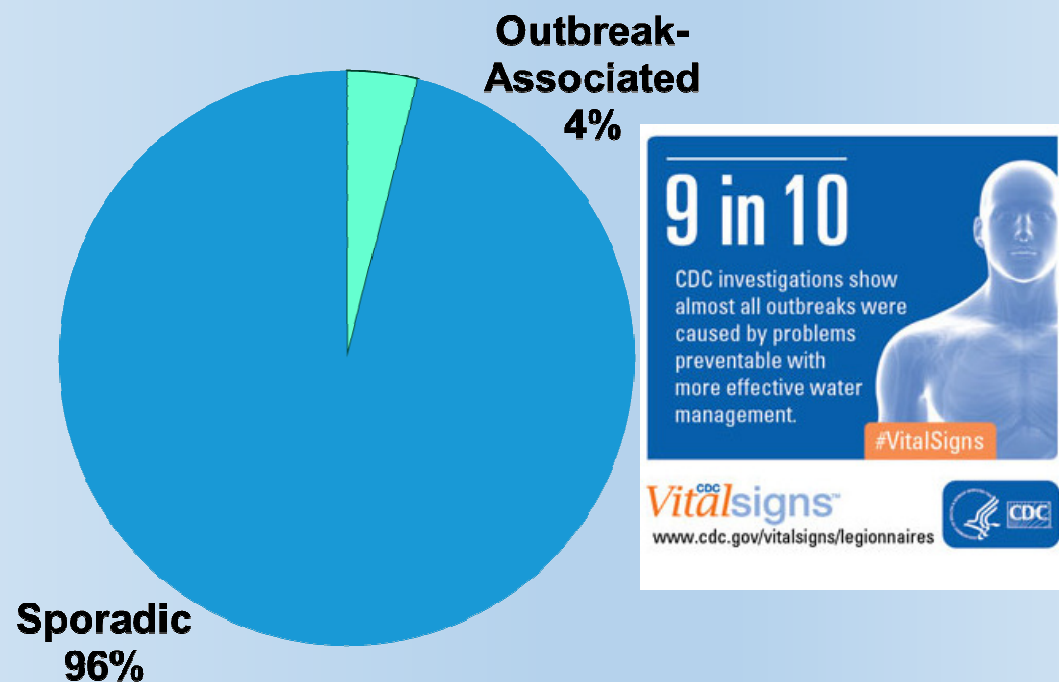


Figure from Cassell et al. 2017

Sporadic Legionnaires' Disease -Nationally

- Most cases of LD are not associated with a recognized outbreak
- Possible overestimation of sporadic disease cases
- How many cases are potentially preventable?



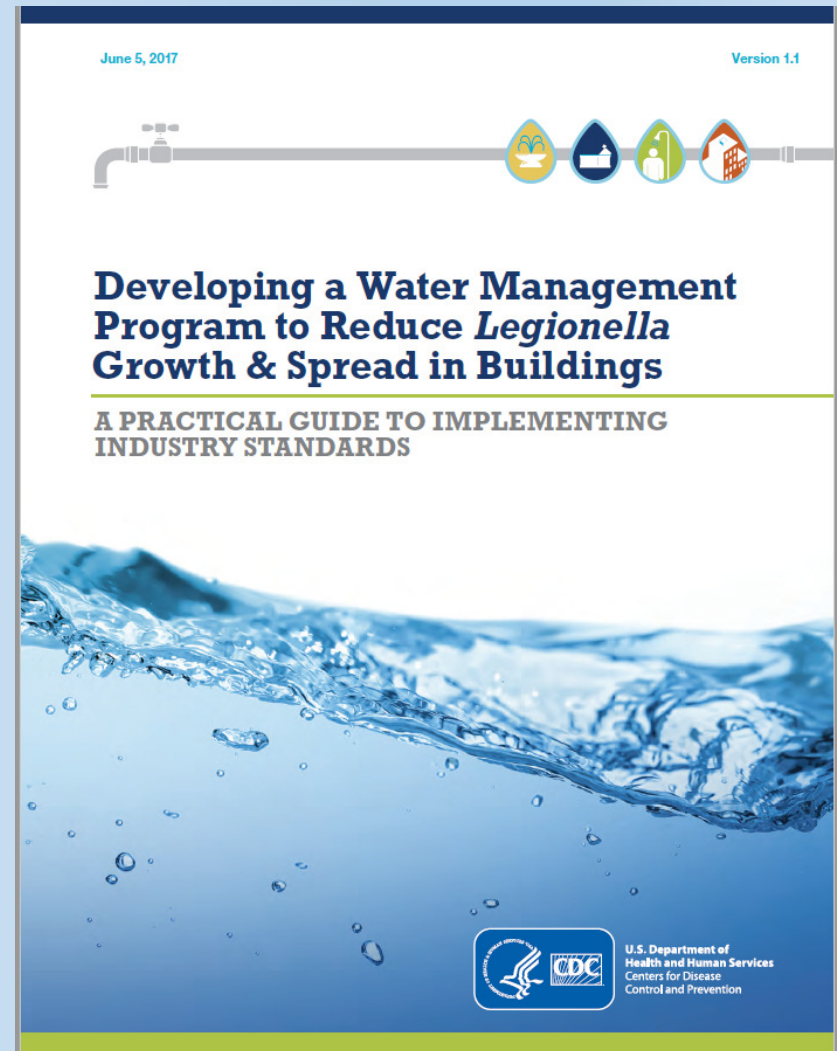
Water Management Program

Tools to guide you

- CDC Toolkit (v. 1.1 - 6/5/2017)

<https://www.cdc.gov/legionella/downloads/toolkit.pdf>

Based upon ASHRAE std. 188: *Legionellosis: Risk Management for Building Water Systems*



Who needs a WMP?

Identifying Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of *Legionella* growth and spread.

If you answer YES to any of questions 1 through 4, you should have a water management program for that building's hot and cold water distribution system.

Healthcare Facilities

Yes ___ No ___ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems[†] or weakened immune systems?

Yes ___ No ___ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?

Yes ___ No ___ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?

Yes ___ No ___ 4. Does your building have more than 10 stories (including basement levels)?

Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for that device.

Yes ___ No ___ 5. Does your building have a cooling tower*?

Yes ___ No ___ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?

Yes ___ No ___ 7. Does your building have a decorative fountain?

Yes ___ No ___ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?

If you answer NO to questions 1 through 8, you should still maintain water systems according to manufacturer recommendations.

On properties with multiple buildings, prioritize buildings that house or treat people who are at increased risk for Legionnaires' disease (see Appendix A to learn who is at increased risk).

The building standards discussed in this toolkit do not apply to single-family or small multiple-family residences (e.g., duplexes), even those with the devices in questions 6 through 8, but residents do need to take steps to protect themselves from waterborne diseases.

Homeowners should follow local and state guidelines for household water use, and owners of the devices in questions 6 through 8 should follow the manufacturer's instructions regarding cleaning, disinfecting, and maintenance.

CMS New Requirement-June 2017

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850



Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C 17-30-*Hospitals/CAHs/NHS*
REVISED 06.09.2017

DATE: June 02, 2017
TO: State Survey Agency Directors
FROM: Director
Survey and Certification Group
SUBJECT: Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease (LD)
****Revised to Clarify Provider Types Affected****

Memorandum Summary

- **Legionella Infections:** The bacterium *Legionella* can cause a serious type of pneumonia called LD in persons at risk. Those at risk include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. Outbreaks have been linked to poorly maintained water systems in buildings with large or complex water systems including hospitals and long-term care facilities. Transmission can occur via aerosols from devices such as showerheads, cooling towers, hot tubs, and decorative fountains.
- **Facility Requirements to Prevent Legionella Infections:** 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.
- *This policy memorandum applies to Hospitals, Critical Access Hospitals (CAHs) and Long-Term Care (LTC). However, this policy memorandum is also intended to provide general awareness for all healthcare organizations.*

- **Facility Requirements to Prevent Legionella Infections:** 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.

Expectations for Healthcare Facilities and Surveyors

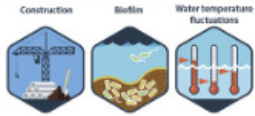

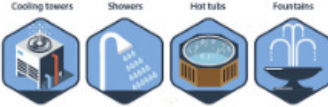
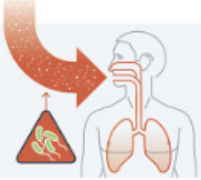
CMS expects Medicare certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in building water systems.


- CMS Surveyors from CT DPH have been instructed to review policies, procedures, & reports documenting water management implementation
- **Conduct risk assessment re: Legionella** & other premise plumbing pathogens
- **Implement a water management program** that considers the ASHRAE industry standard and the CDC toolkit, and includes control measures such as physical controls, temperature management, disinfectant level control, visual inspections, and environmental testing for pathogens.
- **Specify testing protocols and acceptable ranges for control measures, and document the results of testing and corrective actions taken** when control limits are not maintained.

Protect Building Water Systems and People

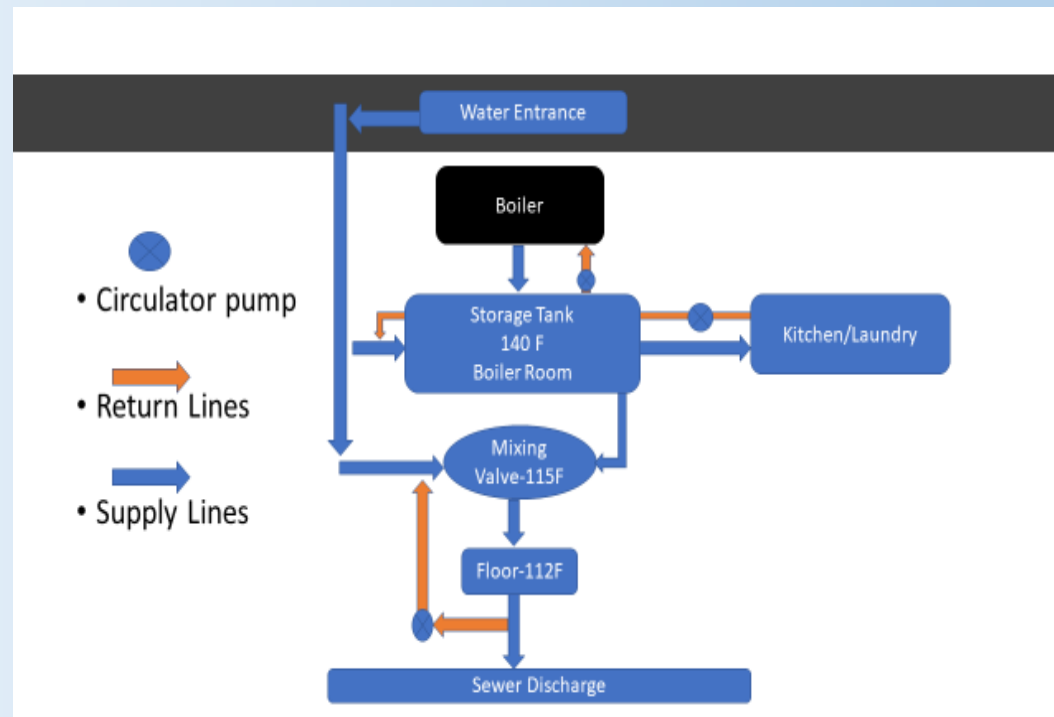
- The goal of a WMP should be to control the conditions inside of plumbing and related equipment to make it unfavorable for Legionella bacteria and other opportunistic premise plumbing pathogens to grow and multiply

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 Legionnaires' disease when they breathe in mist or accidentally swallow water into the lungs containing *Legionella*. 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
06/12/2018

How does the water flow



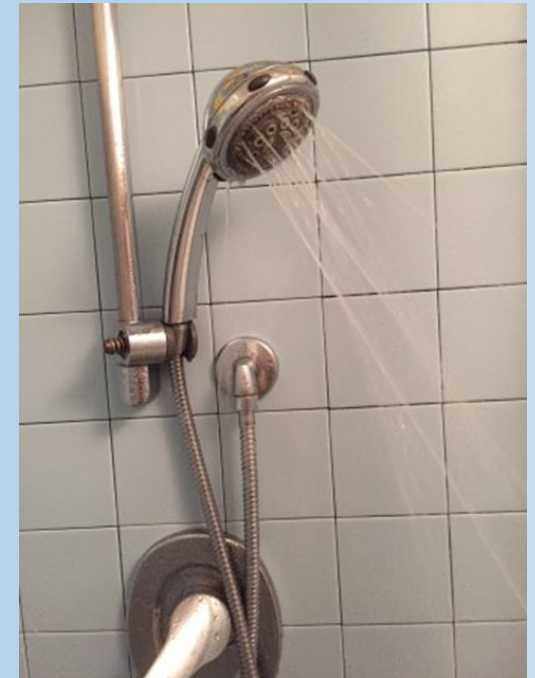
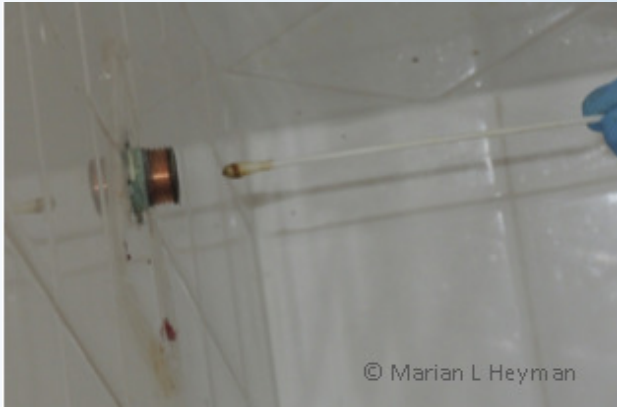
Ice Machines



We want to see this- nice & clean!

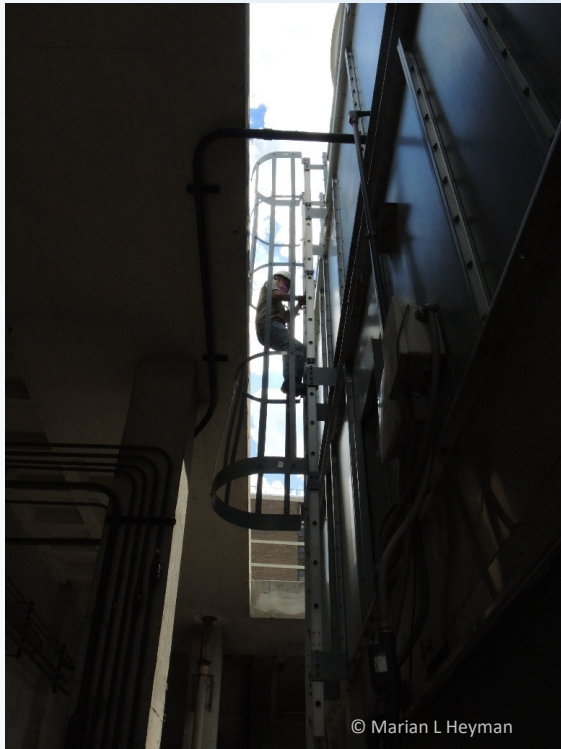


Shower heads, piping



- Sample biofilm inside of shower pipe
- Swab inside shower head for culture.
- For hand-held showers, swab inside of tubing

Cooling Towers



Remember to check the chemical feed stations!

(some of these barrels were not connected to feed dispenser; one barrel was empty)

Surveillance Definitions

- Travel associated Legionnaires' diseases
- Definite healthcare associated Legionnaires' diseases
- Possible healthcare associated Legionnaires' diseases

Travel Associated Legionnaires Diseases Definition

- A travel associated Legionnaires' diseases case is defined as a person who stayed overnight in a accommodation during the 10 days prior to onset of illness

Healthcare Associated Legionnaires' diseases Definitions

- A definite healthcare associated Legionnaires' diseases case is defined as a patient who spent the **entire** 10 days prior to onset of illness in the healthcare facility.
- A possible healthcare associated Legionnaires' diseases case is defined as a patient who spent the **part** of the 10 days prior to onset of illness in the healthcare facility.

Public Health Investigations

Health Care Legionella Investigations

When should we perform a full investigation for the source of *Legionella*?*

- ≥ 1 case of **definite** healthcare-associated Legionnaires' disease
- ≥ 2 cases of **possible** healthcare-associated Legionnaires' disease are identified within 12 months of each other

What is a full investigation

- Epidemiologic Investigation
- Environmental Investigation to look for the source(s)

*Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings. CDC, June 2017. p 23.

Travel-associated investigations

When should we perform a full investigation for the source of *Legionella*?*

- You have identified **two or more cases** of Legionnaires' disease in people who stayed overnight in the same accommodation during the exposure period for Legionnaires' disease

AND

had symptom onsets within 12 months of each other

- You have identified **a single case** following a **previously recognized outbreak** at the **same accommodation**.

What is a full investigation

- Epidemiologic Investigation
- Environmental Investigation to look for the source(s)

Key Elements to an Epidemiologic Investigation

Key elements of a full public health investigation include:

- ◆ 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 definite 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 both 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
- ◆ Performing an environmental assessment to evaluate possible environmental exposures
- ◆ Performing environmental sampling, as indicated by the environmental assessment
- ◆ Decontaminating 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

Key Elements to an Environmental Investigation

Key elements of a full public health investigation include:

- ◆ 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 definite 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 both culture of lower respiratory secretions on selective media and the *Legionella* urinary antigen test
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Sample of a *Legionella* Environmental Assessment Form

Link to the CDC form

<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment.pdf>

CDC Instructional Videos:

<https://www.youtube.com/watch?v=fRnAsRYjis>

Centers for Disease Control and Prevention


Legionella Environmental Assessment Form

HOW TO USE THIS FORM

This form enables public health officials to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of legionellosis. It can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to develop a sampling plan. The assessment should be performed on-site by an epidemiologist and an environmental health specialist with knowledge of the ecology of *Legionella*. Keep in mind that conditions promoting *Legionella* amplification include water stagnation, warm temperatures (77-108°F or 25-42°C), availability of organic matter, and lack of residual disinfectant such as chlorine. For training and information, please visit CDC's legionellosis resources webpage at: <http://www.cdc.gov/legionella/outbreak-toolkit/>.

Complete the form in as much detail as possible. Do not leave sections blank; if a question does not apply, write "N/A". If a question applies but cannot be answered, explain why. Where applicable, specify the units of measurement being used (e.g., ppm). Completion of the form may take several hours.

BEFORE ARRIVING ON SITE



- Request the attendance of the lead facility manager as well as others who have a detailed knowledge of the facility's water systems, such as a facility engineer or industrial hygienist.
- Request that they have maintenance logs and blueprints available for the meeting.
- Bring a plastic bottle, thermometer, pH test kit, and a chlorine test kit that can detect a wide range of residual disinfectant (<1 ppm for potable water and up to 10 ppm for whirlpool spas).
- If the epidemiologic information available suggests a particular source (e.g., whirlpool spa, cooling tower), request that they shut it down (but do not drain or disinfect) in order to stop transmission.

Sample of a *Legionella* Environmental Sampling Protocol

Link to the CDC form

<https://www.cdc.gov/legionella/downloads/cdc-sampling-procedure.pdf>

CDC Instructional Videos:

<https://www.youtube.com/watch?v=xFa2P2rddE>



Centers for Disease Control and Prevention

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:

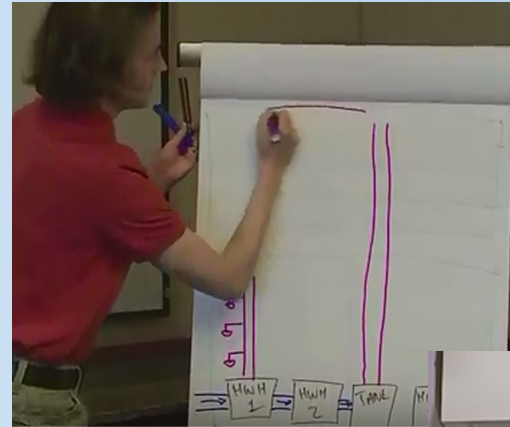
-  **LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM**
-  **SAMPLE DATA SHEET**
-  **LEGIONELLOSIS OUTBREAK INVESTIGATION VIDEOS:**
 - Legionella Ecology and an Introduction to Environmental Health and Engineering*
 - Conducting and Interpreting the Environmental Assessment*
 - How to Make a Sampling Plan*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

How to Collect Environmental Samples for *Legionella*

- The person(s) performing sample collection should be experienced specifically in designing a sampling plan and in sample collection for *Legionella*.

CDC Instructional Videos:

<https://www.cdc.gov/legionella/videos.html>

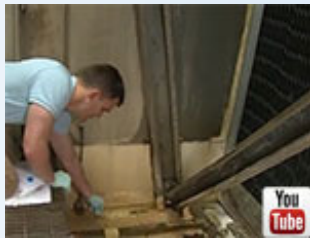


CDC Videos – How to Collect Environmental Samples



[How to Sample Potable Water](#)

Learn CDC's procedure for collecting potable water samples for *Legionella* culture during a cluster or outbreak investigation, or when cases of disease may be associated with a facility.



[How to Sample Cooling Towers](#)

Learn CDC's procedure for collecting environmental samples from a cooling tower for *Legionella* culture during a cluster or outbreak investigation, or when cases of disease may be associated with a facility.



[How to Sample Spas and Fountains](#)

Learn CDC's procedure for collecting environmental samples from spas (hot tubs) and fountains for *Legionella* culture during a cluster or outbreak investigation, or when cases of disease may be associated with a facility.

Environmental Investigations Overview- Big Picture

- **Evaluate bldg. water source, equipment, & process flow**
 - Water source:
 - municipal or private supplier?
 - community well?
 - Facility is its own water supplier (private wells)?
 - Look at equipment and physical plant lay-out
 - Process Flow: How is equipment connected to each other? How do building systems work together (mechanical, plumbing, electrical, etc.)?
- **Evaluate operations, policies, & procedures-** examples of things to look at:
 - Maintenance activities & schedules
 - Monitoring procedures & practices
 - Response to abnormal tests & events
 - Planned and unplanned outages/down time
- **Look at sources & activities outside of the bldg., i.e.:**
 - Construction (indoors and outdoors)
 - Water main breaks
 - Acts of G-d (like catastrophic floods/storms)



Environmental investigations- look for:

Conditions, Objects, and Activities that may lead to exposures that cause disease. **Look both inside and outside of the building.**

Conditions



Steam line rupture (basement)

Objects



Decorative fountain

Activities



Water main break
Jack hammering

Legionnaires' disease can occur in your health care facility!

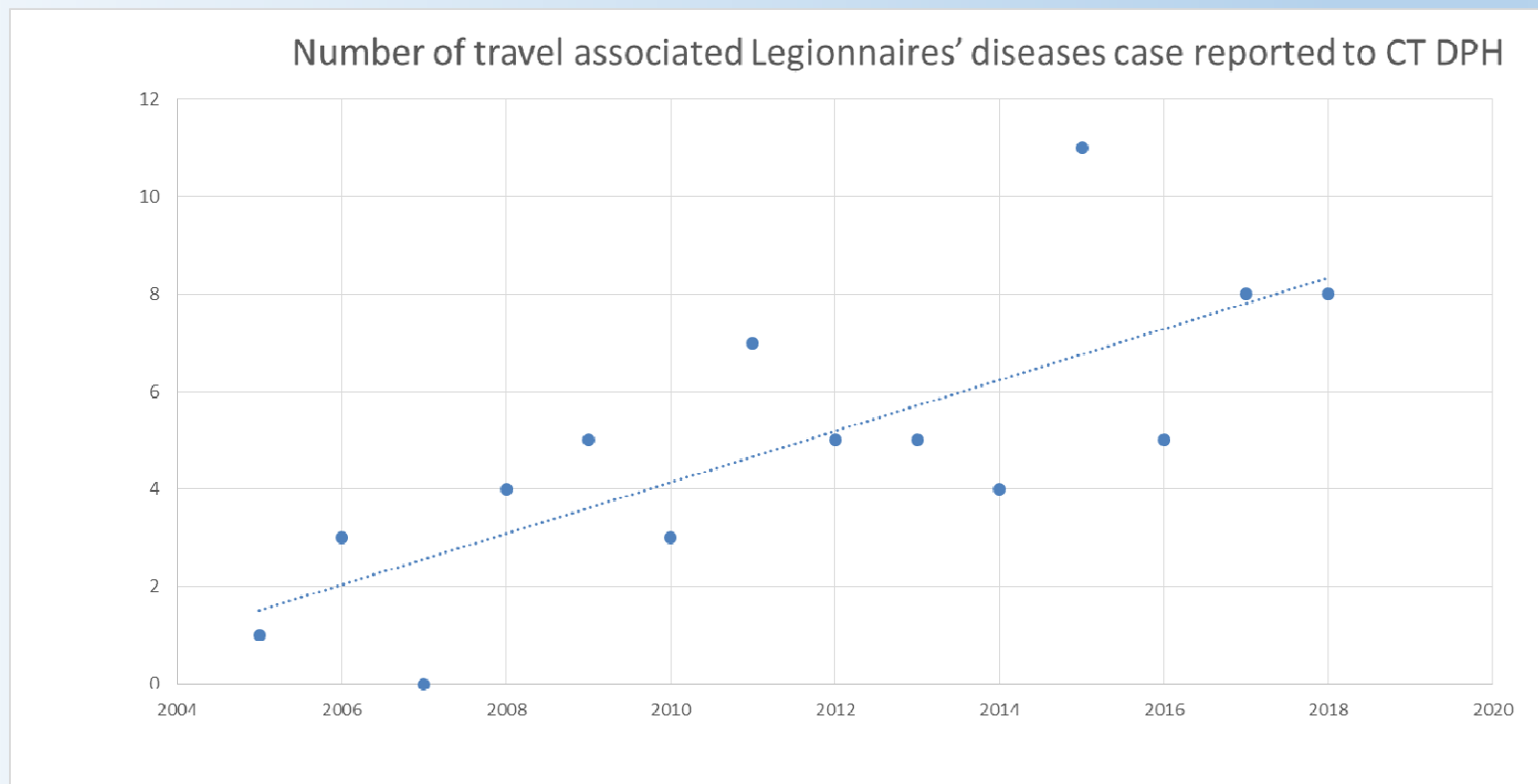
Typical places to look for spread of contaminated water droplets :

- Showerheads and sink faucets
- Hydrotherapy equipment, such as jetted therapy baths
- Respiratory therapy equipment, i.e. CPAP, BiPAP, bronchoscopes
- Ice machines, soda/juice machines
- Cooling towers/evap. condensers
- Decorative fountains and water features (indoors and outdoors)



Final Thoughts

Reports of Travel Associated Legionnaire's disease Cases



Identifying Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of *Legionella* growth and spread.

If you answer YES to any of questions 1 through 4, you should have a water management program for that building's hot and cold water distribution system.

Healthcare Facilities

Yes ___ No ___ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems[†] or weakened immune systems?

Yes ___ No ___ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?

Yes ___ No ___ 3. Does your building have multiple housing units and a centralized hot water system (like a hotel or high-rise apartment complex)?

Yes ___ No ___ 4. Does your building have more than 10 stories (including basement levels)?

Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer NO to all of questions 1 through 4 but YES to any of questions 5 through 8, you should have a water management program for that device.

Yes ___ No ___ 5. Does your building have a cooling tower*?

Yes ___ No ___ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?

Yes ___ No ___ 7. Does your building have a decorative fountain?

Yes ___ No ___ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?

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