Elevating Water Infection Control Risk Assessment: A Cross-functional Strategy for Better Risk Mitigation

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Environmental Health & Engineering

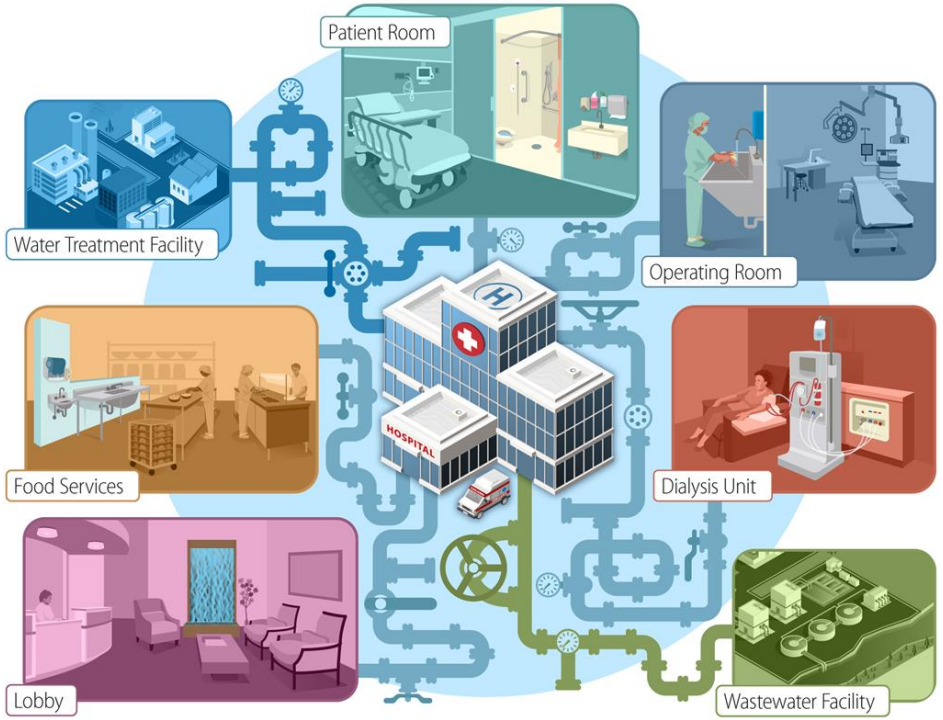
Water and Infection Risk

- Water systems and water-containing devices are well-documented sources of waterborne pathogen outbreaks in acute care settings
  - Twenty sink-to-patient transmission events of Carbapenemase-producing *Enterobacteriacea*, Israel 2017- 2019[1]
  - VIM-producing *Pseudomonas aeruginosa* linked to sink taps and drains via whole genome sequencing, Switzerland 2018-2020[2]
  - *Mycobacterium chimaera* aerosolized from heater-cooler units used in cardiac surgeries, 2011 to present[3-4]
  - *Mycobacteria abscessus* infections potentially linked to ice and water -machine, United States 2017-2018[5]

Water and Infection Risk

Why is the risk greater in healthcare settings?[6]

- Complex plumbing systems
- Potentially dated infrastructure
- More varied water uses
- Vulnerable patient population
    - Conditions and/or treatments that impair the immune system
    - Presence of indwelling devices



Centers for Disease Control and Prevention, 2019

Water Management-Regulatory[7]

CMS Memo: Ref QSO-17-30-Hospitals/CAHs/NHs (7.6.18)

CMS expects Medicare and Medicare/Medicaid 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.

Facilities must have water management plans and documentation that, at a minimum, ensure each facility:

- Conducts a facility risk assessment to identify where *Legionella* and other opportunistic waterborne pathogens (e.g. *Pseudomonas*, *Acinetobacter*, *Burkholderia*, *Stenotrophomonas*, nontuberculous mycobacteria, and fungi) could grow and spread in the facility water system.
- Develops and implements a water management program that considers the ASHRAE industry standard and the CDC toolkit.
- Specifies testing protocols and acceptable ranges for control measures, and document the results of testing and corrective actions taken when control limits are not maintained.
- *Maintains compliance with other applicable Federal, State and local requirements.*

Note: CMS does not require water cultures for Legionella or other opportunistic water borne pathogens. Testing protocols are at the discretion of the provider.

Water Management-Regulatory[8]

Joint Commission Standard for Water Management Program—January 1, 2022

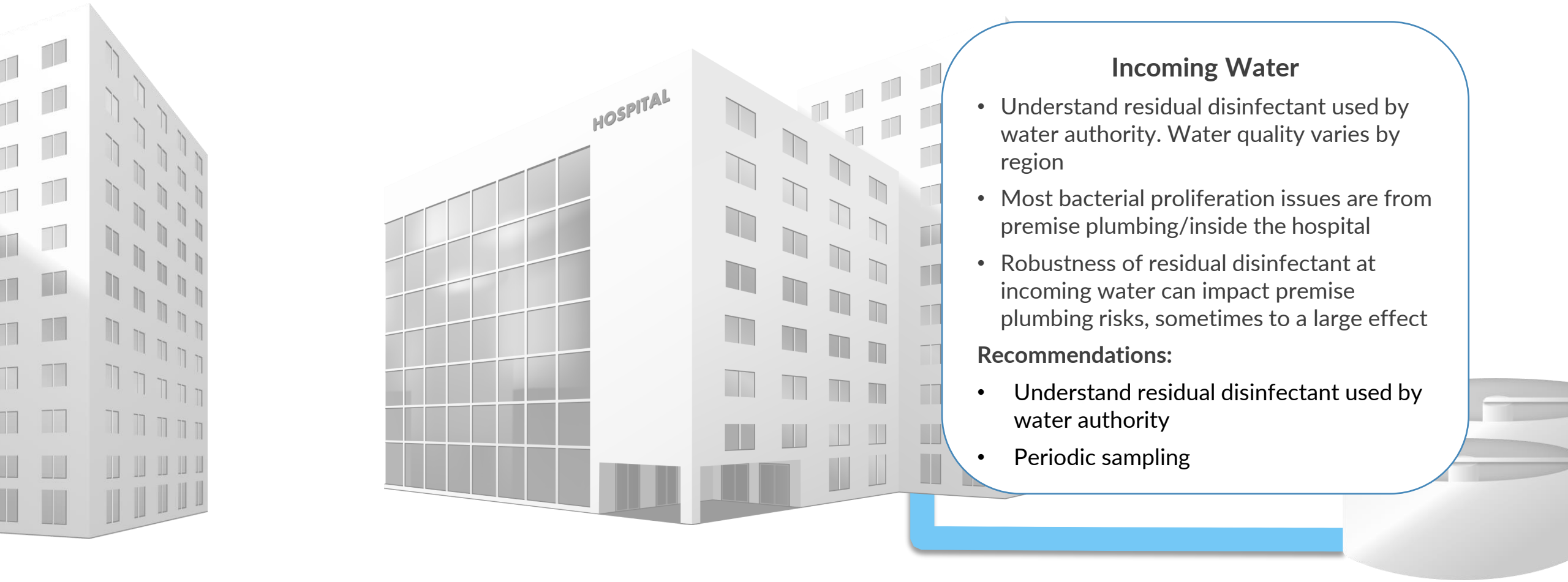
- EC.02.05.02 EPs 1-4

EC.02.05.02, EP 2

This element of performance will go into effect January 1, 2022: The individual or team responsible for the water management program develops the following:
- A basic diagram that maps all water supply sources, treatment systems, processing steps, control measures, and end-use points
Note: An example would be a flow chart with symbols showing sinks, showers, water fountains, ice machines, and so forth.
- A water risk management plan based on the diagram that includes an evaluation of the physical and chemical conditions of each step of the water flow diagram to identify any areas where potentially hazardous conditions may occur (these conditions can most likely occur in areas with slow or stagnant water)
Note: Refer to the Centers for Disease Control and Prevention's "Water Infection Control Risk Assessment (WICRA) for Healthcare Settings" tool as an example for conducting a water-related risk assessment.
- A plan for addressing the use of water in areas of buildings where water may have been stagnant for a period. (for example, unoccupied or temporarily closed areas)
- An evaluation of the patient populations served to identify patients who are immunocompromised
- Monitoring protocols and acceptable ranges for control measures
Note: Hospitals should consider incorporating basic practices for water monitoring within their water management programs that include monitoring of water temperature, residual disinfectant, and pH. Additionally, protocols should include specificity around the parameters measured, locations where measurements are made, and appropriate corrective actions taken when parameters are out of range.

Water Systems 101

Water Systems, Subsystems & Components



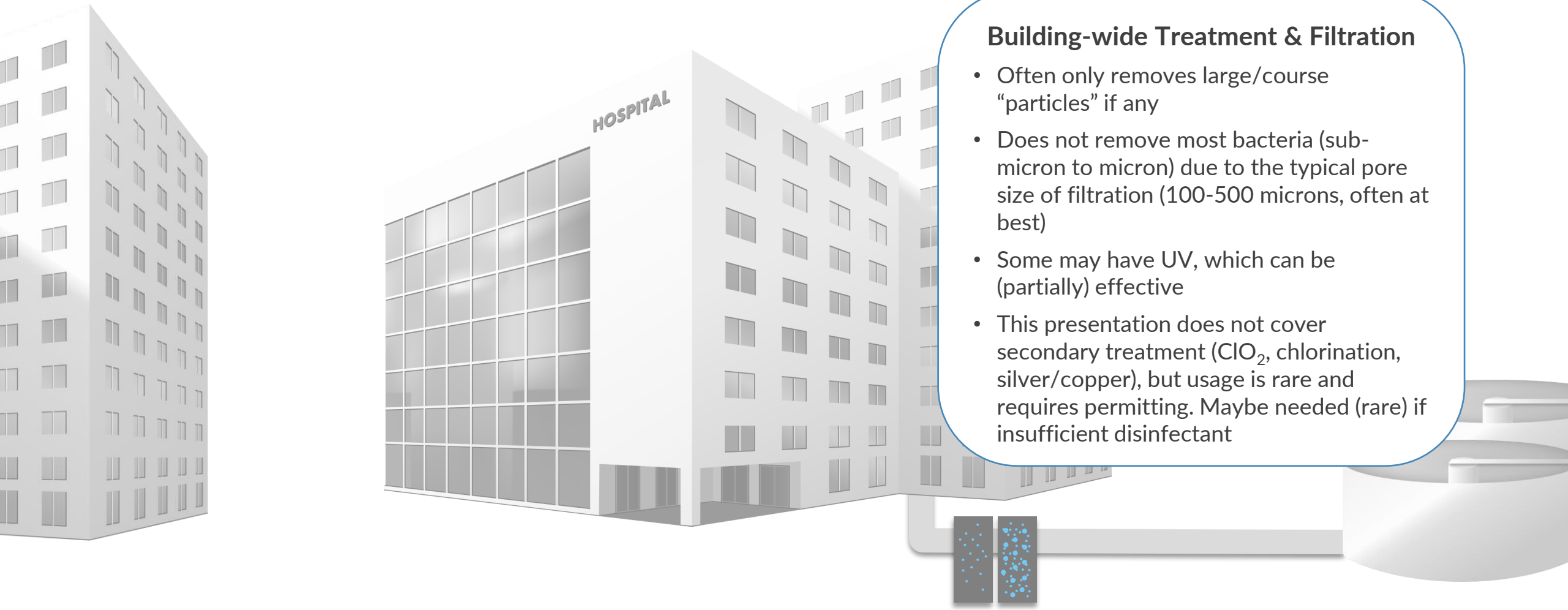
Incoming Water

- Understand residual disinfectant used by water authority. Water quality varies by region
- Most bacterial proliferation issues are from premise plumbing/inside the hospital
- Robustness of residual disinfectant at incoming water can impact premise plumbing risks, sometimes to a large effect

Recommendations:

- Understand residual disinfectant used by water authority
- Periodic sampling

Water Systems, Subsystems & Components



Building-wide Treatment & Filtration

- Often only removes large/course “particles” if any
- Does not remove most bacteria (sub-micron to micron) due to the typical pore size of filtration (100-500 microns, often at best)
- Some may have UV, which can be (partially) effective
- This presentation does not cover secondary treatment (ClO_2, chlorination, silver/copper), but usage is rare and requires permitting. Maybe needed (rare) if insufficient disinfectant

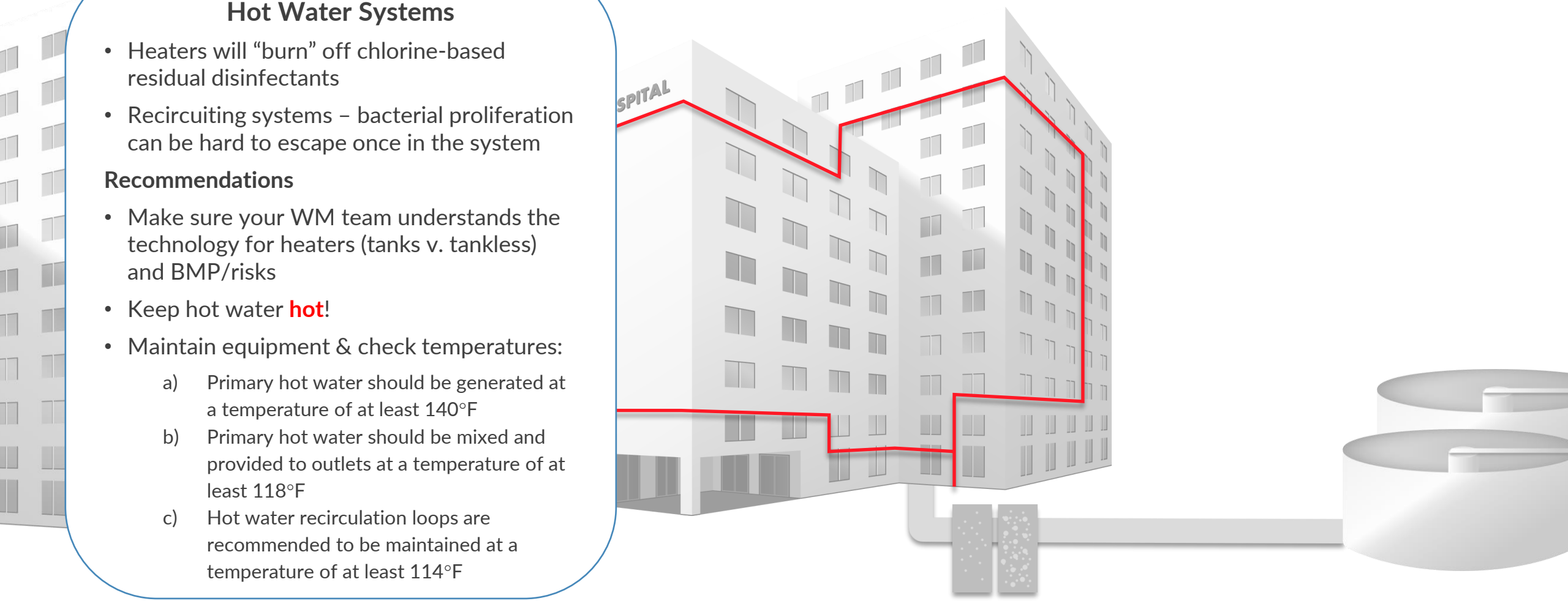
Water Systems, Subsystems & Components

Hot Water Systems

- Heaters will “burn” off chlorine-based residual disinfectants
- Recircuiting systems – bacterial proliferation can be hard to escape once in the system

Recommendations

- Make sure your WM team understands the technology for heaters (tanks v. tankless) and BMP/risks
- Keep hot water **hot**!
- Maintain equipment & check temperatures:
    a) Primary hot water should be generated at a temperature of at least 140°F
    b) Primary hot water should be mixed and provided to outlets at a temperature of at least 118°F
    c) Hot water recirculation loops are recommended to be maintained at a temperature of at least 114°F



Water Systems, Subsystems & Components

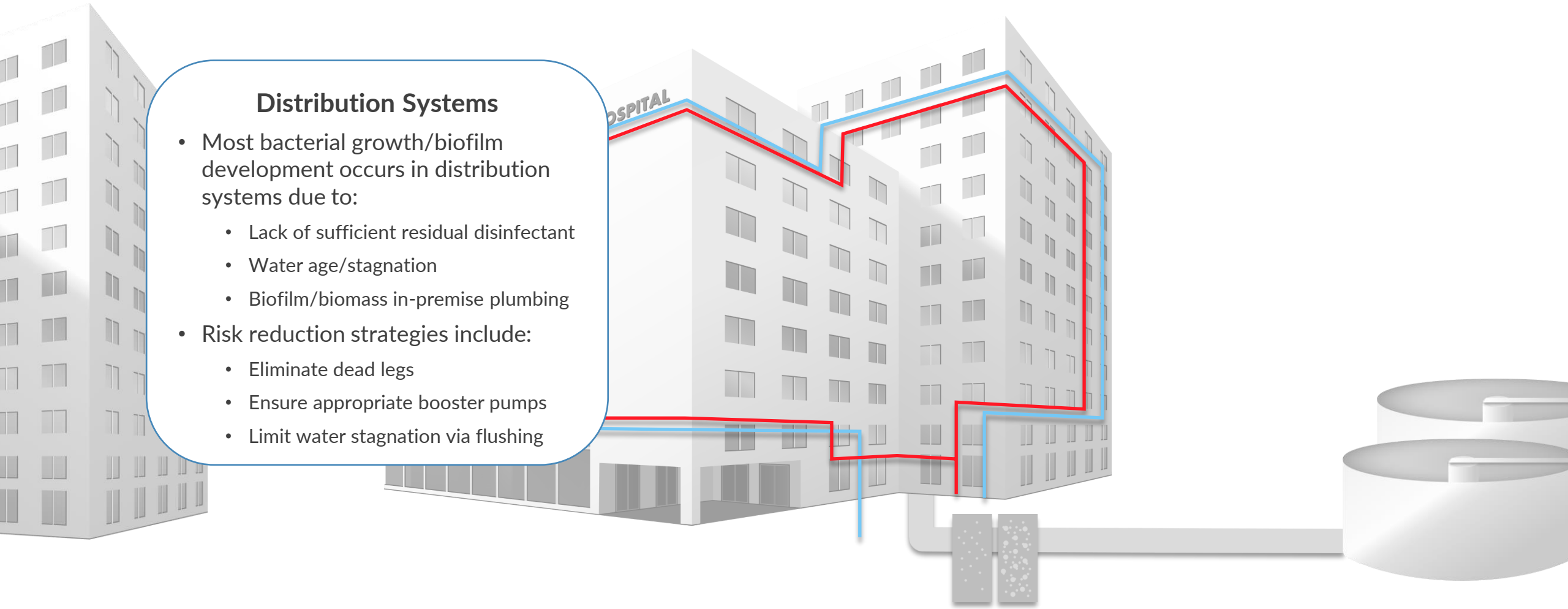
Cold Water Systems

- “Once through” systems
- Will maintain higher residual disinfectant
- Must keep cold water cold
  - Insulation
  - Water age
  - Flushing
  - Dead legs

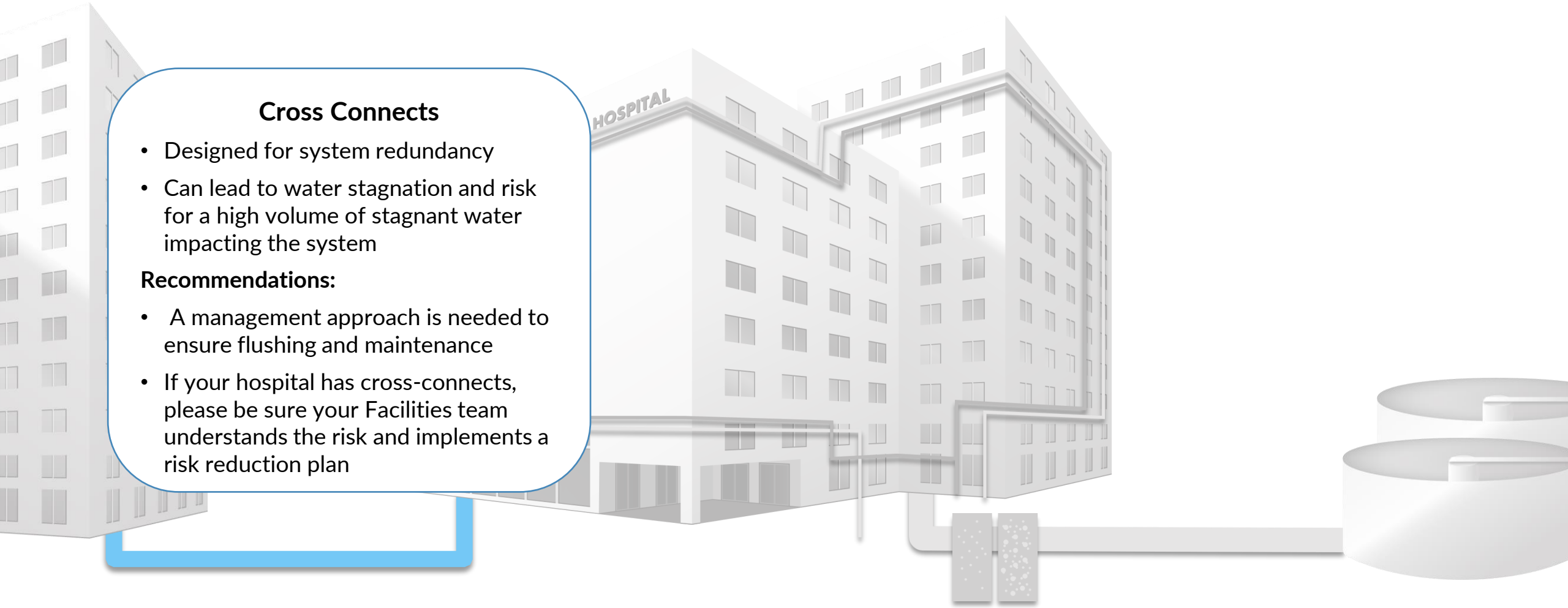
Water Systems, Subsystems & Components

Distribution Systems

- Most bacterial growth/biofilm development occurs in distribution systems due to:
  - Lack of sufficient residual disinfectant
  - Water age/stagnation
  - Biofilm/biomass in-premise plumbing
- Risk reduction strategies include:
  - Eliminate dead legs
  - Ensure appropriate booster pumps
  - Limit water stagnation via flushing



Water Systems, Subsystems & Components



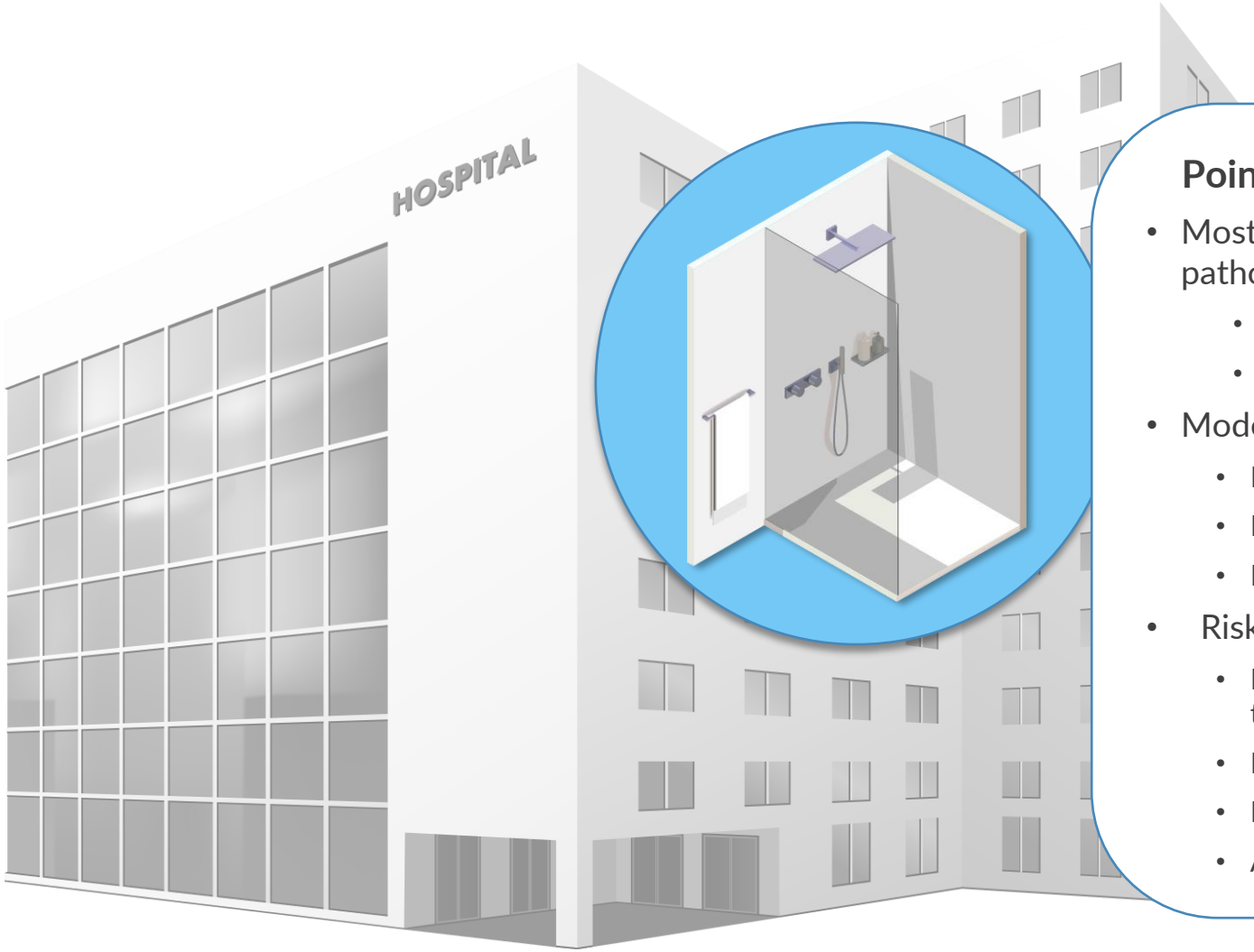
Cross Connects

- Designed for system redundancy
- Can lead to water stagnation and risk for a high volume of stagnant water impacting the system

Recommendations:

- A management approach is needed to ensure flushing and maintenance
- If your hospital has cross-connects, please be sure your Facilities team understands the risk and implements a risk reduction plan

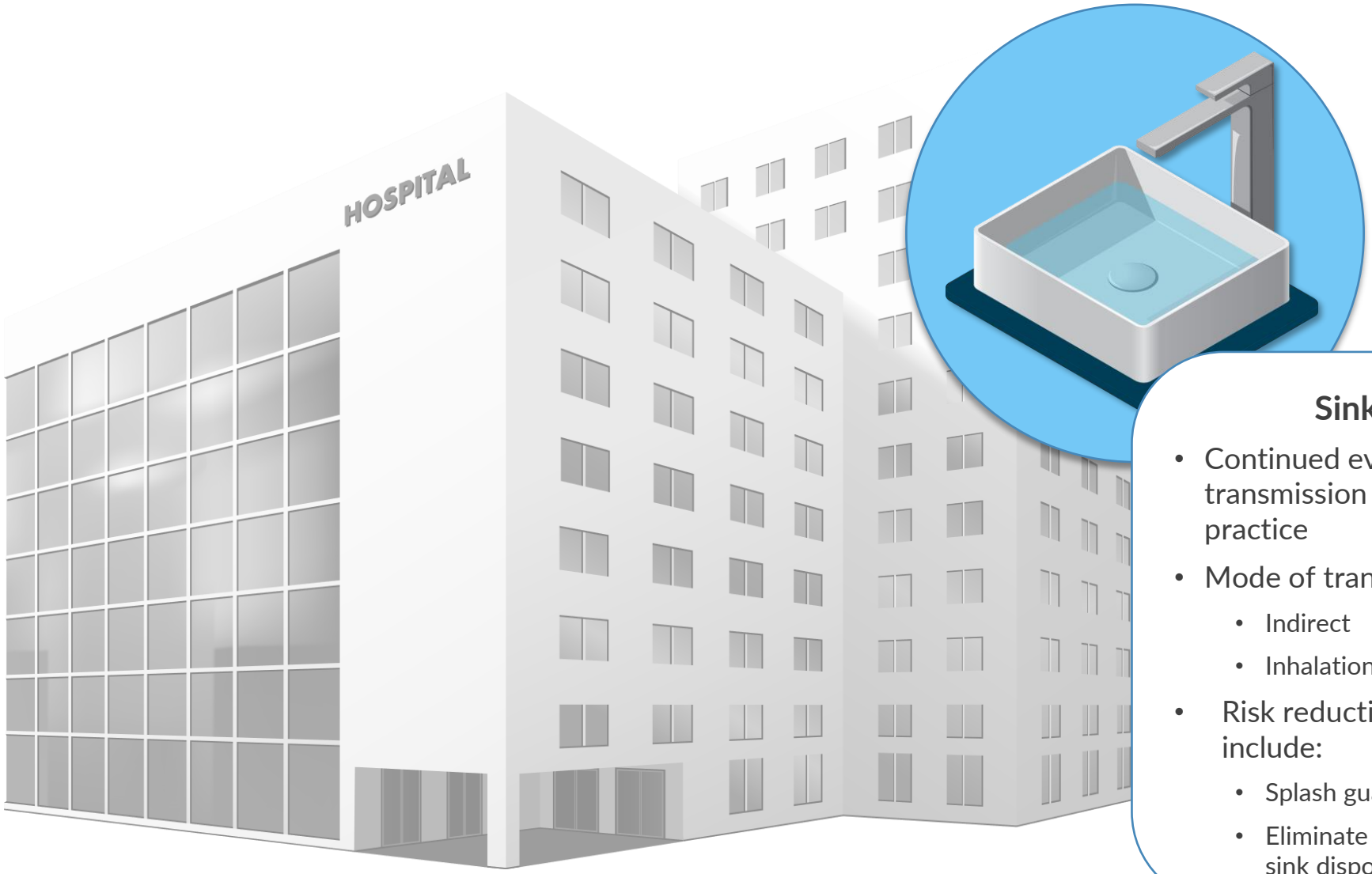
Key Point-of-Use Locations



Point-of-Use (e.g., sinks, showers)

- Most patients are exposed to waterborne pathogens at:
  - End outlets near the point-of-care
  - Reprocessing/support areas
- Mode of transmission:
  - Direct
  - Indirect
  - Inhalation
- Risk reduction strategies include:
  - Measure at least residual disinfectant and temperature profiles
  - Remove aerators
  - Flush/reduce water age
  - Align shower/tub usage with flushing

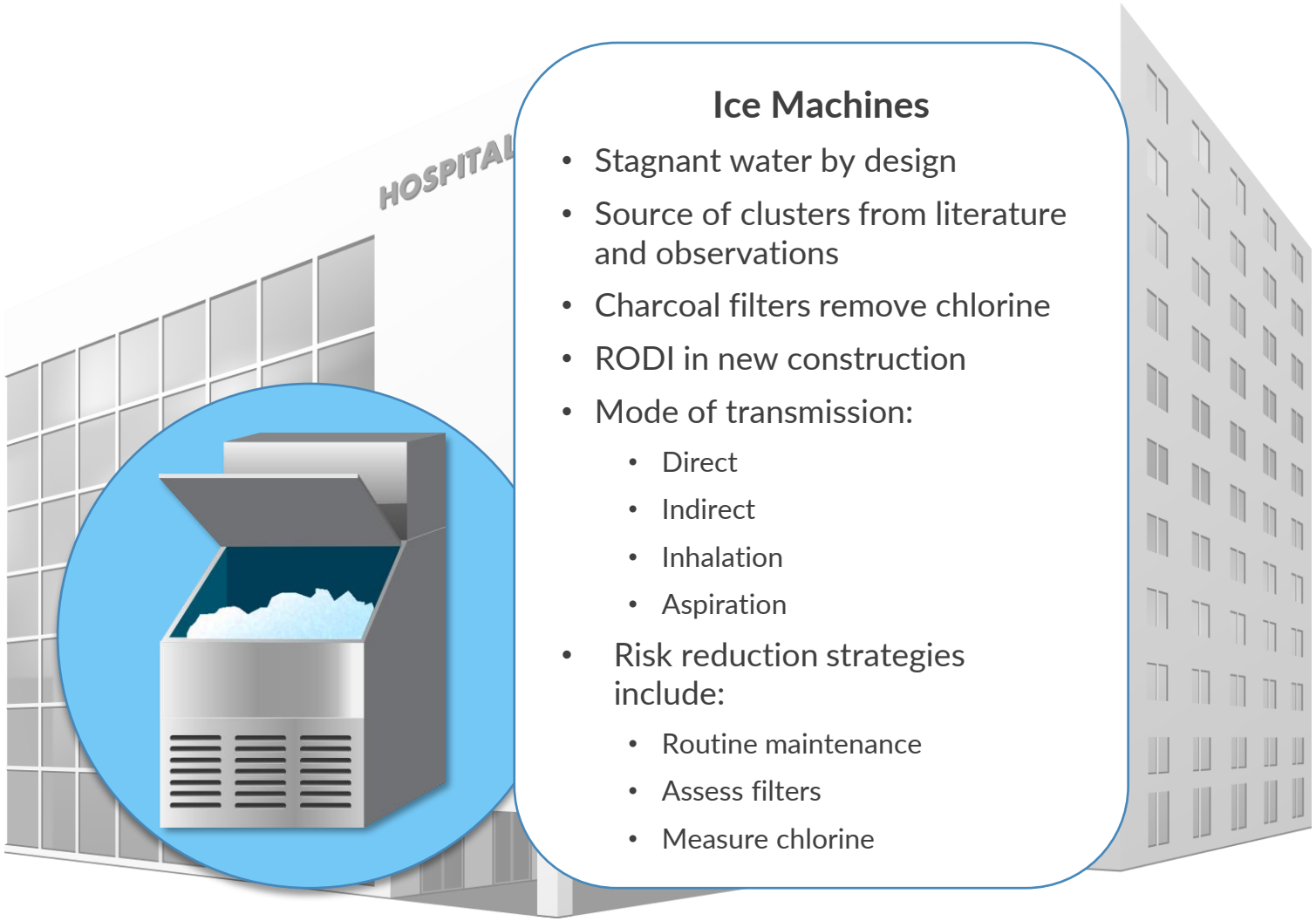
Key Point-of-Use Locations



Sinks Drains

- Continued evidence of MDRO transmission in literature and practice
- Mode of transmission
  - Indirect
  - Inhalation
- Risk reduction strategies include:
  - Splash guards
  - Eliminate non-needed nutritive sink disposal

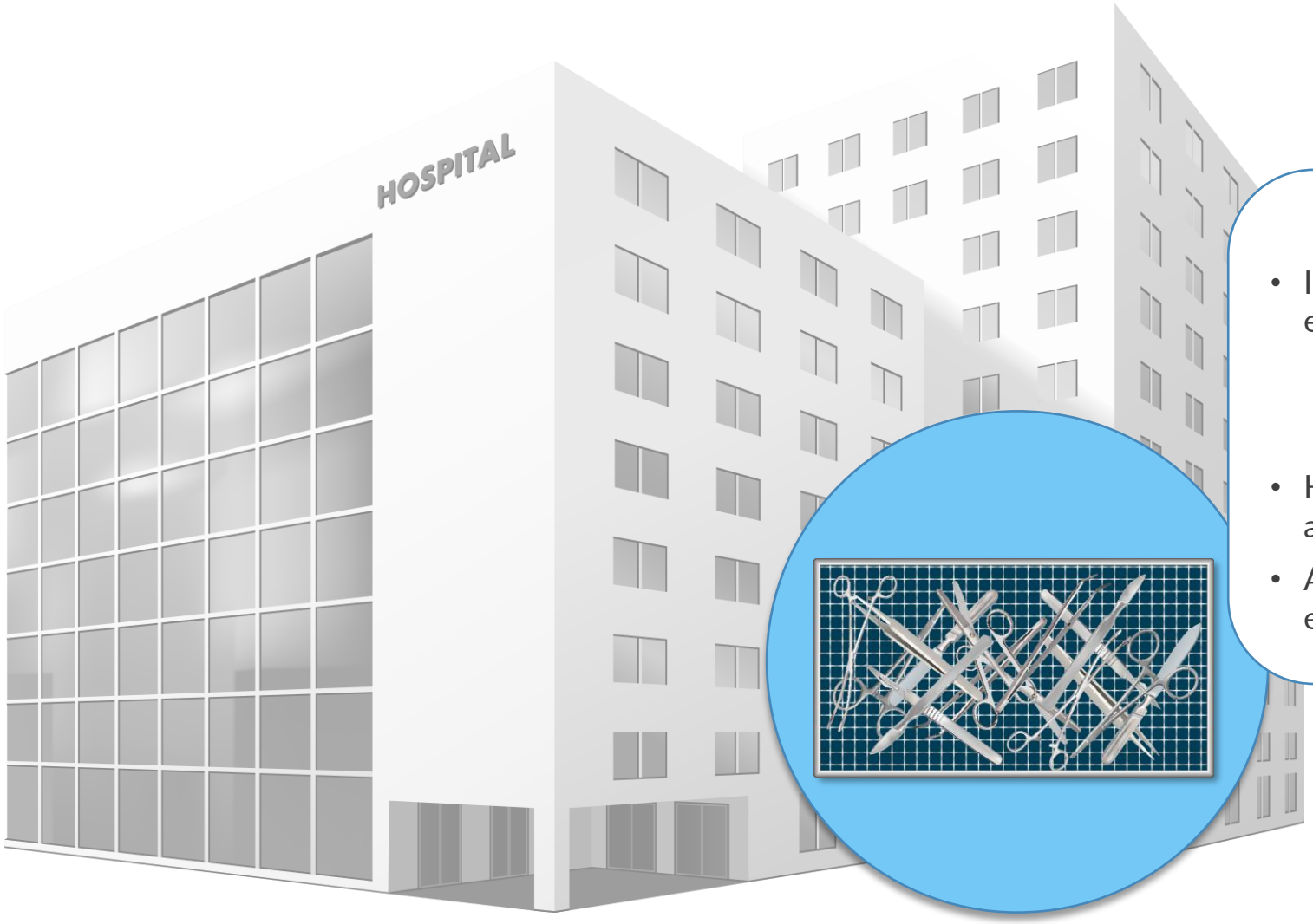
Key Point-of-Use Locations



Ice Machines

- Stagnant water by design
- Source of clusters from literature and observations
- Charcoal filters remove chlorine
- RODI in new construction
- Mode of transmission:
  - Direct
  - Indirect
  - Inhalation
  - Aspiration
- Risk reduction strategies include:
  - Routine maintenance
  - Assess filters
  - Measure chlorine

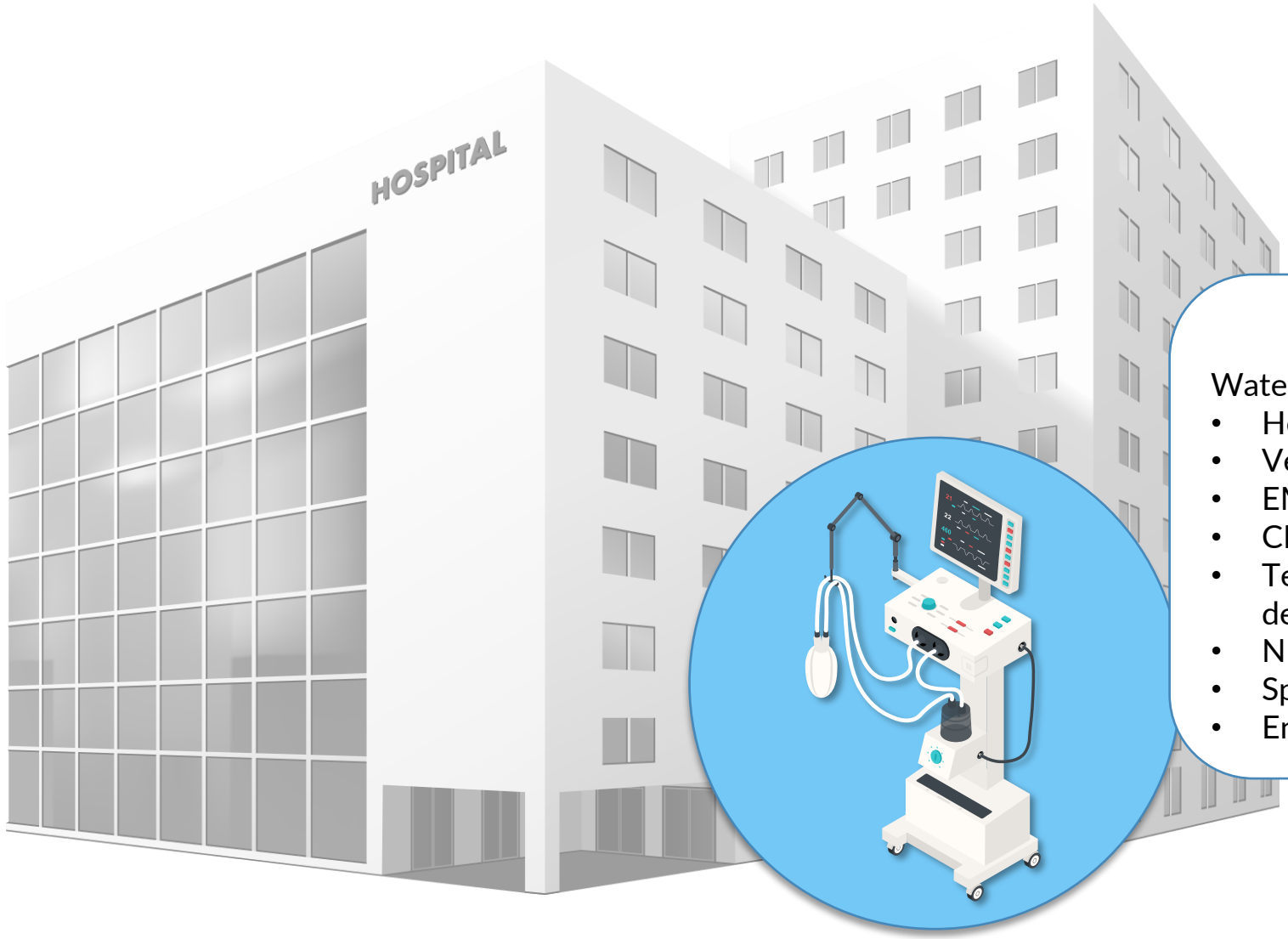
Key Point-of-Use Locations



Reprocessing Equipment

- Ionic compounds are key to equipment integrity
  - Can lead to instrument pitting/damage that can impact reprocessing
- HPC/Endotoxins are infection and patient safety issues
- AAMI ST-108 provides an example program to reduce risk

Medical Equipment



Medical Equipment

Water sources include:

- Heater-cooler units*
- Ventilators*
- EMCO circuits
- CPAP/BiPAP
- Temperature management devices
- NICU incubators*
- Splint pans
- Enteral feeding pumps

Range of Monitoring Procedures

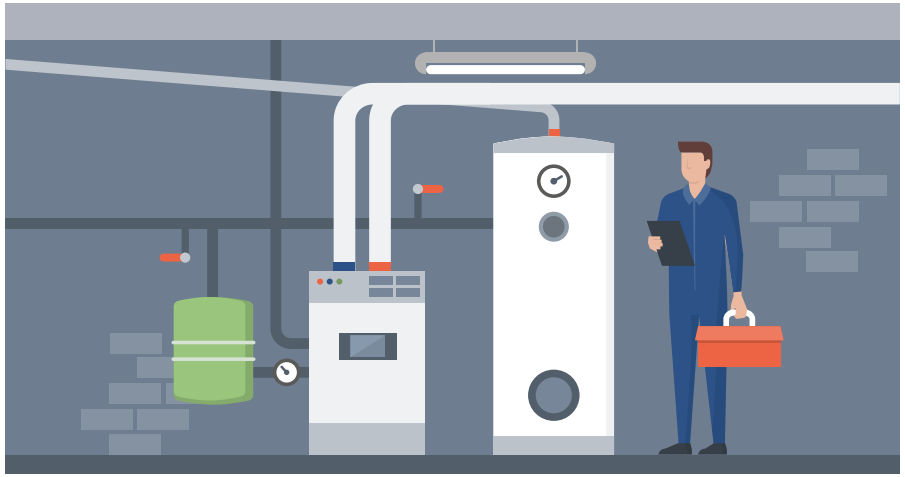
	Control Measures	Low-Risk Population	High Risk Population
Sink	Typical Minimum	Temperature, pH and chlorine at distal outlets	
	Increased Surveillance	Temperature pH and chlorine at distal outlets	Temperature, pH and chlorine at distal outlets Legionella and/or HPC?
Shower	Typical Minimum	Temperature, pH and chlorine at distal outlets	
	Increased Surveillance	Temperature, pH and chlorine at distal outlets	Temperature, pH and chlorine at distal outlets Legionella and/or HPC?
Ice Machine	Typical Minimum	Review preventative maintenance and filters	
	Increased Surveillance	Review preventative maintenance and filters	Review preventative maintenance and filters Chlorine testing Legionella and/or HPC?
Re-processing	Typical minimum	Review system design	Review system design Initial testing?
	Increased Surveillance	Follow AAMI ST-108 or similar	

Monitoring Procedure Considerations for WICRA

- Does a monitoring/prevention plan exist?
- Are the criteria met for selected water quality parameters?
- If not met, does it impact all areas of the hospital (e.g., residual disinfectant) or specific areas (SPD, dialysis, dental)?
- If not met, is it a routine or in-routine exceedance?
- Algorithm/response plan for sampling events?
- Is an action plan in place for continued compliance?
- What is the timeline for the action plan?

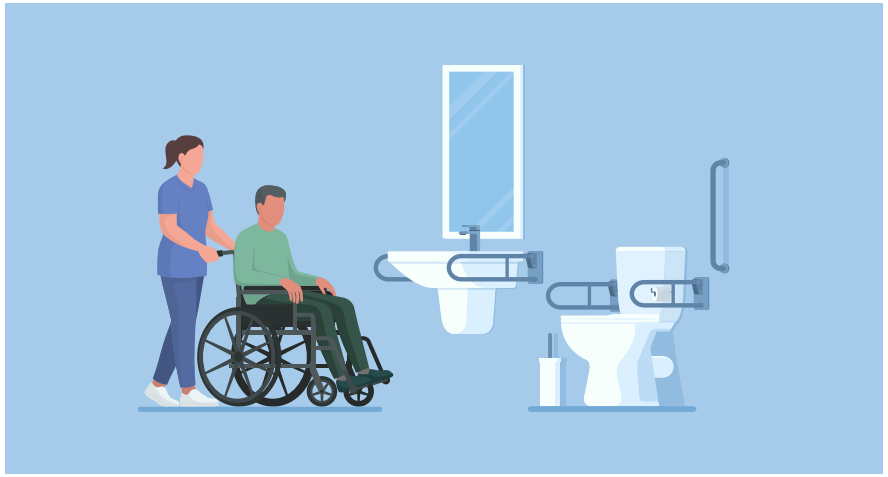
Risk Assessment

Risk Assessment Comparison



Water Systems Risk Assessment

- Bottom-up approach
- Focus on building water systems



Water Infection Control Risk Assessment

- Top-down approach
- Focus on end outlets including medical equipment that uses water

Water Systems Risk Assessment

- Process
  - Conducted primarily by environmental health consultant and Facilities/Engineering department
  - Water Management Plan and flow diagrams review
  - Site visit main campus and primary satellite location to review systems and operations
  - Review of water quality monitoring records
  - Review of system changes/updates
- Narrative assessment with risk ranking scheme

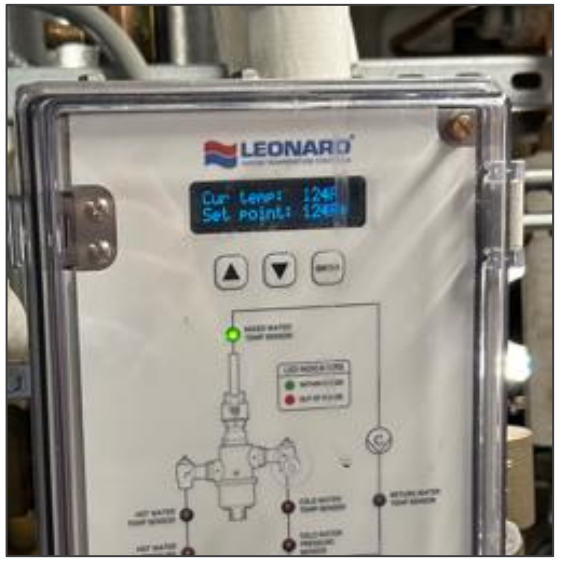
Water Systems Risk Assessment-Typical Findings

- Hot water heater, supply (mixed), and return temperatures inadequate
- Temperature sensors missing, malfunctioning, not-readable (UV powered)
- Cross-connects not managed/flushed
- Flow diagrams not accurate/need updated
- Low chlorine (or residual disinfectant at distal outlets)
- Exceedance on water sampling of cooling towers, portable water, or special uses (RODI) without follow-up
- Dead legs

Water Systems Risk Assessment-Typical Findings

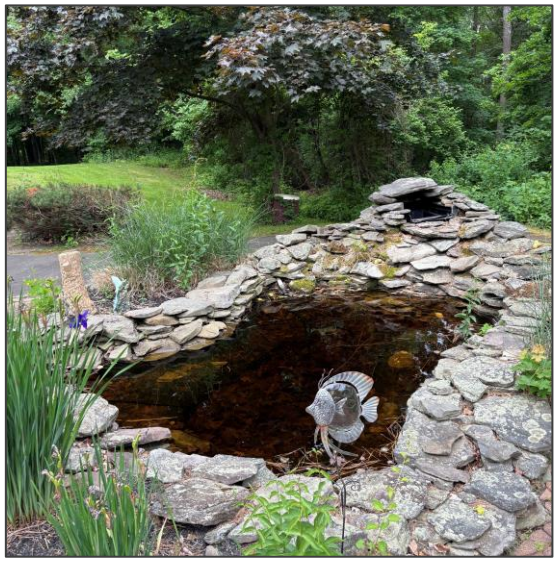
Hot water heater <140 F/Broken Gauge

Mixed water heater <118 F (or malfunctioning)

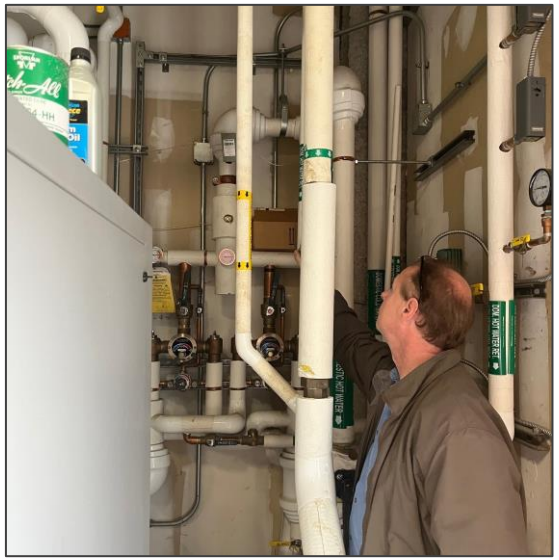


Proper water temperature on a mixing valve

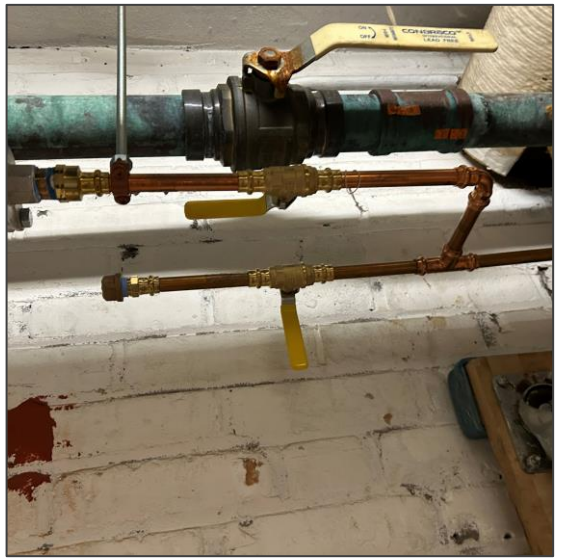
Water Systems Risk Assessment-Typical Findings



Off-season stagnation of a fountain



Dead leg piping



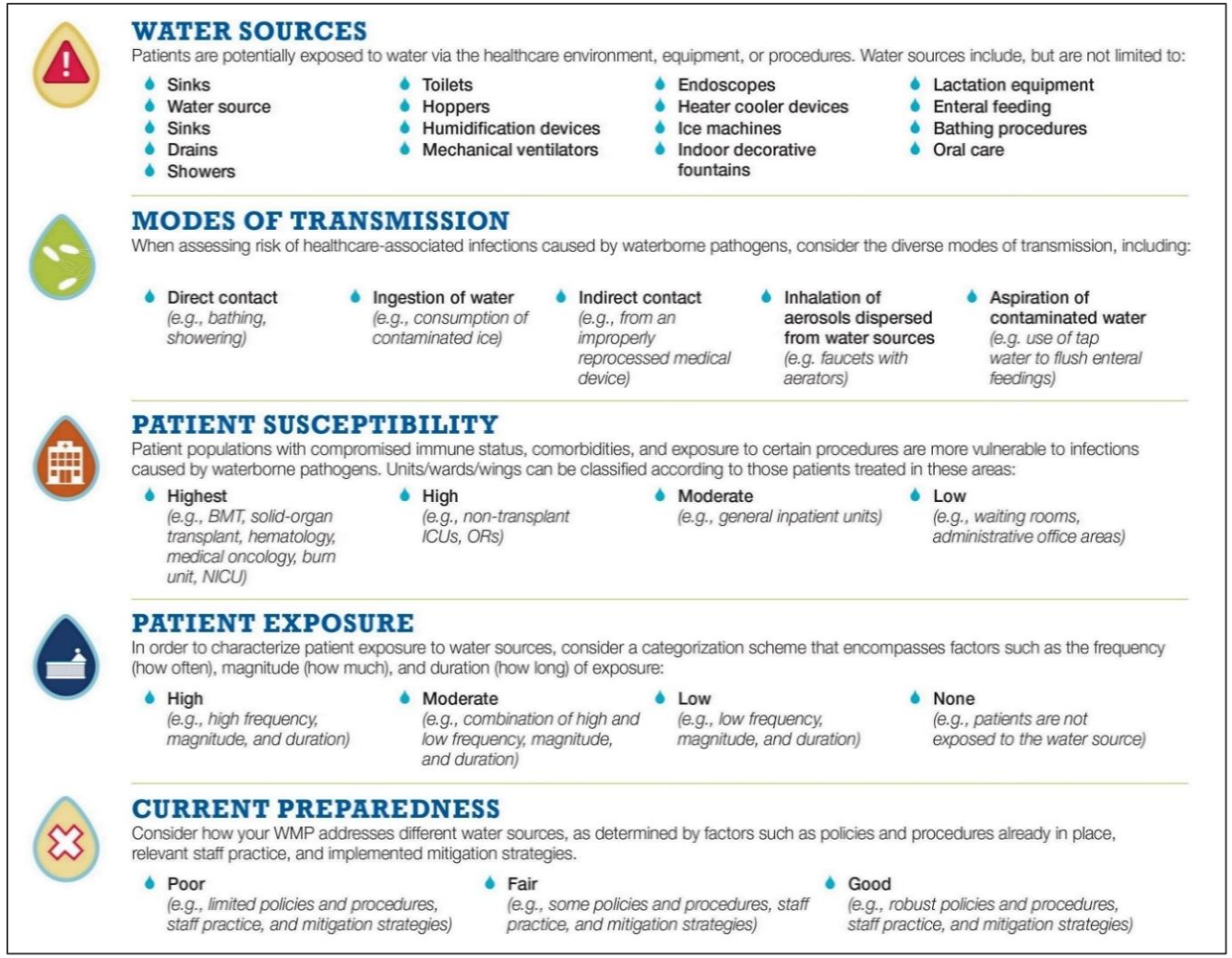
Dead leg piping

Water Systems Risk Assessment-Typical Findings

Properly maintained and labeled cross-connect (bypass)

Dead legs for “future” washer/capacity (valve installed for flushing; piping later removed)

CDC Water Infection Control Risk Assessment



WATER SOURCES

Patients are potentially exposed to water via the healthcare environment, equipment, or procedures. Water sources include, but are not limited to:

- Sinks
- Water source
- Sinks
- Drains
- Showers
- Toilets
- Hoppers
- Humidification devices
- Mechanical ventilators
- Endoscopes
- Heater cooler devices
- Ice machines
- Indoor decorative fountains
- Lactation equipment
- Enteral feeding
- Bathing procedures
- Oral care

MODES OF TRANSMISSION

When assessing risk of healthcare-associated infections caused by waterborne pathogens, consider the diverse modes of transmission, including:

- **Direct contact** *(e.g., bathing, showering)*
- **Ingestion of water** *(e.g., consumption of contaminated ice)*
- **Indirect contact** *(e.g., from an improperly reprocessed medical device)*
- **Inhalation of aerosols dispersed from water sources** *(e.g. faucets with aerators)*
- **Aspiration of contaminated water** *(e.g. use of tap water to flush enteral feedings)*

PATIENT SUSCEPTIBILITY

Patient populations with compromised immune status, comorbidities, and exposure to certain procedures are more vulnerable to infections caused by waterborne pathogens. Units/wards/wings can be classified according to those patients treated in these areas:

- **Highest** *(e.g., BMT, solid-organ transplant, hematology, medical oncology, burn unit, NICU)*
- **High** *(e.g., non-transplant ICUs, ORs)*
- **Moderate** *(e.g., general inpatient units)*
- **Low** *(e.g., waiting rooms, administrative office areas)*

PATIENT EXPOSURE

In order to characterize patient exposure to water sources, consider a categorization scheme that encompasses factors such as the frequency (how often), magnitude (how much), and duration (how long) of exposure:

- **High** *(e.g., high frequency, magnitude, and duration)*
- **Moderate** *(e.g., combination of high and low frequency, magnitude, and duration)*
- **Low** *(e.g., low frequency, magnitude, and duration)*
- **None** *(e.g., patients are not exposed to the water source)*

CURRENT PREPAREDNESS

Consider how your WMP addresses different water sources, as determined by factors such as policies and procedures already in place, relevant staff practice, and implemented mitigation strategies.

- **Poor** *(e.g., limited policies and procedures, staff practice, and mitigation strategies)*
- **Fair** *(e.g., some policies and procedures, staff practice, and mitigation strategies)*
- **Good** *(e.g., robust policies and procedures, staff practice, and mitigation strategies)*

CDC Water Infection Control Risk Assessment

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
BICU Soiled Utility	Hopper, no lid, behind closed door	Indirect contact	4	2	1	8	Automatic door closure; appropriate soiled equipment storage
BICU Medication Preparation Room	Sink with aerator, no splash guard	Aerosolization, and potential for splashing	4	2	3	24	Install splash guards; evaluate removing aerator

Updated WICRA

Step 1: Consolidate locations into general categories based on patient population and service

ICU	2	Inpatient Medicine	3	Inpatient Surgical	4	Perioperative	5	Procedural	6	Medicine Clinic	7	Outpatient Procedural (Cath, GPU)
Patient room sink	A	Patient room sink	A	Patient room sink	C	Communal hand wash	C	Communal hand wash	C	Communal hand wash	C	Communal hand wash
Patient room shower	B	Patient room shower	B	Patient room shower			D	Med room sinks	D	Med room sinks	D	Med room sinks
Communal hand washing s	C	Communal hand washi	C	Communal hand washi	F	Eye wash stations	F	Eye wash stations			E	Nutrition room sinks
Med room sinks	D	Med room sinks	D	Med room sinks	G	Ice/water dispenser	G	Ice/water dispenser	F	Eye wash stations	F	Eye wash stations
Nutrition room sinks	E	Nutrition room sinks			p	"Heater-cooler" contraption CVOR			G	Ice/water dispenser	G	Ice/water dispenser
Ice/water dispenser	G	Ice/water dispenser	G	Ice/water dispenser	K	Communal toilets						
Portable dialysis water/dra	L	Patient room toilet	I	Patient room toilet								
Patient room toilet												

Step 2: Identify all location categories present at each hospital campus

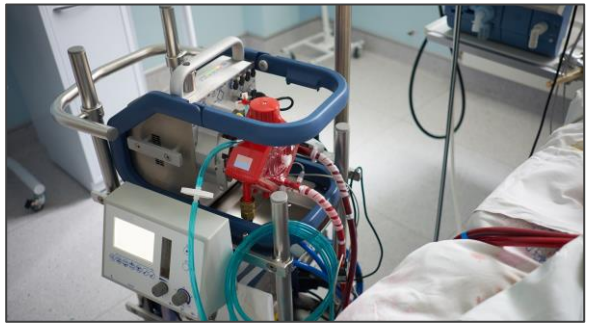
Satellite #1	Satellite #2	Satellite #3	Satellite #4	Satellite #5
Inpatient (medicine/surgical)	Perioperative	Medicine Clinic	Medicine Clinic	Medicine Clinic
Inpatient psych	Medicine Clinic	Radiology	Radiology	Radiology
Perioperative	Radiology	Pharmacy	Scope reprocessing	Scope reprocessing
Medicine Clinic	Pharmacy	Scope reprocessing		
Infusion	SPD	SPD		
Radiology				
Pharmacy				
SPD				

Updated WICRA

Step 3: Identify water sources of each location category

Point-of-Use

- Sinks
- Showers/tubs
- Toilets
- Reprocessing equipment
- Dialysis water boxes
- Ice/water machines
- Specialized systems
- Flushing rim sinks
- Auto-diluter
- Dishwashers
- Floor drains
- Fire sprinklers
- Eye wash stations



Medical Equipment

- Ventilators
- EMCO circuits
- CPAP/BiPAP
- Heater-cooler units
- Temperature management devices
- NICU incubators
- Splint pans
- Enteral feeding pumps

Specialty Systems

- Critical water systems
- Cooling towers
- Outdoor irrigation systems
- Therapy pools
- Fish tanks
- “Bubble” walls

Updated WICRA

Step 4: Assign patient susceptibility, patient exposure, and preparedness for all plumbed water outlets and specialty systems

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 Susceptibility x Patient Exposure x Preparedness	Comments
ICU	Portable dialysis water/drain box	Inhalation of aerosols/Indirect Contact	4	3	3	36	
ICU	Patient shower	Inhalation of aerosols/direct contact	4	3	1	12	
ICU	Patient room toilet	Inhalation of aerosols/direct contact	4	3	1	12	
ICU	Patient room sink	Inhalation of aerosols/ direct contact/indirect contact	4	3	1	12	
ICU	Shower/tub room	Inhalation of aerosols/ direct contact	4	3	1	12	
ICU	Nutrition room sinks	Indirect contact	4	2	1	8	Clinical nutrition "milk lab"

Step 5: Assign patient susceptibility, patient exposure, and preparedness for all medical devices with water source/reservoir

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 Susceptibility x Patient Exposure x Preparedness	Comments
ECMO circuits	Inhalaton	4	3	1	12	
Ventilators	Inhalaton	4	3	1	12	
Blanketrols	Indirect	4	3	1	12	
Giraffe incubators	Inhalaton	4	3	2	24	

WICRA-Typical Findings

Whirlpool tub (w/ staining)

Low flow faucet

Visual Biofilm

WICRA-Typical Findings

Aerator with suspect biofilm

Infrared Sink (low flow)

ICU Plumbing Fixture with dead legs

Updated WICRA

Considerations for WICRA rankings:

- Patient susceptibility
  - Which patients are generally assigned to that service/location?
  - Are these patient groups immunocompromised or critically ill?
  - Which patients receive materials produced by a given location?
- Patient exposure
  - Do the patients routinely use the water source?
  - Is the water source in a room with enhanced air handling?
  - Are environmental controls, like splash guards, in place?
  - Does the medical device stay in a patient's room for the entire admission?
  - Is the medical device used as part of another invasive device?
  - Is the medical device/equipment used for critical procedures?
- Preparedness
  - Are there protocols for preventative maintenance of the water system?
  - Is the water system tested as part of a quality control program?
  - Does medical equipment with a water reservoir have cleaning protocols with clear operational owners?
  - Does the water system use specialized water, like reverse osmosis?

Updated WICRA

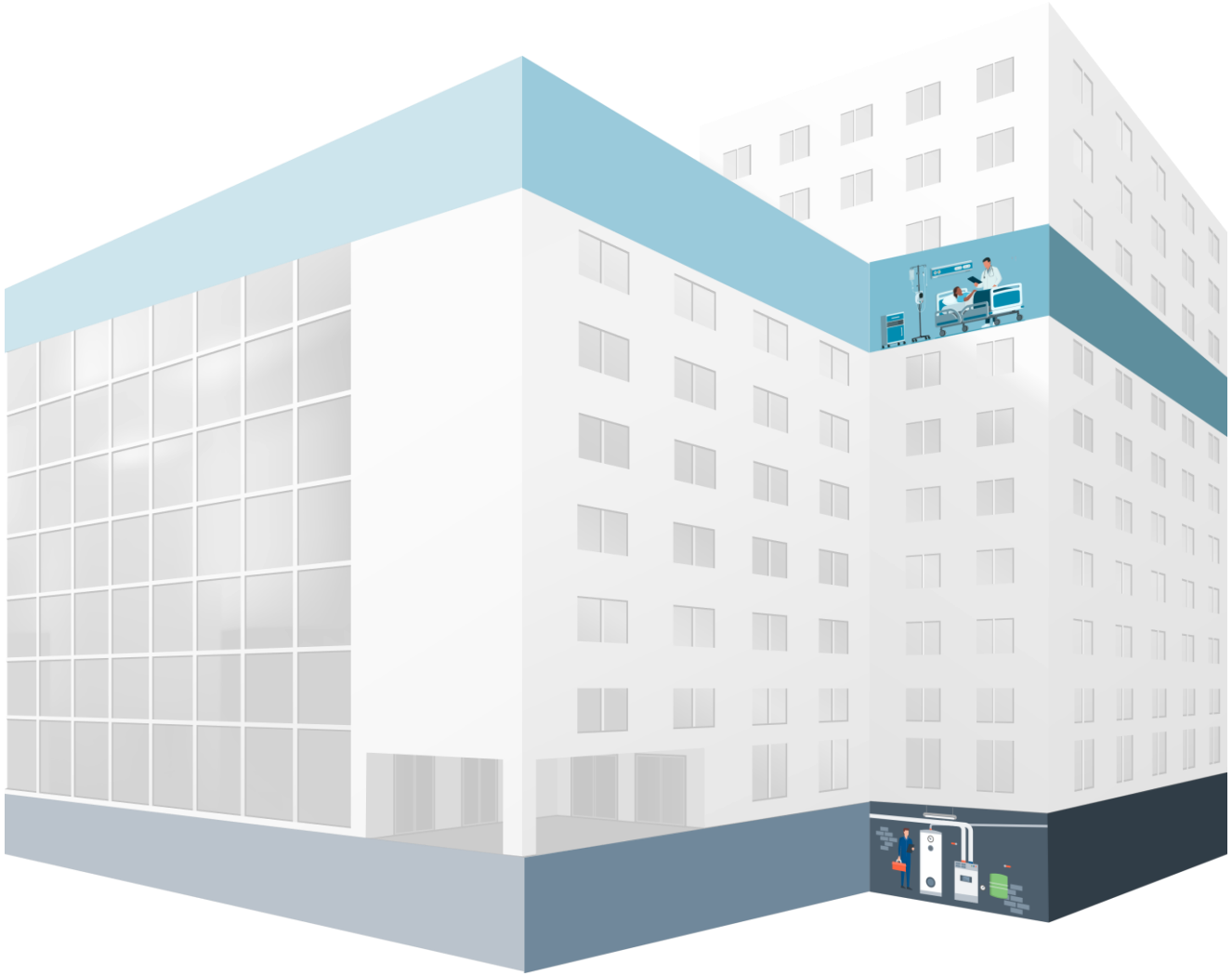
Step 6: Use risk score to determine annual priorities for patient safety and quality improvement initiatives

Score	Implication
<12	Continue to implement and monitor current process
12-21	Consider enhanced monitoring or improvement processes, if applicable
>21	Urgent improvement action required

Conclusion

Limitations of a Single Focus Approach

- Water system risk assessment is a “Bottom-up” approach that focuses on water systems’ design, physical condition, and maintenance vulnerabilities
- WICRA is a “Top-down” risk assessment focused on end outlets and other water uses (incl. medical equipment that uses water)
- WICRA assumes deep knowledge of water systems and generally assumes a water systems risk assessment has already been completed



Benefits of a Comprehensive Risk Assessment

- Multidisciplinary team
- Assessment of water systems **and** identification of components/water uses and risks is important
- Water system risk assessment should be done initially and annually (lots of opportunities for failure)
- WICRA robust patient risk assessment
  - Patient susceptibility
  - Degree of patient exposure
  - Current mitigation/preparedness practices
  - Considers sources beyond plumbed systems
- Systematic follow-up actions based on monitoring procedures or risk assessment findings
- Routine reassessment, review, and updates

Conclusion

- Understanding the complexity, condition, and scope of your hospital's water system is essential to developing a comprehensive water management risk management plan
- The CDC WICRA is a valuable tool for creating a robust patient-centered risk assessment and directing water management team priorities, but it requires deep knowledge of the water system
- Conduct both a water systems risk assessment and WICRA and share results with key team members
- A multidisciplinary team with representatives from Infection Prevention, Facilities/Engineering, Environmental Health/Safety, and an environmental health consultant helps ensure a building and systems-wide assessment

References

1. Regev-Yochay G, Margalit I, Smollan G, et al. Sink-traps are a major source for carbapenemase-producing *Enterobacteriaceae* transmission. *Infect Control Hosp Epidemiol.* 2024; 45: 284-291. https://doi.org/10.1017/ice.2023.270
2. Catho G, Martischang R, Boroli F, et al. Outbreak of *Pseudomonas aeruginosa* producing VIM carbapenemase in an intensive care unit and its termination by implementation of waterless patient care. *Crit Care*. 2021; 25, 301. https://doi.org/10.1186/s13054-021-03726-y
3. Kasperbauer S, Daley CL. *Mycobacterium chimaera* Infections Related to the Heater-Cooler Unit Outbreak: A Guide to Diagnosis and Management. *Clin Infect Dis*. 2019; 68(7): 1244-1250. https://doi.org/10.1093/cid/ciy789
4. Food and Drug Administration. FDA's Ongoing Evaluation and Continued Monitoring of Reports of Nontuberculous Mycobacteria Infections Associated with Water-Based Heater-Cooler Devices. Published June 14, 2022. Accessed April 3, 2024. https://www.fda.gov/medical-devices/what-heater-cooler-device/fdas-ongoing-evaluation-and-continued-monitoring-reports-nontuberculous-mycobacteria-infections
5. Klpompas M, Akusobi C, Boyer S, et al. *Mycobacterium abscessus* Cluster in Cardiac Surgery Patients Potentially Attributable to a Commercial Water Purification System. *Ann Intern Med*. 2023; 176(3): 333-339. https://doi.org/ 10.7326/M22-3306
6. Centers for Disease Control and Prevention. Reduce Risk from Water. cdc.gov. Last reviewed September 11, 2019. Accessed May 15, 2024. https://www.cdc.gov/hai/prevent/environment/water.html
7. Centers for Medicare & Medicaid Services. Requirement to Reduce *Legionella* Risk in Healthcare Facility Water Systems to Prevent Cases and Outbreaks of Legionnaires' Disease. Ref QSO-17-30-Hospitals/CAHs/NHs. 2018. cms.gov. Published July, 6, 2018. Accessed April 3, 2024. https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/QSO17-30-HospitalCAH-NH-REVISED-.pdf
8. The Joint Commission. R^3 Report: New Standard for Water Management Program—Hospitals, Critical Access Hospitals, and Nursing Care Centers. Jointcommission.org. Published October 7, 2021. Accessed April 26, 2024. https://www.jointcommission.org/-/media/tjc/documents/standards/r3-reports/r3-report-water-management-final_nov1.pdf
9. Centers for Disease Control and Prevention. Water Infection Control Risk Assessment (WICRA) for Healthcare Settings. cdc.gov. Accessed May 15, 2024. https://www.cdc.gov/hai/pdfs/prevent/water-assessment-tool-508.pdf

Questions?

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