

Outbreaks and Surveillance

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Objectives

Learner will be able to...

- **describe reporting requirements to public health.**
- **list the components of an outbreak investigation.**
- **discuss basic principles of epidemiology as related to healthcare associated infection (HAI) surveillance.**



Outbreak Definition

- **Definition of an OUTBREAK (CA Reg. Title 17 & 22)**
- **AFL 23-08**
 - Number of cases indicating an outbreak will vary depending on the organism
 - Above expected baseline
 - A single case of a communicable disease long absent from a population or the first invasion by a disease not previously recognized requires immediate reporting and epidemiologic investigation



Health and Human Services Agency
California Department of Public Health



Gavin Newsom
Governor

AFL 23-08

TOMÁS J. ARAGÓN, M.D., Dr.P.H.
State Public Health Officer & Director

January 18, 2023

TO: General Acute Care Hospitals (GACH)
Skilled Nursing Facilities (SNF)

SUBJECT: Requirements to Report Outbreaks and Unusual Infectious Disease Occurrences
(This AFL supersedes AFL 19-18)

AUTHORITY: Title 42 Code of Federal Regulations (CFR) section 482.42,
Title 17 California Code of Regulations (CCR) sections 2500-2502,
Title 22 CCR sections 70737, 70739, 72523, 72539, and 72541

All Facilities Letter (AFL) Summary

This AFL reminds providers of the requirements to report outbreaks and unusual infectious disease occurrences to the local public health officer and the California Department of Public Health (CDPH) and provides definitions and updated examples of reportable incidents.

Health facilities licensed by CDPH Licensing and Certification (L&C) are required to report outbreaks and unusual infectious disease occurrences to the local public health officer and their respective District Office (DO). To account for changes in the local epidemiology of some multidrug-resistant organisms (MDRO), this AFL revises examples of incidents that should be reported relative to the usual frequency of the MDRO in the same facility, region or local health jurisdiction (LHJ). Facilities should consult with their LHJ for information about the local epidemiology of a given MDRO to determine whether incidents should be reported. In addition, this AFL refers to recommended pathogen-specific outbreak reporting thresholds, definitions and other resources provided by the Council for Outbreak Response – Healthcare-Associated Infections and Antimicrobial Resistance (CORHA), where available.



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Related Definitions

Unusual Diseases

- A rare disease or newly apparent or emerging disease
- Syndrome of uncertain etiology which a health care provider has reason to believe could possibly be caused by a transmissible infectious agent or microbial toxin

Unusual Occurrences

- Occurrences such as epidemic outbreak, poisonings, fires, major accidents, death from unnatural causes or other catastrophes
- Unusual occurrences which threaten the welfare, safety or health of residents, personnel or visitors

Reporting

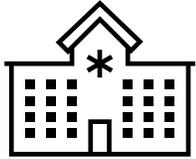
Health facilities licensed by CDPH Licensing and Certification (L&C) are required to report outbreaks and unusual infectious disease occurrences

IMPORTANT:

Facilities should report suspect cluster/outbreaks even when laboratory testing are pending



Who to Report to:



County will gather outbreak information and provide recommendations
HAI IP Team



CDPH L&C district office determines regulatory follow-up actions



How to Report to the County of San Diego

All reportable conditions can be found at www.SDEpi.org

- HAI IP Team: PHS.HAI.HHSA@sdcounty.ca.gov

- Epidemiology Unit by phone - **(619) 692-8499**
- After hours Urgent reporting - **(858) 565-5255**
- Outbreak reporting - PHS.OutbreakReporting.HHSA@sdcounty.ca.gov
- Fax reporting - **(858) 715-6458**



Outbreak Detection

Many ways outbreaks are detected:



Hospitals/ERs



Laboratories



Local facility partners



Animal Health



Surveillance
(State/Local)
Bodies of authority

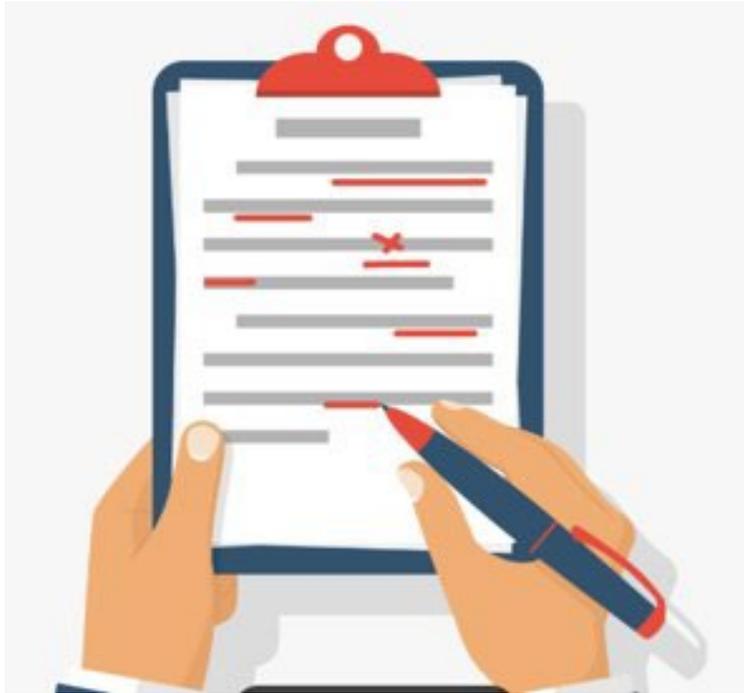


Environmental



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Pro Tip: Document Everything



Stay organized!
What to document
Dates/Times
Meetings
Case Logs

**DOCUMENT IT,
OR IT
DIDN'T HAPPEN**

Healthcare Facility Outbreak Investigation Steps



- Step 1: Confirming diagnosis
- Step 2: Determine existence of outbreak
- Step 3: Alert key partners
- Step 4: Identify and count cases
- Step 5: Organize data (Linelist)
- Step 6: Gather data (Observations)
- Step 7: Formulate and test hypothesis
- Step 8: Implement control measures
- Step 9: Follow-up
- Step 10: Communicate findings

Step 1: Confirm Diagnosis

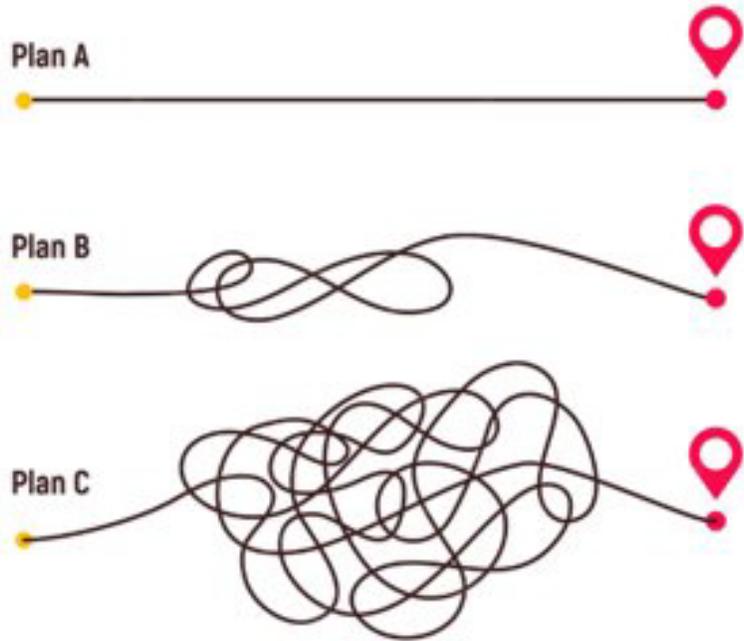


Verify that diagnoses for the disease, pathogen or infection are accurate

Consider:

- Specimen collection
- Repeat tests
- Laboratory Errors
- Surveillance definitions

Step 2: Determine Outbreak



Confirm the existence of an outbreak and which path to take

Considerations to rule out false problems

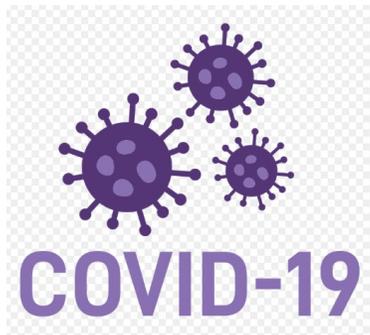
- Pseudo-outbreaks
- Use time frames
- Limitations
- Community levels
- Calculating occurrence rates, percent positivity, etc.

Outbreak Definition - Why



- **Identify cases consistently**
- **Track trends accurately**
- **Implement the right control measures**
- **Determine when the outbreak is over**
- **Prevent severe outcomes**

Outbreak Definition - Example



≥ 2 cases of suspect*, probable or confirmed COVID-19 among residents with epi-linkage

OR

≥ 2 cases of suspect*, probable or confirmed COVID-19 among HCP **and** ≥ 1 cases of suspect*, probable or confirmed COVID-19 among residents, with epi-linkage, and no other sources for at least one case

Outbreak Definition - Example



Scabies

Two or more confirmed cases or 1 confirmed case and at least 2 suspect cases occurring among patients/residents, HCP, volunteers, or visitors during a 6-week period

Outbreak Definition – Example

GI



Two or more epidemiologically-linked cases of new onset vomiting and/or diarrhea within a 1–2-day period

Step 3: Alert Key Partners

WHO?

- Administration
- Staff
- Residents
- Public Health
- CDPH L&C district office



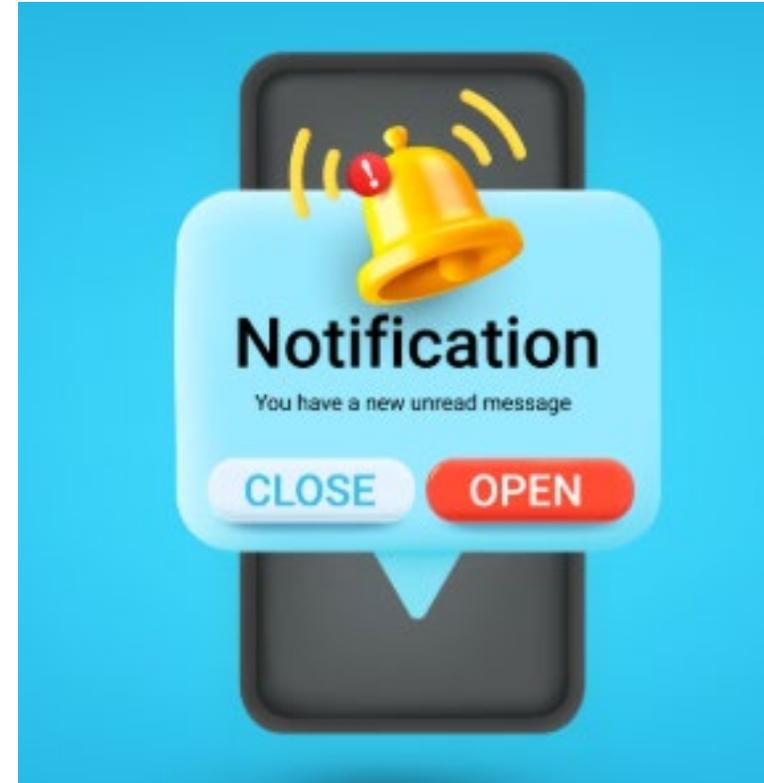
HOW?

- Meetings
 - Emails
- Morning Huddles
 - Data
- Signage



Resident Notification

- Increase Transparency
- Signage
- Exposure Risk
- Signs and Symptoms
- Follow Up Testing
- Treatment



Step 4: Identify and count cases

Identify as many cases as possible!



Define:

- **Timeframe** (*incubation period, latency*)
- **Confirmed/Suspect Cases** (*symptoms, tested*)
- **Exposed/Unexposed** (*whole facility, wing*)
- **Epi-linkage**

Public Health Sources! Minimizes bias

What is Epi Linkage?

Resident Epi-Linkage

- Same unit or ward
- Shared care location (e.g., therapy, radiology)
- Shared HCP within 7 days

HCP Epi-Linkage

- Within 6 feet for ≥ 15 minutes
- Same unit or shift
- No more likely outside exposure

Determining epi-linkage requires clinical and epidemiologic judgment.



Step 5: Organize data (Case Log)



	A	B	C	D	E	F
1	Last Name	First Name	DOB	Position at Facility	Building (Number, "A","B")	Exposure Date
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

- Identify and sort Staff/Residents/Visitors
- Demographic information
- Exposure information
- Past medical history
- Test type (if completed)
- Follow up (if indicated)
- Case definition (PH use)

Step 5: Organize Data (For What?)

Age group	Males		Females		Total	
	Pos/Exam	Prevalence %	Pos/Exam	Prevalence %	Pos/Exam	Prevalence %
Pauni River						
2-9	0/14	0	0/14	0	0/28	0
10-18	2/17	11.76	2/24	8.33	4/41	9.76
19-27	5/22	22.73	1/21	4.76	6/43	13.95
28-37	7/11	63.66	4/11	36.36	11/22	50.00
38-47	6/10	60.00	3/9	33.33	9/19	47.37
48-57	0/4	0	3/6	50.00	3/10	30.00
58-67	5/7	71.43	2/3	66.67	7/10	70.00
≥ 68	3/3	100.00	1/1	100.00	4/4	100.00
Total	28/88	31.82	16/89	17.98	44/177	24.86
Purus River						
2-9	2/82	2.44	3/83	3.61	5/165	3.03
10-18	12/101	11.88	12/113	10.62	24/214	19.51
19-27	16/59	27.12	5/60	8.33	21/119	17.65
28-37	22/45	48.89	13/37	35.13	35/82	42.68
38-47	25/37	67.57	14/30	46.67	39/67	58.21
48-57	16/24	66.67	11/20	55.00	27/44	61.36
58-67	8/13	61.54	7/11	63.64	15/24	62.50
≥ 68	12/18	66.66	5/11	45.45	17/29	58.62
Total	113/379	29.82	70/365	19.18	183/744	24.60

Affected Groups

- Residents vs Staff
- Unit or Wing
- Age group or gender

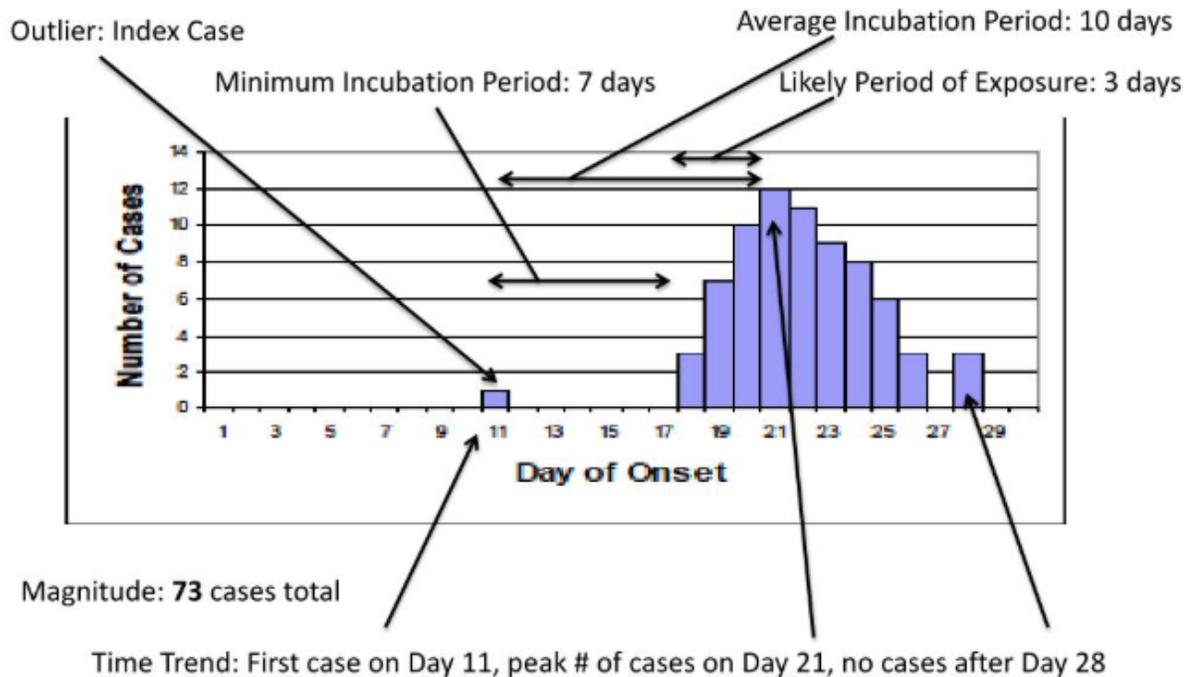
Population at Risk

- Who was exposed?
- How large is the denominator?

Vulnerabilities

- Shared staff?
- Shared location?
- Process gaps?

Step 5: Organize data (Case Log)



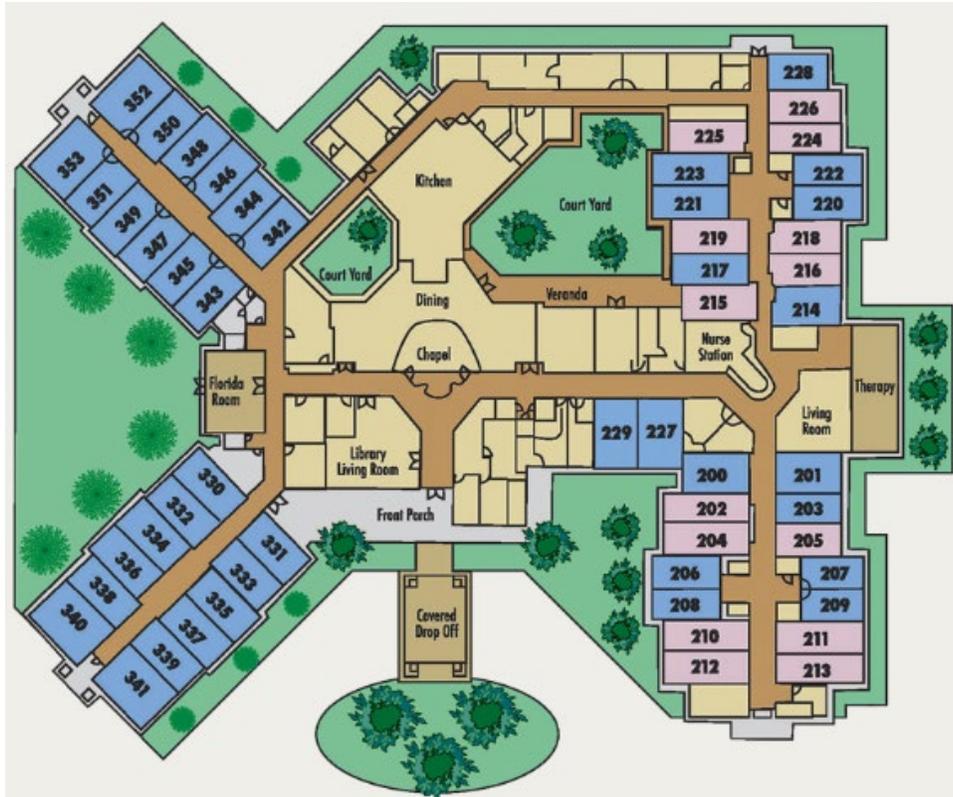
What an Epi Curve Shows:

- Onset date of each case
- Magnitude (total number of cases)
- Shape of transmission pattern
- Direction of the outbreak (increasing or declining)

Look for:

- Point-source vs propagated spread
- Ongoing transmission
- Effect of control measures

Step 5: Facility Map



Why Map Cases?

- Identify clustering by unit or room
- Detect shared pathways (therapy, dining, staff flow)
- Visualize transmission patterns
- Guide cohorting decisions

Step 6: Gather Data (Observations)



- Targeted Infection control rounding
- Observations: HH, PPE use, signage, Medication prep, EVS terminal cleans, respiratory practices
- Staff interviews

Considerations:

- Transmission Type
- Exposure

Step 7: Formulate and test hypothesis



**Develop
Hypothesis**

A hypothesis is a working explanation

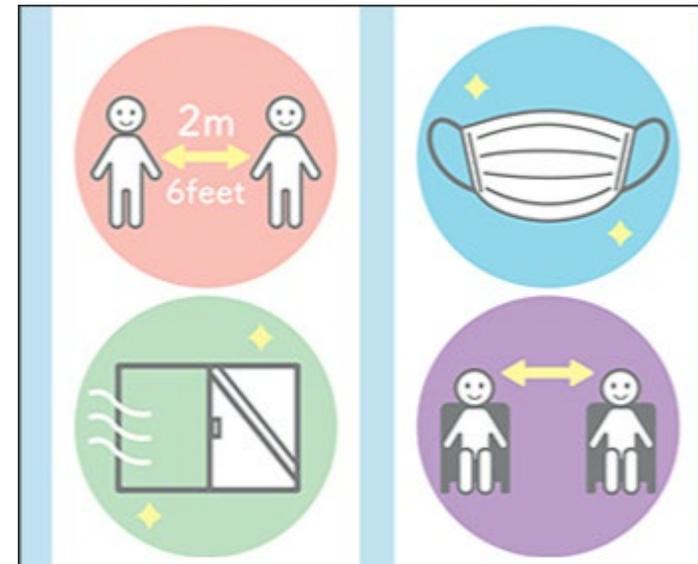
- Why are people getting sick?
- Reasons
- Why is transmission occurring?

Step 8: Implement Control Measures



- Vaccination or PEP
- Transfer facilities
- Closing a unit or facility

- Isolation and room placement
- Restricting Visitors
- Environmental control measures
- Increase ventilation



Step 9: Follow-up



- Evaluate impact:
 - Have infections decreased?
 - Are control measures effective?
- Routine data collection
- Surveillance plan
 - assessing adherence
- Resources
- Improvement Plan

Step 10: Communicate



- Conclusions:
 - Transmission source/Pathogen
 - Date started? Outbreak ended?
- Outcomes:
 - What control measures were the most effective?
 - Impact on residents/how many cases
- Lessons Learned:
 - What worked? What gaps were identified?
- Future Planning:
 - Training opportunities
 - Resource allocation

CDPH Outbreak Resources

Infection Prevention Surveillance Plan Essentials for Long-Term Care



CDPH Outbreak Resources

Outbreak guidance for	Resource type
<i>Candida auris</i>	Quicksheet (PDF)
Carbapenem resistant Enterobacteriaceae (CRE)	Quicksheet (PDF), Slides (PDF), Webinar_Recording
<i>Clostridioides difficile</i> infection (CDI)	Quicksheet (PDF), Slides (PDF), Webinar_Recording
Healthcare-associated Acute Viral Hepatitis	Quicksheet_(PDF), Slides (PDF), Webinar_Recording
Healthcare-associated Legionnaires' Disease	Quicksheet (PDF), Slides, Webinar Recording
Influenza and Other Respiratory Illness Outbreak	Quicksheet (PDF) Skilled Nursing Facilities annual guidance (PDF)
All outbreak types	Outbreak Line List (EXCEL)



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Legionella



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History of Legionella



- American Legion convention at the Bellevue-Stratford Hotel in Philadelphia in 1979.
- More than 200 attendees got sick with a mysterious illness, and 34 people died.
- Hotel's air conditioning system and spread through contaminated water droplets in the air.



Notable outbreaks

1. Los Angeles VA Hospital (1981)

At least 250 patients, visitors, and employees became ill. The bacteria were found in the hospital's drinking water and the water used for bathing and other patient care activities.

2. Bogalusa, Louisiana (1989)

33 patients were hospitalized with severe pneumonia-like symptoms. The bacteria were growing in the stagnant water of the facility's plumbing system.

3. Stafford District Hospital, UK (1985)

175 cases and 28 deaths. Hospital's air-conditioning cooling tower located on the hospital's roof, circulated water that was not treated properly



Organisms Found in Healthcare Facility Plumbing

Opportunistic Pathogens of Premise Plumbing

Gram negative bacteria

- *Pseudomonas aeruginosa*
- *Pseudomonas putida*-*P. fluorescens*
- *Burkholderia cepacia* complex (*B. cenocepacia*, *B. cenocepacia*, at least 8 other genera/species)
- *Cupriavidus (Ralstonia) pauculus*
- *Herbaspirillum*
- *Methylobacterium* spp
- *Ralstonia pickettii*, *Ralstonia mannitolilytica*
- *Sphingomonas* (*S. dimobills*, *Sphingomonas* spp)
- *Acetivibrio* (*A. succiniflavus*, *S. succiniflavus*)
- *Indoplanomonas* (*I. nitrospilla*)
- *Neisseria* (*N. meningitidis*, *N. meningitidis*)
- *Neisseria baumannii* complex, *A. calcoaceticus*
- *Alcaligenes xyloxydans*, *A. faecalis*
- *Aeromonas hydrophila*, *Aeromonas* spp
- *Elizabethkingia* (*E. meningoseptica*)
- *Legionella* (*L. pneumophila*)

Other bacteria/actinomycetes

- *Microbacterium* spp
- *Tetrasphaera* spp

- *Rhodococcus equi*, *Rhodococcus* spp
- *Gordoniae* spp

Fungi

- Yeasts (eg. *Candida parapsilosis*, *C. tropicalis*)
- *Aspergillus* (*A. fumigatus*, *A. niger*)

- *Fusarium* spp
- *Exophiala* spp

Protozoa

- *Acanthamoeba* spp
- *Vermamoeba vermiformis*
- *Naegleria* spp

Non-fecal coliforms

- *Enterobacter cloacae*
- *Klebsiella* spp
- *Pantoea agglomerans*

- *Rahnella aquatilis*
- *Serratia liquefaciens*, *Serratia marcescens*

Nontuberculous mycobacteria (NTM or Environmental Mycobacteria)

- *Mycobacterium abscessus* clade (*M. abscessus*, *M. boletii*, *M. massiliense*)
- *M. chelonae*
- *M. mucogenicum* clade (*M. mucogenicum*, *M. phociaeum*)
- *M. fortuitum* clade (*M. fortuitum*, *M. cosmeticum*, *mageritense*, *M. porcinum*, *M. septicum*)
- *M. immunogenium*
- *M. smegmatis* clade (*M. goodii*, *M. wolinskyi*)
- *M. aurum*
- *M. simiae*
- *M. avium* complex (*M. avium*, *M. intracellulare*, *M. chimera*, *M. avium* ss *hominissuis*, *M. abscessus*)
- *M. scrofulaceum*, *M. calcoaceticus*
- *M. parascrofulaceum*
- *M. xenopi*
- *M. arupense*
- *M. kansasii*
- *M. neoaurum*
- *M. nonchromogenicum* clade (*M. nonchromogenicum*, *M. triviale*, *M. terrae*)
- *M. gordonae* (only among patients with severe immune deficiency)

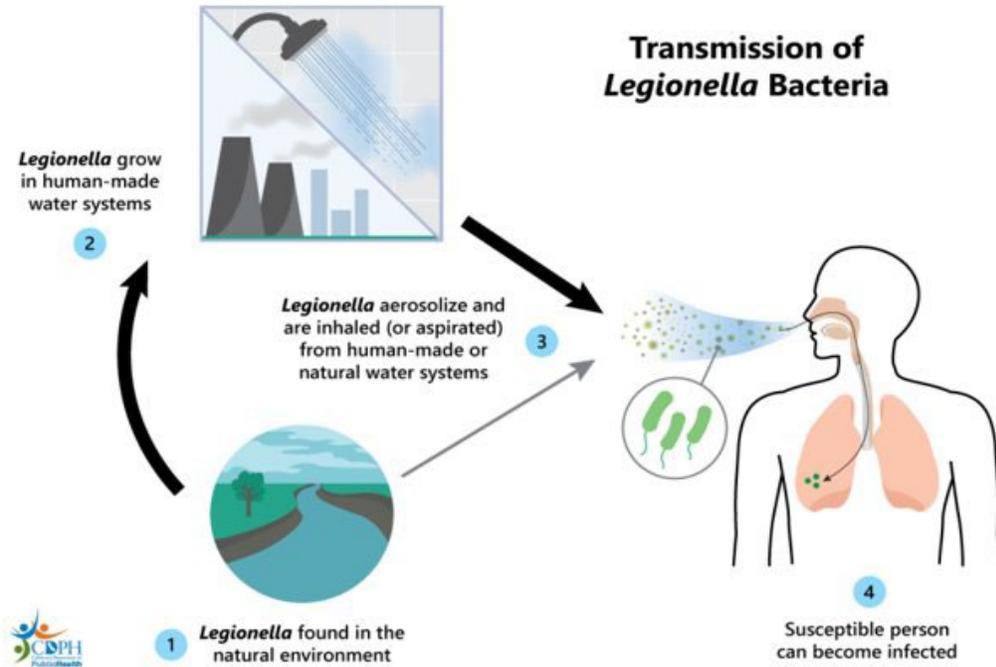
47 different organisms can be found in drinking water

Reduce Risk to Patients from Plumbing

(www.cdc.gov/hai/prevent/environment/water.html)



At Risk



- Immunosuppressed
- Age >50 years
- Cancer
- Current or former smokers
- Chronic lung diseases
- Underlying kidney or liver failure
- Diabetes

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

For those who get Legionnaires' disease during a stay in a healthcare facility, about 1 out of every 4 will die.

[About Legionnaires' Disease](#) | [Legionella](#) | [CDC](#)

Legionella Case



Pontiac Fever

- Influenza-like illness
- Incubation period usually 24-48 hours

Legionnaires' Disease

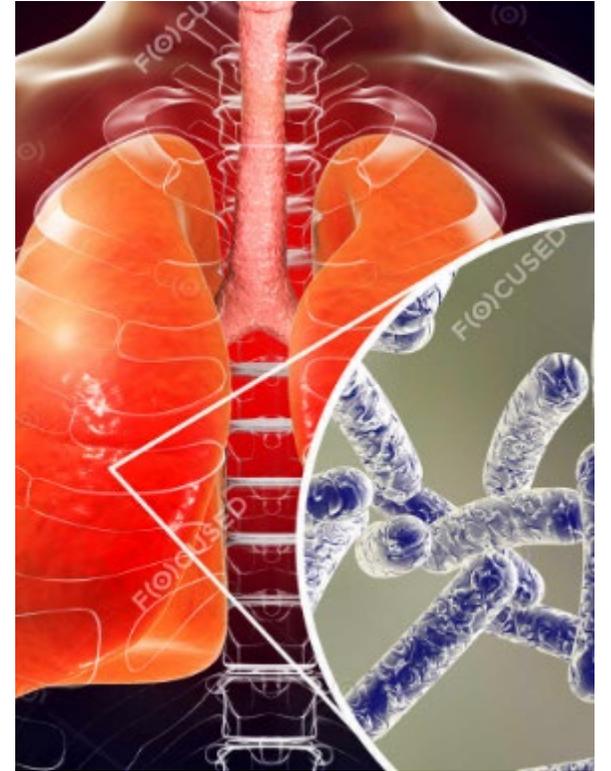
- Pneumonia
 - Incubation period 2-14 days (5-6 days)
 - Mortality: 8% (range 5-30%)
- **Extrapulmonary Legionellosis can occur**

Clinical Definition

Healthcare-Associated Legionnaires' Disease (CSTE Definition)

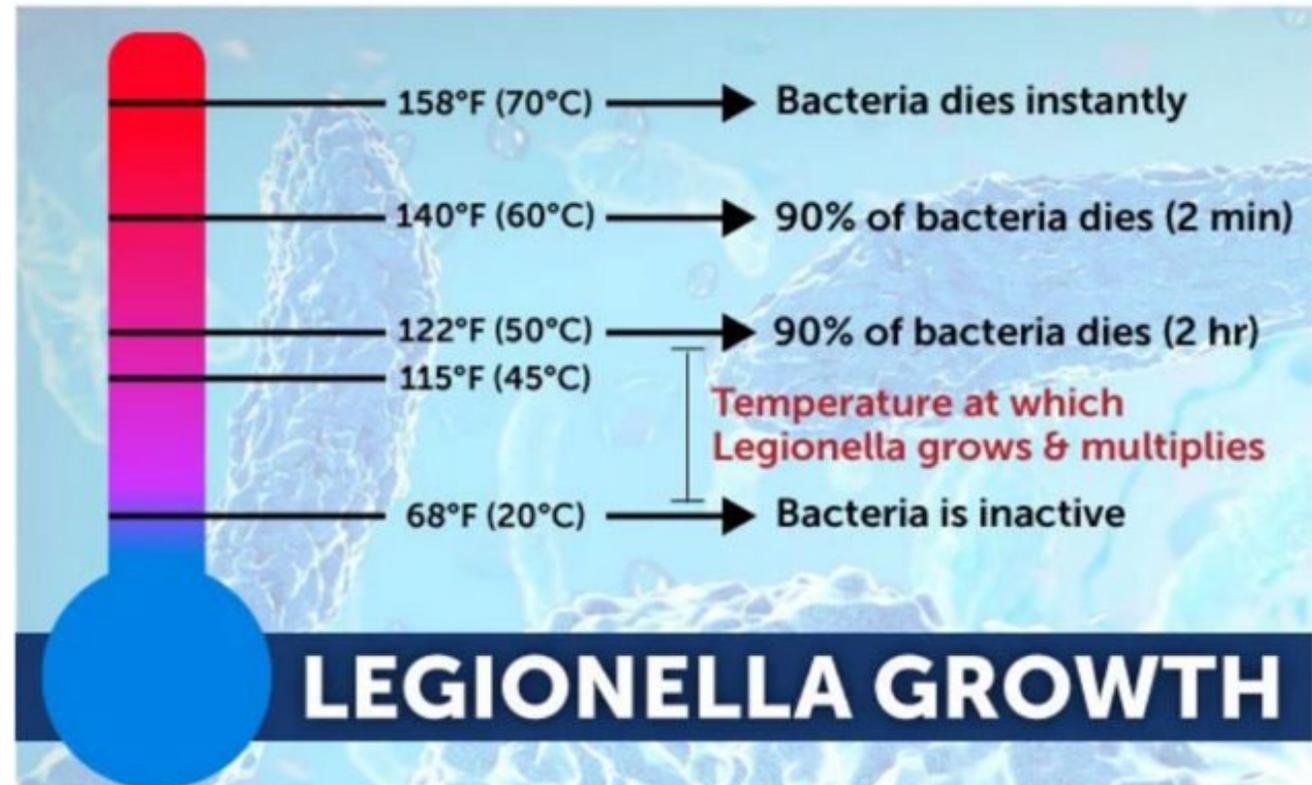
A case of LD is considered **healthcare-associated** if the patient had exposure to a healthcare facility during the **10 days prior to symptom onset**, and meets one of the following criteria:

- **Definite Healthcare-Associated**
 - The patient was continuously admitted to a healthcare facility for the **entire 10 days before symptom onset**.
- **Possible Healthcare-Associated**
 - The patient had exposure to a healthcare facility for **any portion of the 10 days prior to symptom onset**, but was not continuously hospitalized for all 10 days.



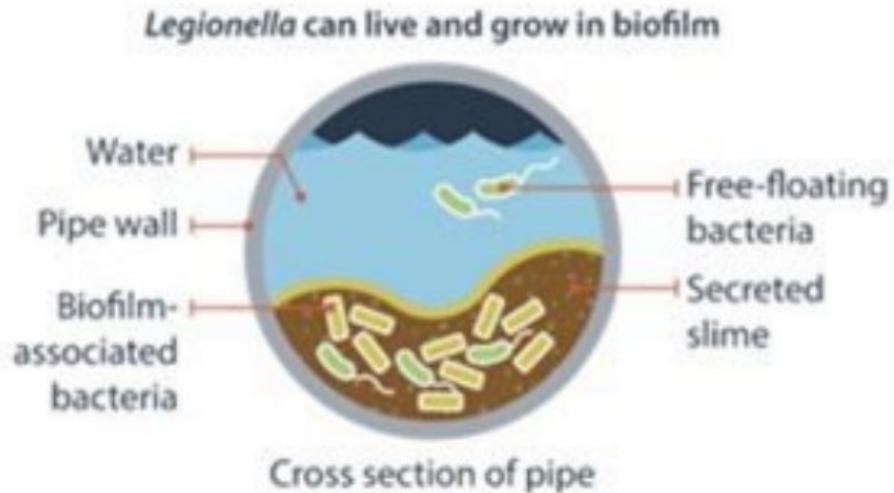
Legionella

- Grows best in warm water (77–113°F / 25–45°C)
- Killed at higher sustained temperatures
- pH important



Facility & Water Challenges

- Biofilm
 - is a slimy layer that forms inside pipes and fixtures
 - Protects from heat and disinfectants
- Scale and sediment
- Water pressure changes
- Construction
 - Dead legs



Where does it live? - Healthcare

Healthcare facilities are higher risk environments because residents are more vulnerable, and plumbing systems are complex. If water sits in that temperature range without movement, bacteria can multiply.

- Showers and showerheads
- Faucets and sink aerators
- Ice machines
- Water heaters & storage tanks
- Unused rooms or low-flow fixtures



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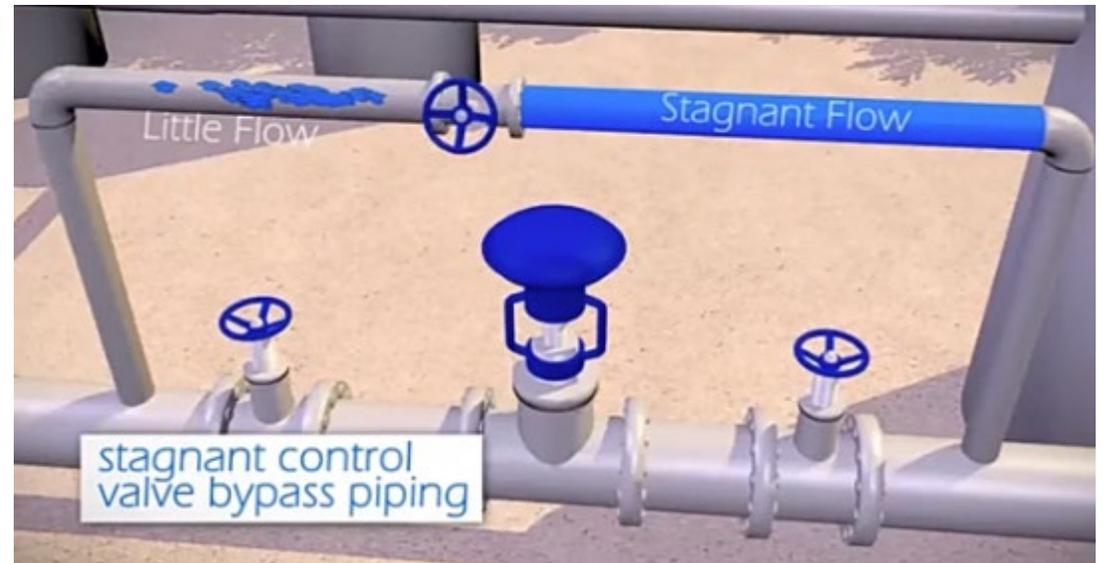
What are 'Dead Legs'?

A Hidden Risk in Plumbing Systems

- A section of pipe with little or no water flow

Frequently found in:

- Closed or unused rooms
- Capped or abandoned pipe sections
- Unit closures
- Low-use fixtures

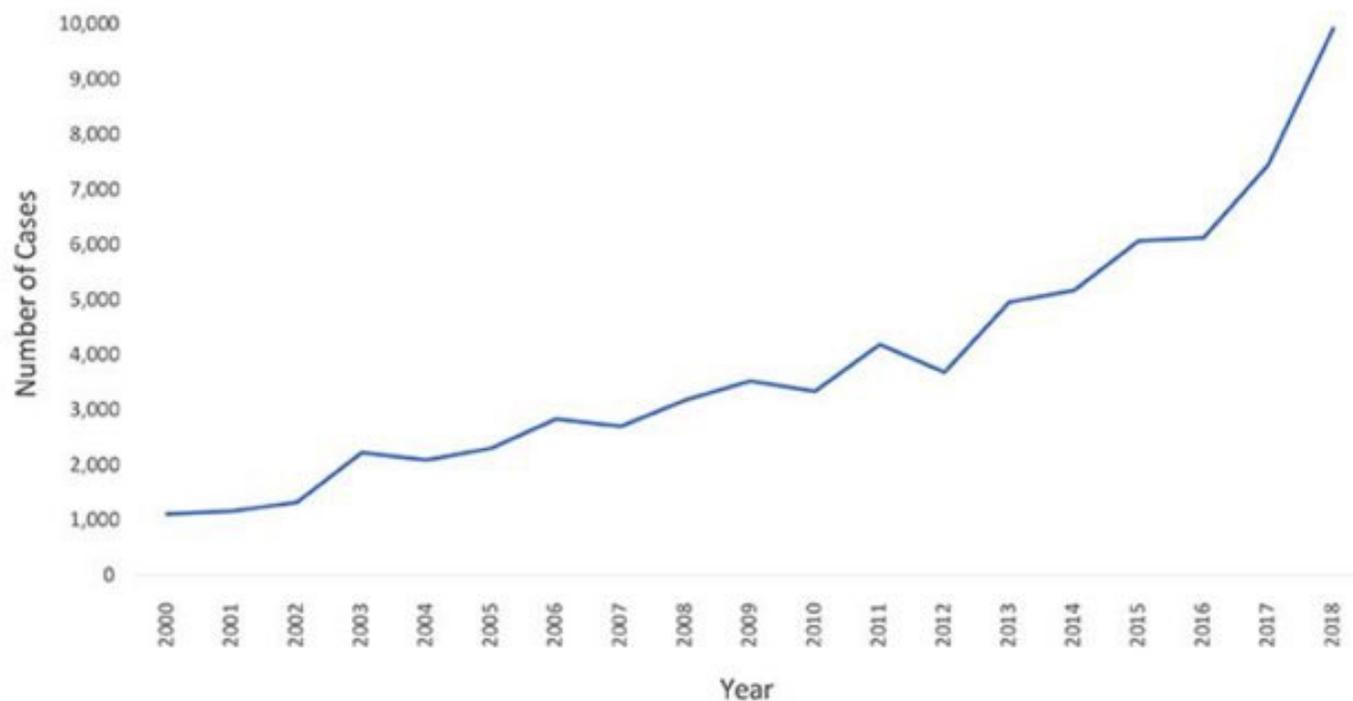


What are 'Dead Legs'?



Legionella Data

Legionnaires' disease is on the rise in the United States
2000-2018



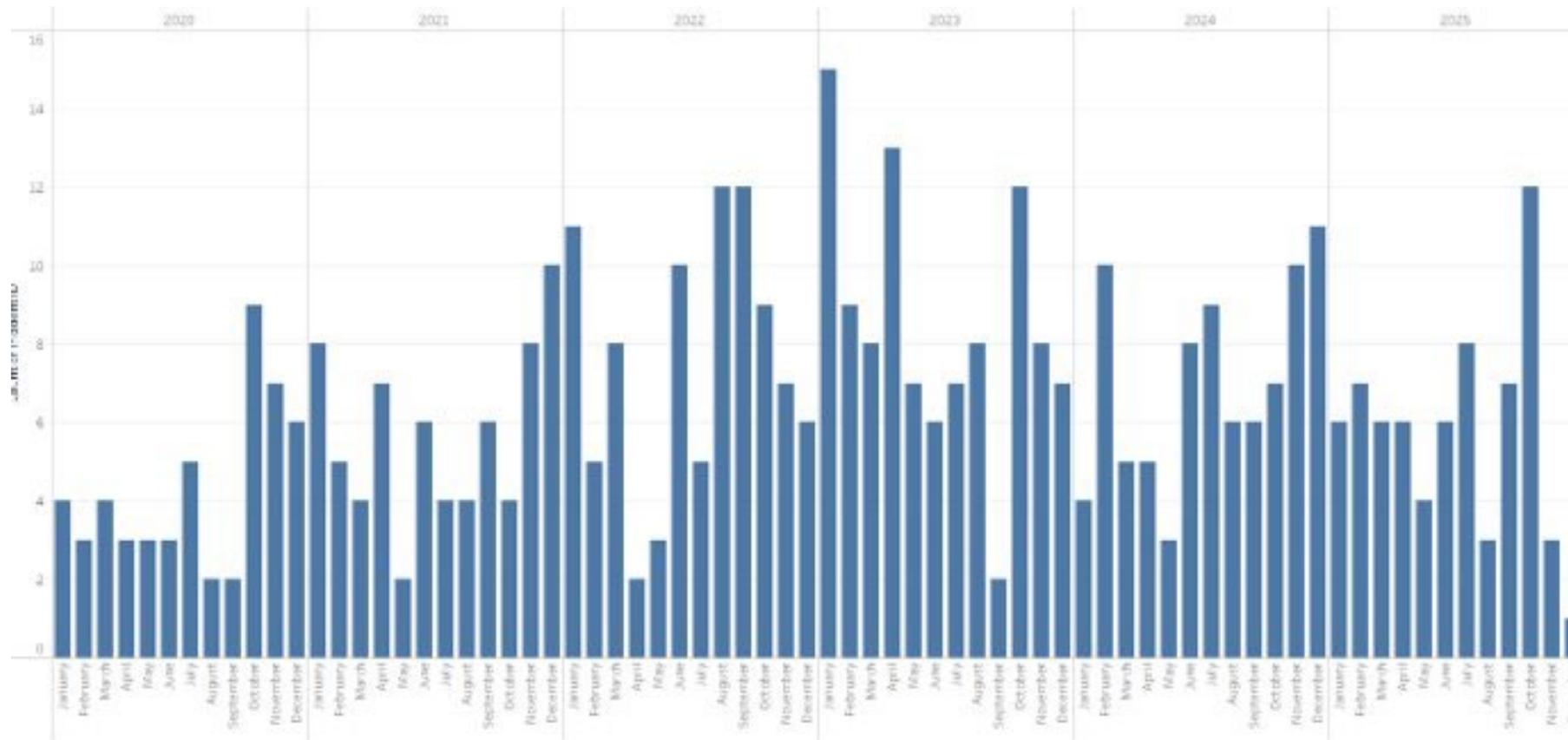
Source: Nationally Notifiable Diseases Surveillance System

[Legionnaires Disease and Pontiac Fever | CDC
\(www.cdc.gov/legionella/index.html\)](http://www.cdc.gov/legionella/index.html)



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San Diego Legionella Data (2020-2025)



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Facility Requirements



Health and Human Services Agency
California Department of Public Health

KAREN L. SMITH, MD, MPH
Director and State Public Health Officer

September 17, 2018

TO: All Facilities

SUBJECT: Reducing Legionella Risks in Health Care Facility Water Systems

AUTHORITY: Title 42 Code of Federal Regulations sections 482.42, 483.80, and 485.635



EDMUND G. BROWN JR.
Governor

AFL 18-39

All Facilities Letter (AFL) Summary

- This AFL notifies hospitals, critical access hospitals (CAHs), and skilled nursing facilities (SNFs) of the requirement to reduce the risks of Legionella in facility water systems, per the Centers for Medicare and Medicaid Services (CMS), [Quality, Safety, and Oversight \(QSO\) 17-30](#) memorandum.
- Hospitals, CAHs and SNFs 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.
- Although [QSO 17-30](#) applies to hospitals, CAHs, and SNFs, the memorandum is also intended to provide general awareness for all health care providers.

Background

Legionnaires' disease, a serious type of pneumonia, can occur in persons who inhale aerosolized droplets of water contaminated with the bacterium Legionella. Legionella can also cause a milder influenza-like illness called Pontiac fever. Those who are at risk for Legionnaires' disease include persons who are at least 50 years old, smokers, or those with underlying medical conditions such as chronic lung disease or immunosuppression. The rate of reported cases of legionellosis, which comprises both Legionnaires' disease and Pontiac fever, has increased 286% in the United States from 2000 to 2014.

Federal Requirement (CMS)

- Develop and implement policies to reduce microbial growth in building water systems
- Maintain a Water Management Program (WMP)
- Document monitoring and corrective actions

California Requirement (CDPH – AFL 18-29)

- Conduct a Legionella risk assessment
- Develop and implement a Water Management Program
- Establish control measures and testing protocols
- Comply with federal, state, and local regulations

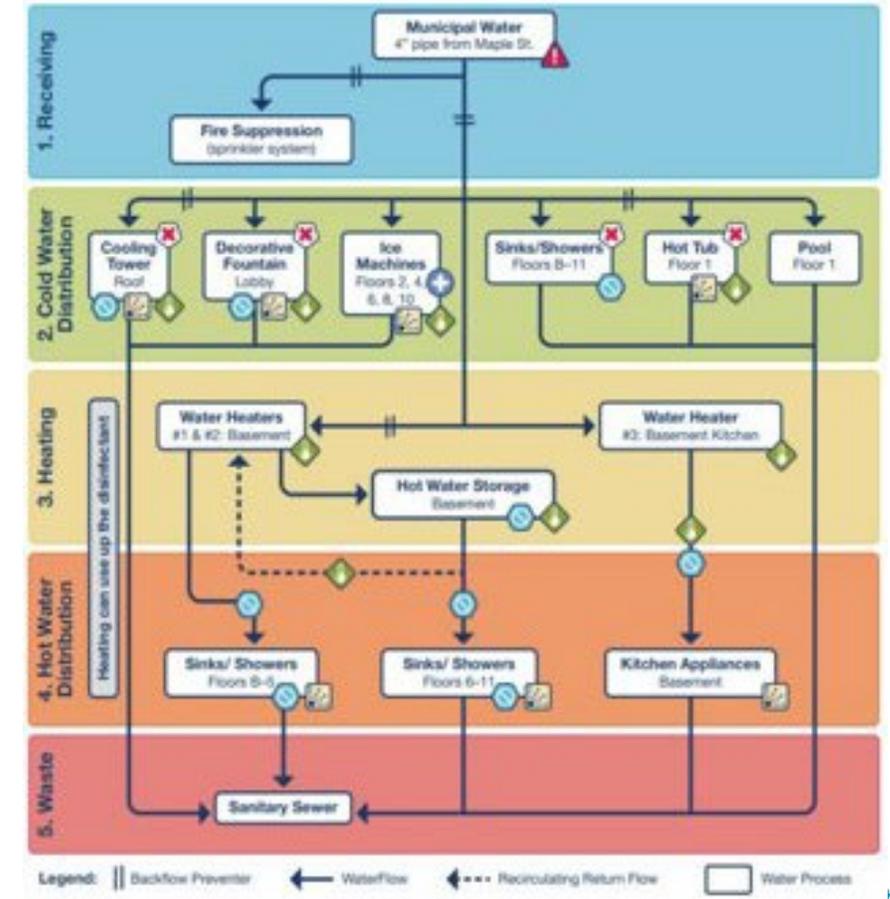
Follow Industry Standards

- ASHRAE 188 framework



Legionella Water Management Program (WMP)

- Establish a WMP team
- Include infection prevention, facilities management, infectious disease clinician, risk and quality management
- Describe the building water systems
- Develop text and flow diagrams
- Identify areas where Legionella could grow and spread



LG Outbreak Example (Steps 1-5):

1. Confirm Diagnosis:
Positive UA antigen, PNA or CXR

2. Determine Outbreak: No clear community exposure

3. Define the Case: Onset timing aligned with facility stay; case definitions

4. Identify & Count Cases: Active case finding, review logs, admissions

5. Organize Data/Document: case log, water management

LG Outbreak Example (Steps 6-10):

6. Gather Observations:
Construction review, Plumbing changes

7. Form Hypothesis:
Faucets/showers affected by recent construction

8. Implement Control Measures:
Restrict high-risk fixtures, temperature/disinfectant verification

9. Follow-Up:
Ongoing surveillance, monitor pneumonia cases, reassess water parameters

10. Communicate:
Public health, internal leadership updates, & lessons learned

Outbreak Detection Control Measures

Restricting
showers: Bed
baths

Restrict
drinking
water:
Bottled only

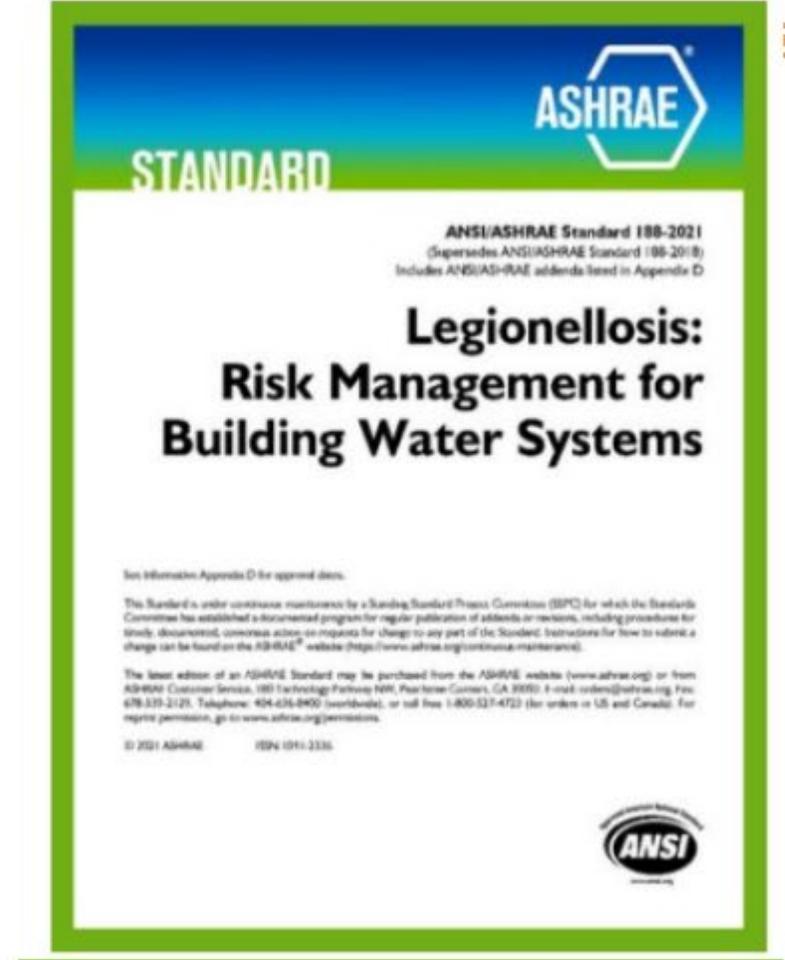
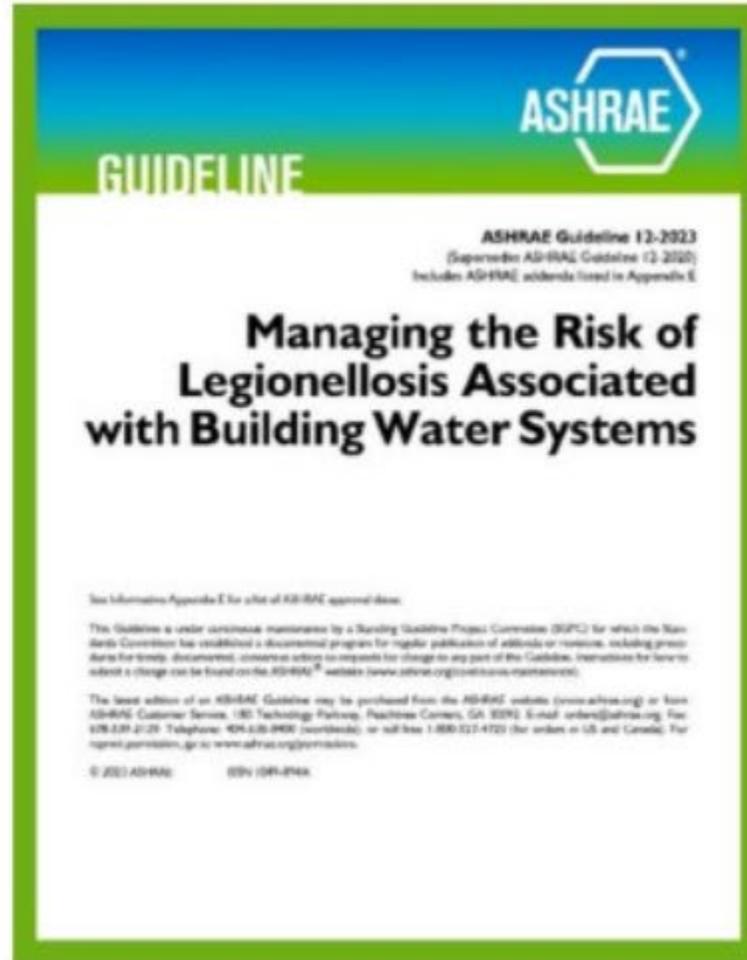
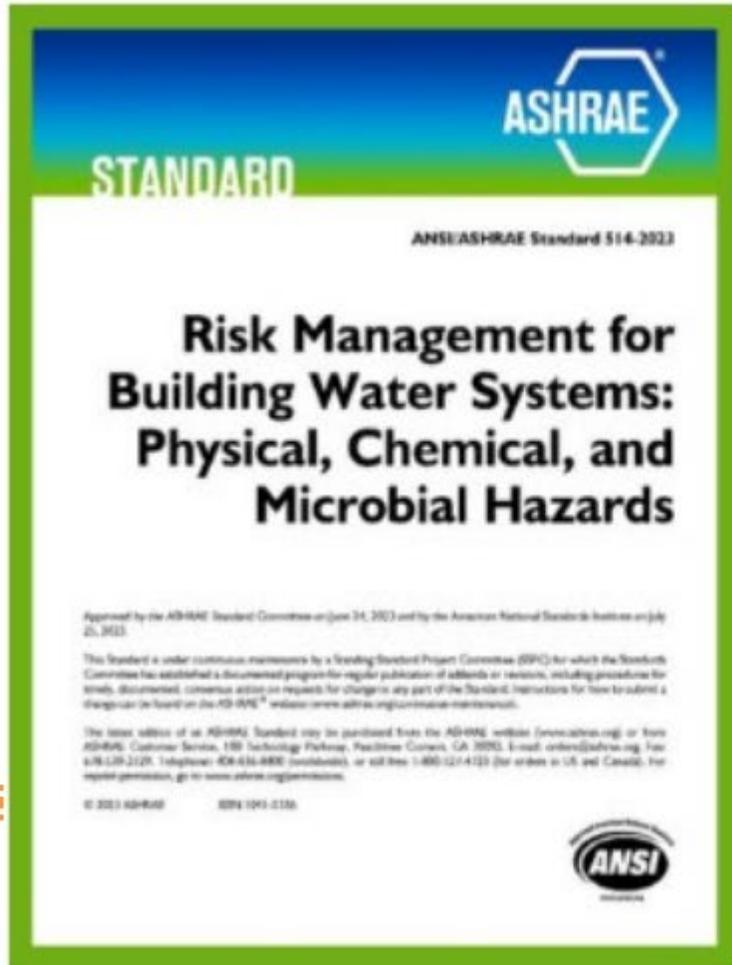
No use of the
ice machine

Ensuring
sterile
water

Turn off
whirlpools

Installing
filters

ASHRAE



[ASHRAE Standards 514, 188, and 12](https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-systems-risk-management)

www.ashrae.org/technical-resources/standards-and-guidelines/guidance-for-water-systems-risk-management



Resources

- [Title 17, California Code of Regulations \(CCR\) 2500, 2593, 2641.5-2643.20, and 2800-2812 Reportable Diseases and Conditions](#)
- [AFL 23-08](#)
- [AFL 18-39](#)
- [Outbreak Response and Prevention in Healthcare Settings Resources – NACCHO](#)
- [Data and Reports – County of San Diego](#)
- [Current Outbreaks | Foodborne Outbreaks | CDC](#)
- [Legionella Essentials](#)
- [The History of Legionnaires' Disease: Origins and Major Outbreaks - Prevent Legionnaires](#)
- www.cdc.gov/legionella/wmp/control-toolkit/potable-water-systems.html
- [www.cdc.gov/legionella/downloads/ toolkit.pdf](#)
- [The History of Legionnaires' Disease: Origins and Major Outbreaks - Prevent Legionnaires](#)
- [Water Management in Healthcare Facilities | Control Legionella | CDC](#)
- [Infection Prevention Surveillance Plan Essentials for Long-Term Care](#)



Questions?

For more information, contact the HAI Program at
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Thank you!



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