Texas Hospital Association Foundation

NUGGETS OF KNOWLEDGE

Presented by Infection Control Consultants of New Mexico

ICCNM
Infection Control Consultants of New Mexico

Welcome

IC Nuggets of Knowledge Series are monthly one-hour learning sessions using a web-based format to share information, network, and opportunity to address questions and concerns with ICCNM Consultants

When: 1:00 to 2:00 pm

2nd Thursday of the month

If you have feedback on this learning opportunity or have suggestions for future learning opportunities, feel free to reach out to me at any time!

- ncostilla@tha.org

Introductions

- Infection Control Consultants of NM (ICCNM Consulting)
- New Mexico based consulting company
- Consultants are certified in Infection Control (CIC)
- Presenters for this series
  - Kerry Flint, PhD
  - Terri Kangas-Feller
  - Barbara Mooney
  - Kelly Yaple
- www.iccnm.org

ICCNM Consulting

Water Management

November 10, 2022

Presented by Infection Control Consultants of NM

Terri Kangas-Feller, BS, RN, CIC

Learning Outcomes

- Describe goals of a water management team
- Discuss key risks that support water pathogens
- Identify mitigation strategies for pathogens in water and interruptions in water supply
- Identify regulatory requirements for water management in health care

What is a water management plan? What does it do? Pick one best answer

- A: Ensures you do not run out of water
- B: Tests waters for pathogens
- C: Oversees the availability and reliability of safe water
- D: A plan that addresses water outages

Water Issues

Pathogens

Contamination

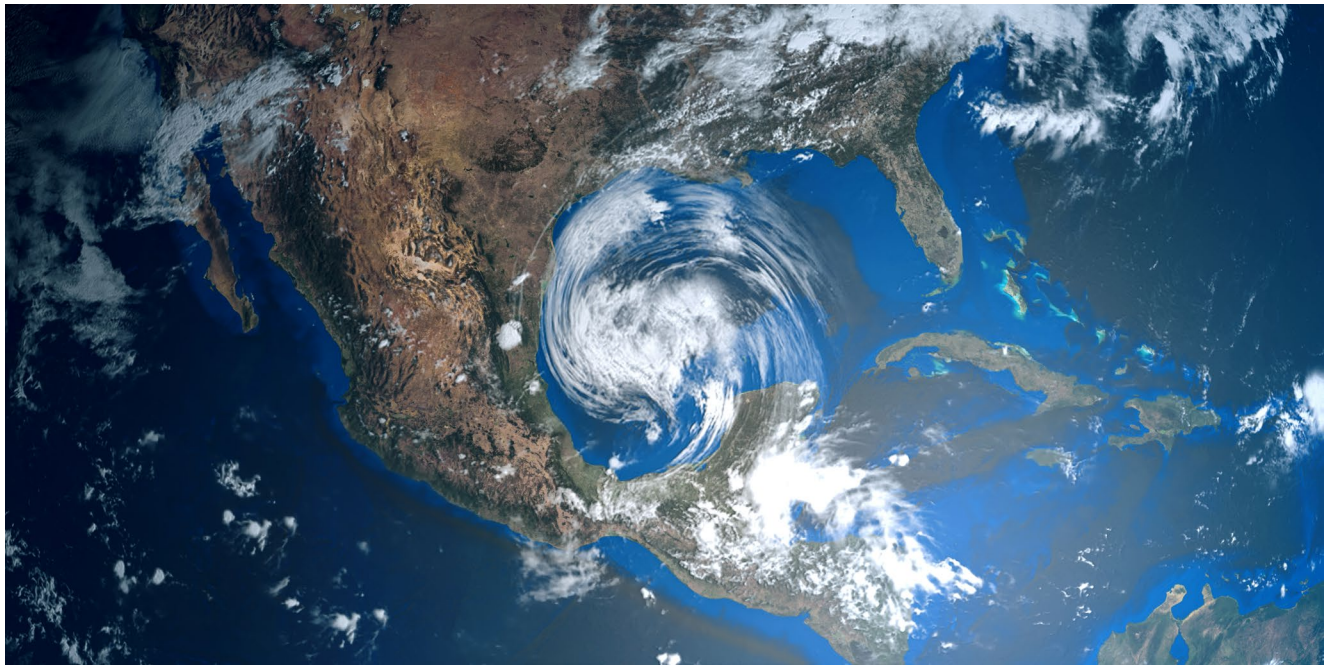
Loss

Case Study No. 2: Nursing Home

A 165-bed nursing home in Florida experienced a water supply interruption in 2004 because of Hurricane Ivan. As with most hurricanes, there were a few days to prepare before the hurricane made landfall. This facility stocked up on bottled water and other water containers and filled up every available container before landfall.

When the hurricane made landfall, the public water supply was interrupted due to power loss and the facility had to use the stocked water supply. As the loss of water service persisted through day one to day two, toilet flushing became a problem because each flush required a few gallons of water

As the loss of water service continued through day three, facility staff went to the homes of staff who had swimming pools (which is relatively common in Florida) and filled up buckets and containers with pool water to bring back to the facility for toilet flushing. This effort was very labor-intensive (e.g. a gallon of water weighs more than 8 pounds) but it provided the water necessary for toilet flushing.



Outbreak in Caruarú, Brazil

Patients at an outpatient dialysis facility in Caruarú, Brazil developed visual disturbances, nausea, and vomiting associated with hemodialysis over a 4-day period. Within a month of the exposure, 26 patients died due to liver failure and another 20 patients remained hospitalized (1,3). It turned out that the facility used untreated surface water for dialysis and did not adequately treat or filter the water before using it. This example demonstrates the importance of removing cyanotoxins from water used for dialysis.

Not Only Infections

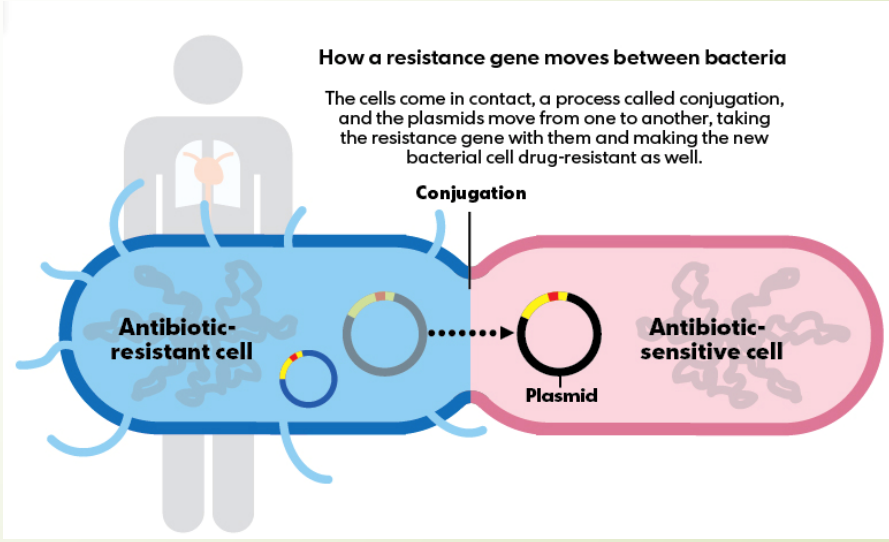
- In 1989, the Environmental Protection Agency placed 236 square miles of North Carolina's coastal soil and water on the list of toxic areas known as Superfund sites.

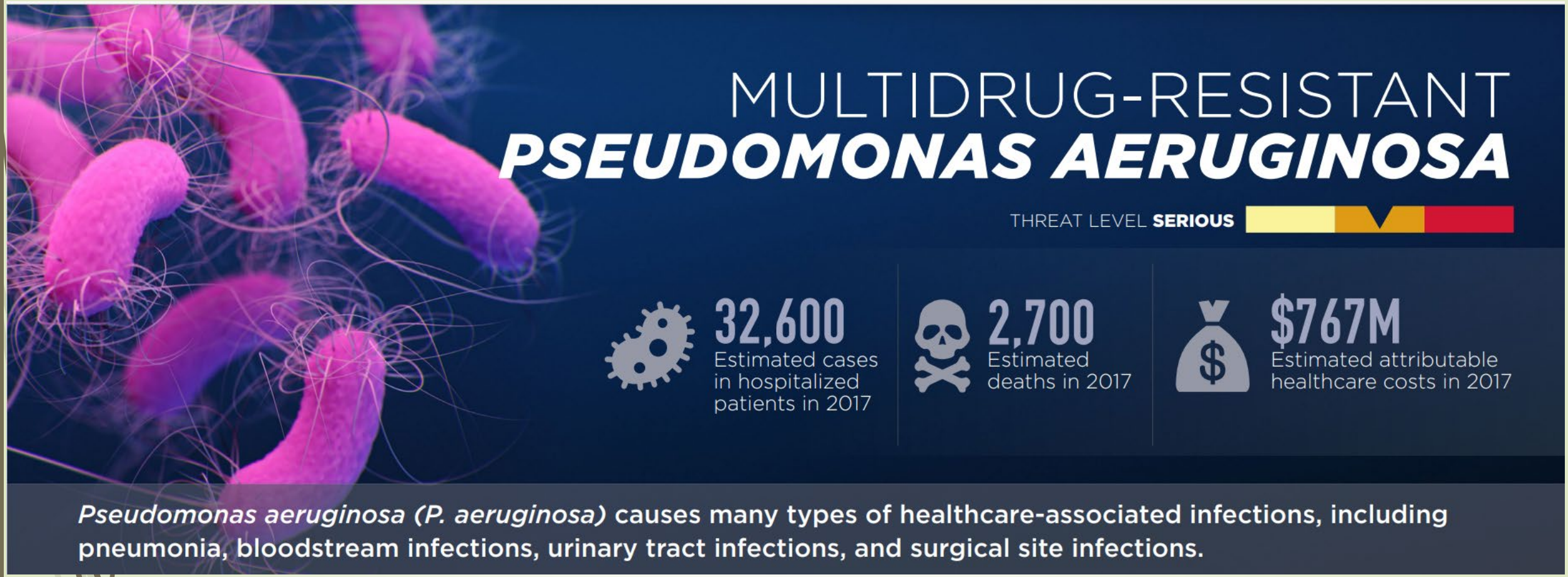
- “past exposures from the 1950s through February 1985 to trichloroethylene (TCE), tetrachloroethylene (PCE), vinyl chloride, and other contaminants in the drinking water at the Camp Lejeune likely increased the risk of cancers."

Common Opportunistic Water Pathogens

- Legionella pneumophila
- Mycobacterium avium
- Pseudomonas aeruginosa

- 9% mortality in reported cases, 25% if acquired in hospital
- As high as 25% in 5 years-respiratory
- Serious threat level in the 2019 AR Report
  - 2700 deaths in 2017
  - 8K-18K cases per year, underestimated due to Pontiac fever which often resolves




MULTIDRUG-RESISTANT
PSEUDOMONAS AERUGINOSA
THREAT LEVEL SERIOUS
32,600
Estimated cases in hospitalized patients in 2017
2,700
Estimated deaths in 2017
$767M
Estimated attributable healthcare costs in 2017
Pseudomonas aeruginosa (P. aeruginosa) causes many types of healthcare-associated infections, including pneumonia, bloodstream infections, urinary tract infections, and surgical site infections.

Legionella

- Optimal growth 77-113F
- pH 5-8.5
- Biofilm
- Low free chlorine in hot water

- Test HAI pneumonia patients for legionella if they fail outpatient antibiotic treatment for community acquired pneumonia

Figure 1.Cross-section of pipe containing biofilm and *Legionella*

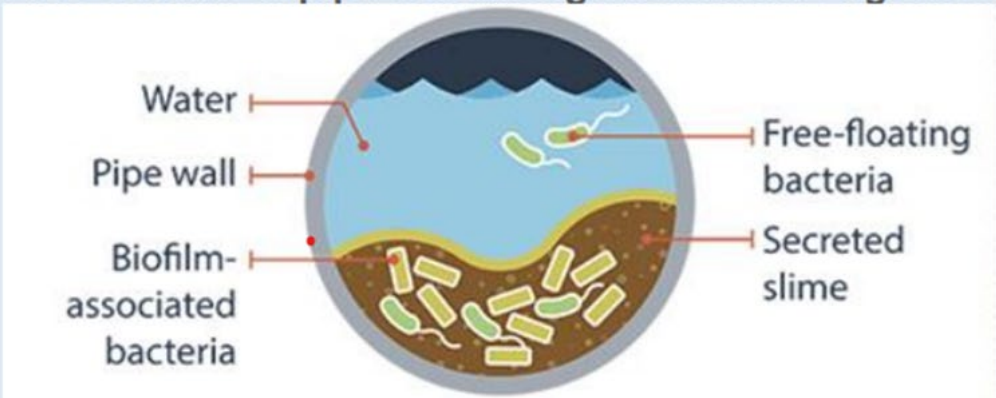
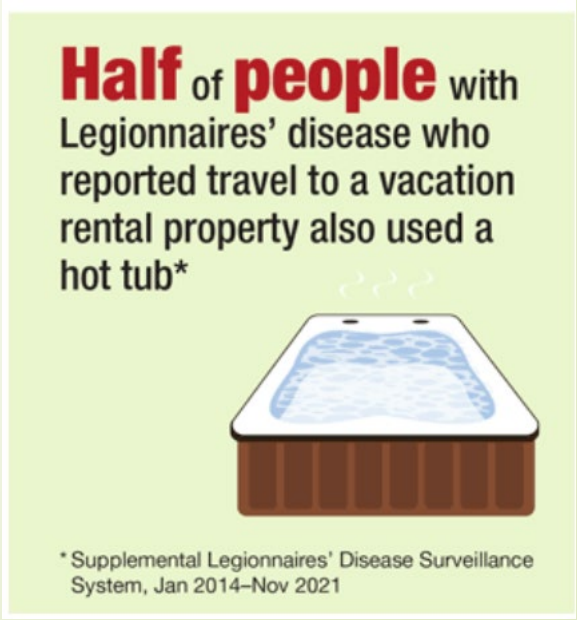


Image from: https://www.cdc.gov/legionella/wmp/overview/growth-and-spread.html

The most commonly used laboratory test for diagnosis of is the urinary antigen test (UAT), which detects a molecule of the Legionella bacterium in urine. If the patient has pneumonia and the test is positive, then you should consider the patient to have Legionnaires' disease.



Legionella

Figure 8

1991-2018

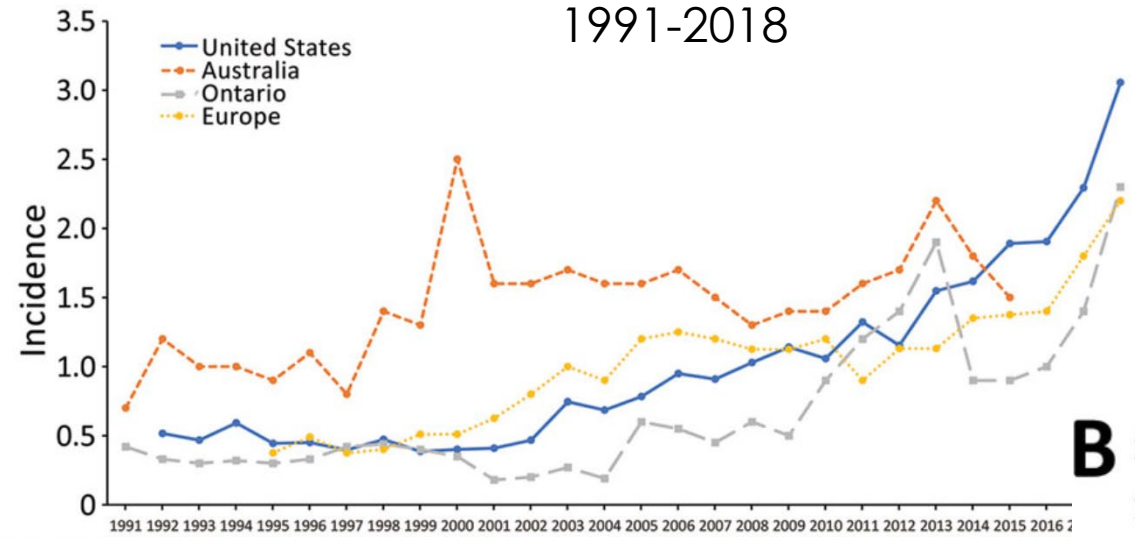
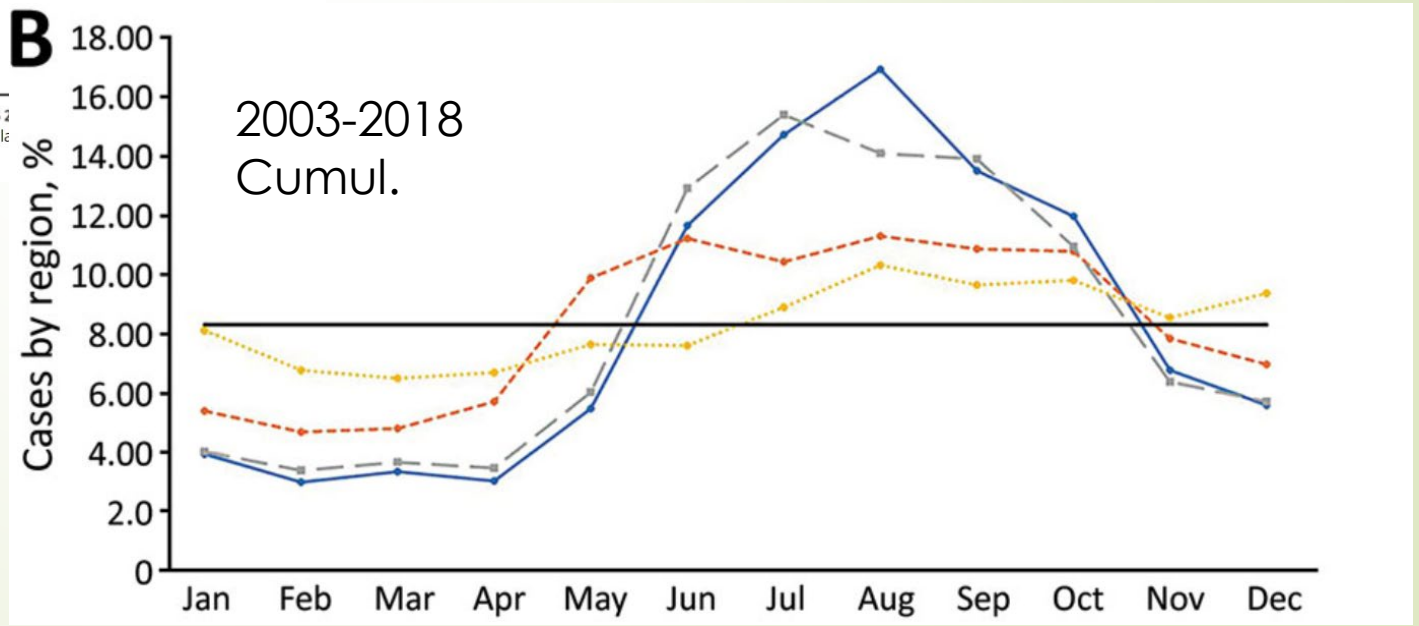


Figure 8. International crude incidence (cases/100,000 population) trends of Legionnaires' disease, United States (National Notifiable Diseases Surveilla (40,41), and Australia (42), 1991–2018.

Years

Monthly (Australia)



- Third shift at a critical access hospital. The water is brown with minimal pressure. Who do you call?

Place your answer in Chat

Where do you find this list?

EMERGENCY CONTACT INFORMATION

Name	Phone Number(s)	Email	Name of person contacted
Operator (Facilities) (primary):			
Owner /Administrator (responsible):			
Infection Prevention			
Safety			
Health Authority Contacts			
Environmental Health Officer:			
Medical Health Officer:			
After hours health authority emergency contact:			
Government Agencies			
Local Government Emergency (Municipality):			
Emergency Management			
Laboratories			
Bacteriological:			
Emergency Departments			
Fire Department:			
Repair Services			
Utility:			
Electrician:			
Plumber:			
Bulk water hauler / alt water supplier:			
Excavator:			
Water Well Drilling Contractor:			
Pump Installer:			
Equipment Supplier(s)			
Water Treatment Supplier:			

Emergency Response

Who to Call

- Administrator
- Infection Prevention
- Facilities
- Safety
- Industrial Hygienist
- Microbiology

Role

- Incident Command
- Outbreaks, Hygiene
- System knowledge
- Life Safety measures
- Identifies hazards and risks
- Pathogen identification

National Incident Management System (NIMS)
Hospital Incident Command System (HICS)
Getting Started - Emergency Preparedness (calhospitalprepare.org)

The Plan


Craftsman tools
Screwdriver
Saw
Hammer
Cable cutter
Sandpaper
Diagonal
Linesman
Long
Furniture lists
Bedroom
King size bed
Headboard
Drawer
Built in closet
Mattress
Lamps x 2
Tomorrow 9.30 AM
Living room
Sofa
Coffee table
Television set
Stools x 4
Bookshelf
Kitchen
Dining table
Chairs x 6
Cupboard
Kitchen counter
Fruit Pantry
Stove & oven
Sideboard
Refrigerator
Will be delivered on 6th Apr
Bathroom
Bathroom sink
Storage (small)
Toilet
Bath tub
Mirror
Bedroom 1.
Room plan
1st floor

Members

- **Administrators**
- **Maintenance- Engineer**
- **Infection Prevention**
- **Safety Officer**
- **Industrial Hygienist- Cert.**
- **Environmental Health Specialist**
- **Microbiologist**
- **Municipal partners?**

- Housekeeping
- Dietary
- Supply Chain
- Department heads
- Leaders of specialty units

FREE TRAINING: PreventLD Training - Preventing Legionnaires' Disease Training | EHS | CDC
https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html

Water Management Program Goals

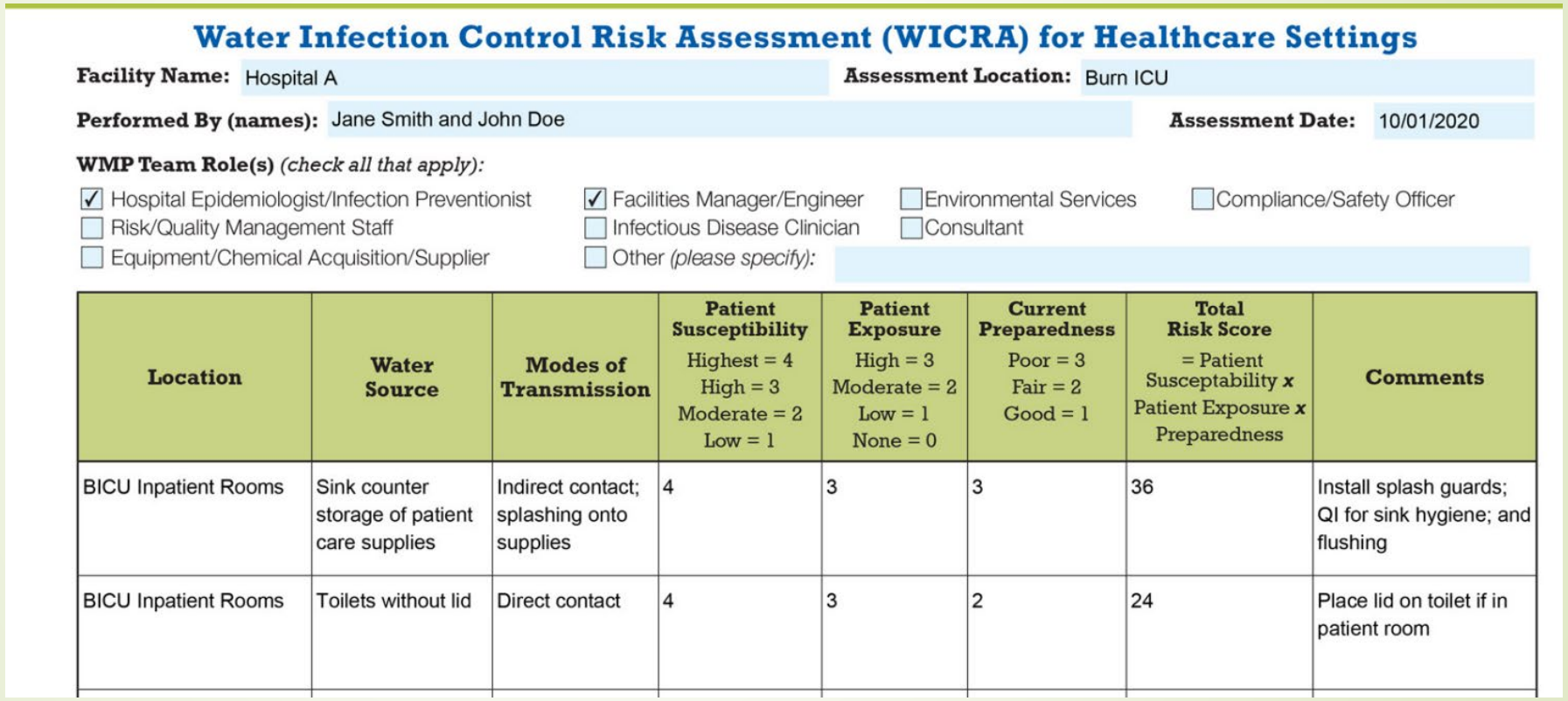
- Document that addresses the effective management of your facilities water systems to protects patients from waterborne illnesses and water interruptions
  - Improves water supply and reliability
  - Identifies risks and hazards, including waterborne pathogens
  - Outlines steps when safe water supply is interrupted
  - How to return to “normal” water operation

Assessment

- How is the water used
  - Specialty units
- What is the demand
- How often are the interruptions
- What is the quality of the water
  - Internal and external
- What high risk features are present in the system
  - Aerators
- What disinfection systems are in place
  - Internal and external
  - Automated or manual
- Status of infrastructure
  - Pipe materials
- Patient exposure points
- Patient susceptibility
- Fire suppression systems

Water Infection Control Risk Assessment (WICRA) for Healthcare Settings (cdc.gov)
https://www.cdc.gov/hai/pdfs/prevent/water-assessment-tool-508.pdf

Water Infection Control Risk Assessment CDC



Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

Facility Name: Hospital A **Assessment Location:** Burn ICU

Performed By (names): Jane Smith and John Doe **Assessment Date:** 10/01/2020

WMP Team Role(s) *(check all that apply):*

- ☑ Hospital Epidemiologist/Infection Preventionist
- ☑ Facilities Manager/Engineer
- ☐ Environmental Services
- ☐ Compliance/Safety Officer
- ☐ Risk/Quality Management Staff
- ☐ Infectious Disease Clinician
- ☐ Consultant
- ☐ Equipment/Chemical Acquisition/Supplier
- ☐ Other *(please specify):*

Location	Water Source	Modes of Transmission	Patient Susceptibility Highest = 4 High = 3 Moderate = 2 Low = 1	Patient Exposure High = 3 Moderate = 2 Low = 1 None = 0	Current Preparedness Poor = 3 Fair = 2 Good = 1	Total Risk Score = Patient Susceptability *x* Patient Exposure *x* Preparedness	Comments
BICU Inpatient Rooms	Sink counter storage of patient care supplies	Indirect contact; splashing onto supplies	4	3	3	36	Install splash guards; QI for sink hygiene; and flushing
BICU Inpatient Rooms	Toilets without lid	Direct contact	4	3	2	24	Place lid on toilet if in patient room

https://www.cdc.gov/hai/pdfs/prevent/water-assessment-tool-508.pdf

High-Risk Features for Pathogen Development

- Hot and cold-water storage tanks
- Water heaters
- Pipes, valves, and fittings
- Expansion tanks
- Water filters
- **Electronic** and manual faucets
- Aerators
- Showerheads and hoses
- Aromatherapy misters
- Misters, atomizers, and humidifiers
- Non-steam humidifiers
- Eyewash stations
- Ice machines
- Hot tubs/saunas/pools
- Decorative fountains
- Cooling towers
- Medical devices (CPAP machines, hydrotherapy),

https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO17-30-HospitalCAH-NH-REVISED-.pdf

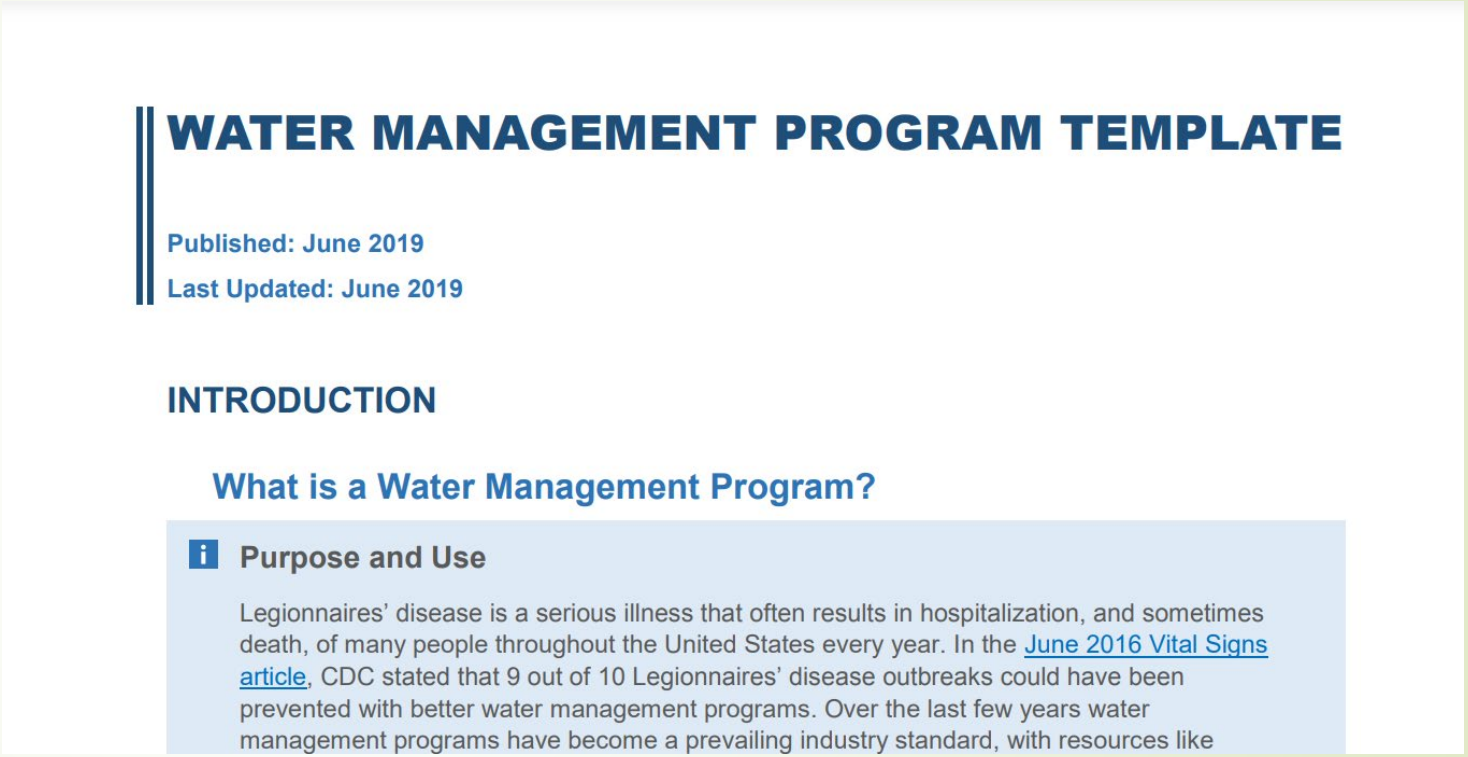
Plan Elements

- Risks
- Schematics
- Routine actions
- Municipal partners
- Likely Emergencies
- Emergency actions
- Contact information
- Communications

What is your role in the water management plan?

Tools

- Water Management Program Template_June2019.pdf (neha.org)
https://www.neha.org/sites/default/files/Water%20Management%20Program%20Template_June2019.pdf



WATER MANAGEMENT PROGRAM TEMPLATE

Published: June 2019

Last Updated: June 2019

INTRODUCTION

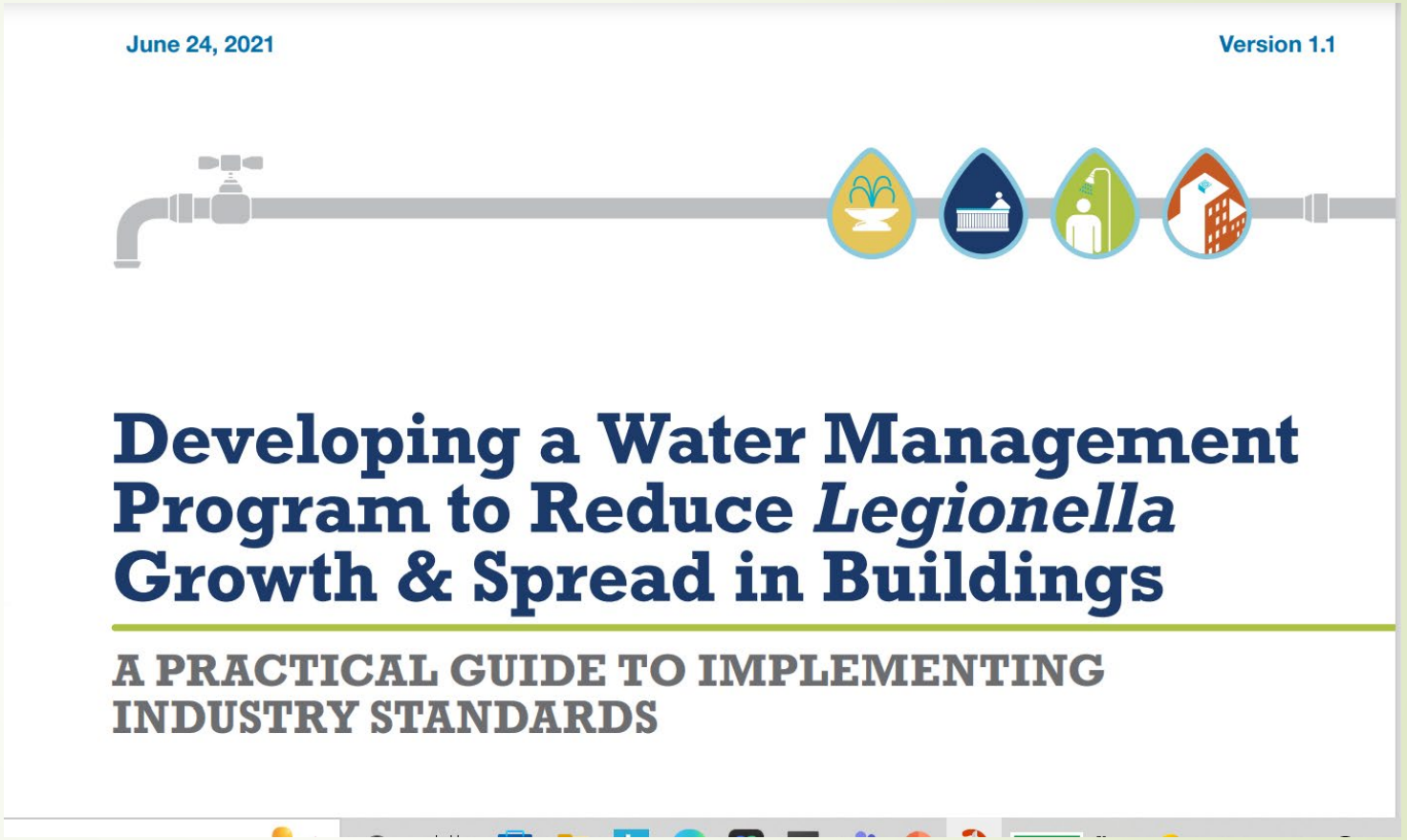
What is a Water Management Program?

Purpose and Use

Legionnaires' disease is a serious illness that often results in hospitalization, and sometimes death, of many people throughout the United States every year. In the June 2016 Vital Signs article, CDC stated that 9 out of 10 Legionnaires' disease outbreaks could have been prevented with better water management programs. Over the last few years water management programs have become a prevailing industry standard, with resources like

Tools continued…

- Legionella Toolkit-Version 1.1-June 24, 2021 (cdc.gov) https://www.cdc.gov/legionella/downloads/toolkit.pdf



Regulations and Guidance

Water

- Drinking water
- Grey water use, Discharge
- Conservation requirements
- Plumbing codes- state
- Dialysis water standards
- Medical Instrumentation water
- Sterile Processing water
- **CMS QSO-17-30 (F 922)**
- **ASHRAE Standard 188-2015**
- **Joint Commission EC 02.05.02**
- DNV Det Norske Veritas

Joint Commission

- EC 02.05.02
  - Team
  - Diagram
  - Water risk management plan
  - Plan for rooms not used frequently
  - Patient susceptibility
  - Monitoring and acceptable ranges
  - Documentation and corrective actions
  - Annual review including new construction or equipment

r3-report-water-management-final_nov1.pdf (jointcommission.org)

CMS QSO 17-30

- Requires a water management plan
  - Risk Assessment
  - ASHRAE 2015 and CDC 2016
  - Testing protocols
- Hospitals, CAH, LTC and awareness for all healthcare organizations

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

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

Center for Clinical Standards and Quality/Quality, Safety and Oversight Group

Ref: *QSO*-17-30- Hospitals/CAHs/NHs
REVISED 07.06.2018

DATE: **June 02, 2017**

TO: State Survey Agency Directors

FROM: Director
Quality, Safety and Oversight Group (*formerly Survey & 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 Expectations for Providers, Accrediting Organizations, and Surveyors****

Situations of Concern in Water Mgmt.

Likely Situations

- Water outages & leaks
- Contamination/colored
- Boil orders
- Electrical outage
- Supply chain issues/treatment
  - Filters, chemicals, testing
- Lack of hot water
- Pipe materials
- Standing water
- Hard water
- Biofilm
- Flooding/road access

Items to address in crisis

- Water for :
  - Hygiene
  - Hands
  - Toilets
  - Cooking
  - medical procedures
  - Sterilization
  - Cooling / heating
  - Hydration
  - Cleaning
  - Fire suppression

Front Line Actions

- Store water in anticipation, e.g. hurricane
- MRE
- Paper plates/cups
- Fans
- Warming Blankets
- Portable Toilets/ commodes/ collect non potable water for flushing
- Commodes/absorbent material
- Sponge baths

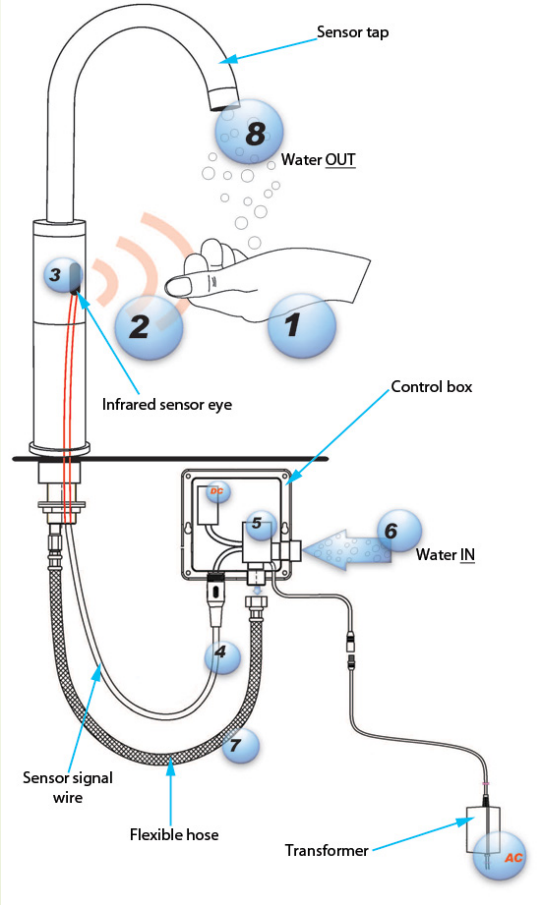
- Water for Hydration – Commercial
- Rotate every 6 months
- "Sell by Date" doesn't necessarily imply the water is compromised
- Avoid extreme temperatures or sunlight for long term storage
- 7 Gallons=56 lbs
- Label water sources, "Non-Potable, shut off valves
- Distribute and use ABHG

Touchless or Manual

- More complex valves

  Versus

- Contact with handles



?

Latest Hands-Free Electronic Water Faucets Found T Hindrance, Not Help, In Hospital Infection Control

Old-fashioned, manual faucets work better, study shows; Hopkins is removing new ones

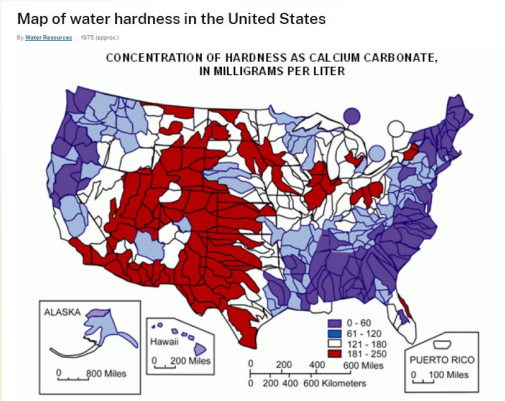
Release Date: March 31, 2011

A study of newly installed, hands-free faucets at The Johns Hopkins Hospital, all equipped with the latest electronic-eye sensors to automatically detect hands and dispense preset amounts of water, shows they were more likely to be contaminated with one of the most

Touchless = Less Bacteria

Water Quality Terminology

- **Utility Water** - water that comes from the tap that may require further treatment
  - Used for flushing, washing, rinsing
- **Critical Water** - water that is extensively treated to ensure microorganisms, inorganic, and organic materials are removed
  - Used for the final rinse or steam generation



- **Adverse effects to the PRODUCT:**
  - Corrosion, pitting, scaling
  - Biomass build-up
  - Increase microbial load or endotoxin content
- **Adverse effects to the PROCESS:**
  - Decreased effectiveness of detergents
  - Degradation of the water system (biofouling or scaling)
- **Adverse effect to the PATIENT:**
  - Infection
  - Toxicity

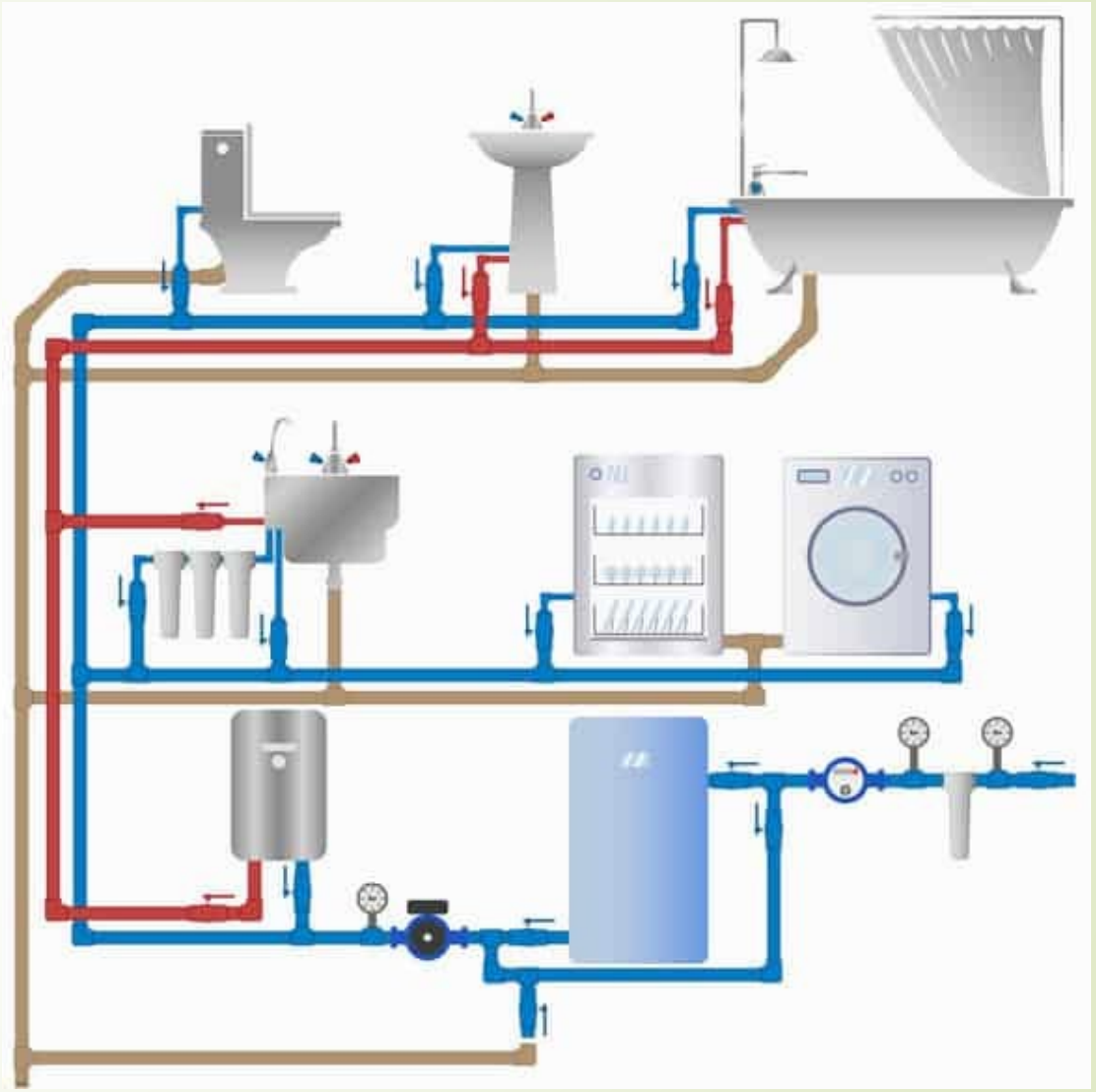
Patient Care Considerations

- Test HAI pneumonia patients for legionella:
  - Legionella cases in the last year
  - Increase in legionella testing (if performed)
  - Changes in water system conducive to legionella growth
- Assess waterborne pathogen exposure prior to admission
  - Vacations, hot tubs, new residence, hotels
  - Involve PH to quickly identify others at risk

- In September of 2019, 8 cases of Legionnaires' disease was linked to the East Texas State Fair hot tub display. One person died in the outbreak. 2021 A citywide ordinance mandating Legionella testing of multifamily housing cooling towers in Garland, Texas is a first of its kind in the United States.

Biofilm in Plumbing

- Premise plumbing:
- Not monitored by EPA regulations except for lead and copper.
- Basically, anything after your main service line.
- How is the IP involved? ICRA



Development in Premise Plumbing

Biofilm support

- Potable water is not sterile
- Adherence facilitated by glycocalyx
- Pipe material matters
  - Copper resists colonization
  - Avoid rubber gaskets
- Disinfection resistance- **Contact time** for water treatment
  - CT needed(mg/L• minutes)
- Low O2 and Carbon environments
- Live inside amoebae organisms

Common pathogens

- *Mycobacterium avium*
- *Legionella pneumophila*,
- *Pseudomonas aeruginosa*
- Klebsiella
- Acinetobacter
- Fusarium and Aspergillus species

Biofilm Removal Strategies

- Filtration in key areas
  - Lab, ER, OR
- In building disinfection
- Remove aerators
- Raise temperature
- Clean showerheads
- Large hole low aeration water sources
- Point of use hot water heaters
- Eliminate dead legs
- Choose materials resistant to biofilm
- Flushing
- Temperature control
- Routine cleaning and maintenance
- UV irradiation (mutagenic)
- Probiotic approach
- Ozone
- Reverse Osmosis

Ice Machines

Discard ice after water line flushes

Routine monthly/quarterly maintenance and cleaning

Empty periodically, inspect

Proper installation and placement

Ice scoops covered outside ice chamber

Organisms can go dormant when frozen

Biofilm in the ice machine lines

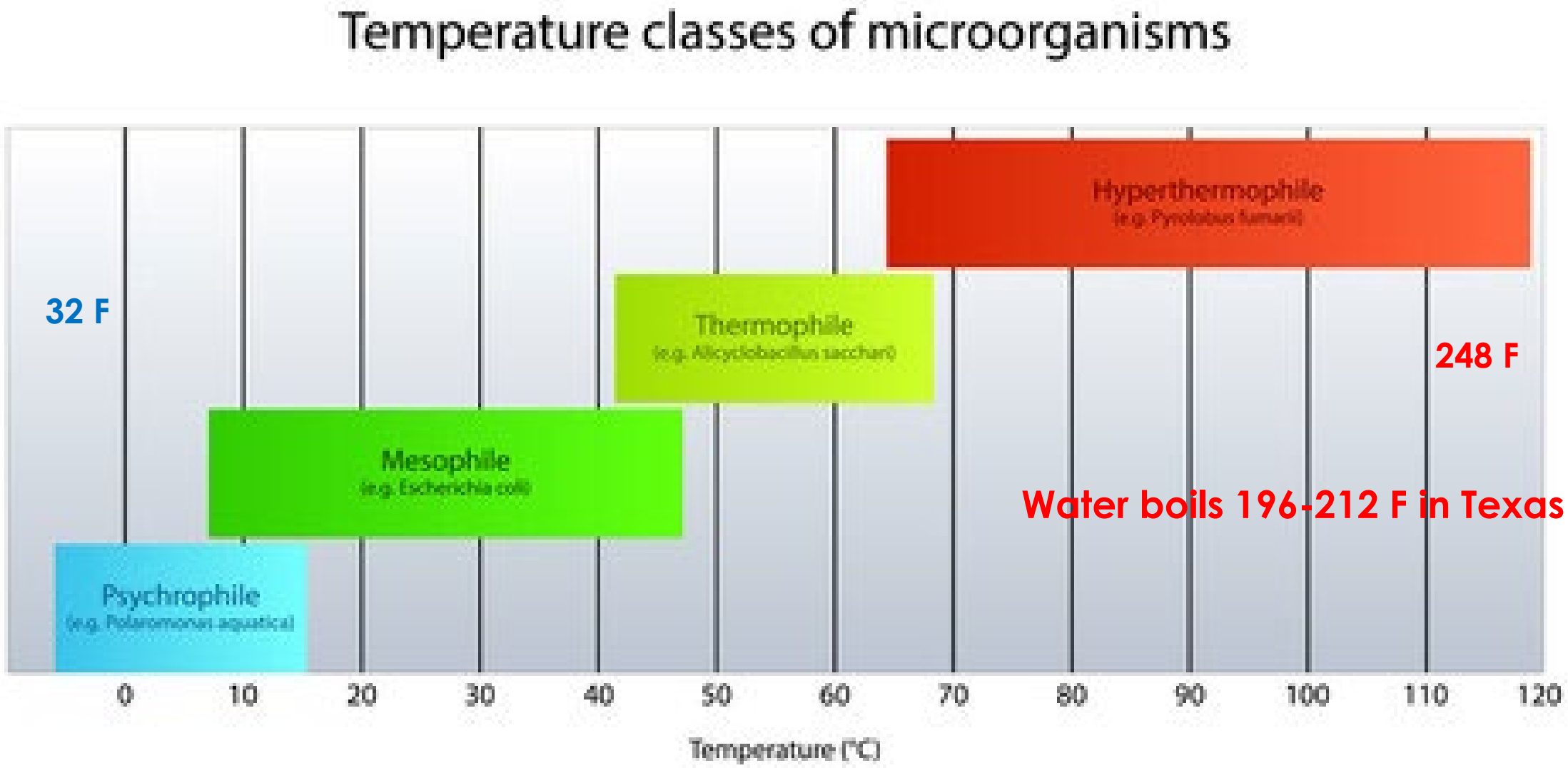
Heat from condenser

Drain pans proliferate

High touch surface

Infrequent use

No FIFO process for ice


Temperature classes of microorganisms
Hyperthermophile
Thermophile
Mesophile
Psychrophile
32 F
248 F
Water boils 196-212 F in Texas
0
10
20
30
40
50
60
70
80
90
100
110
120
Temperature (°C)

Recovery

Reopening

Recovery

- Validate
  - Flush all lines
  - Remediate
    - Superheat
    - Hyperchlorination
    - Copper Silver ionization
    - Monochloramine
    - UV
  - Testing, pressure, temperature, color, odor, fire suppression
  - Enhanced infection surveillance
  - Decontamination of HVAC and Plumbing equipment, medical and laboratory equipment
  - Restock emergency supplies
  - After Action Report

[Emergency Water Supply Planning Guide for Hospitals and Healthcare Facilities (cdc.gov)]

Vacancy, Renovation, Low Census and New Construction

- Flush – entire volume of all lines
- Terminal clean after flushing
- Water temperature testing
- Terminal pathogen testing if warranted
  - Specialty units
- Reclean equipment
- Remove ice

Water Testing

Testing

- In Texas- pathogen testing driven by the risk assessment or outbreaks
- Total Coliform requirements = Not detected
  - E. coli

- What to test?
  - Water
    - Entry
    - Point of use
  - Biofilm swab
  - Point of use swab
  - Hot and Cold water
  - Filters
  - Mist from cooling towers

Texas Department of State Health Services, Infectious Disease Control Unit > Task Force/Recommendations
https://dshs.texas.gov/idcu/disease/legionnaires/taskforce/hospitals/

Sampling and Testing

- CFU Colony Forming Units (Bacteria or Fungi)
  - Drinking water less than 500 cfu/L
- Legionella
  - No actionable levels
- P/A tests Presence/Absence
  - E. Coli
  - Total Coliform

- Test to establish baseline
- Reconfirm baseline after incidents
- Test as part of outbreak investigation
- Point of Use Testing versus Centralized testing
- Test to confirm treatment failure or success

Thank You!

CNE: You will receive an email from me with information on how to get your credit.

Website: Nuggets of Knowledge

Next Session: August 11 at 1pm
New Tech for EVS

THANK YOU!!