Water Management, Construction and Renovation

Through the Lens of Infection Prevention

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10/27/22

Joint Commission Resources

Objectives

- Discuss risk factors related water, construction and renovation in a healthcare facility
- Demonstrate methods to reduce risks to patients and staff related to water, construction and renovation in a healthcare setting
- Identify resources available to support water management and construction/renovation programs

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Water Management and Infection Control

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Recent Legionella Outbreaks

- 6 Cases at a Senior's Home in Montreal – August 2022
- 13 Cases and 1 Death in Napa County, California – July 2022
- 30 Cases and 2 Deaths in Highbridge, The Bronx, New York – June 2022
- 20 cases and 2 deaths in Palm Springs and Palm Desert, California – March 2022

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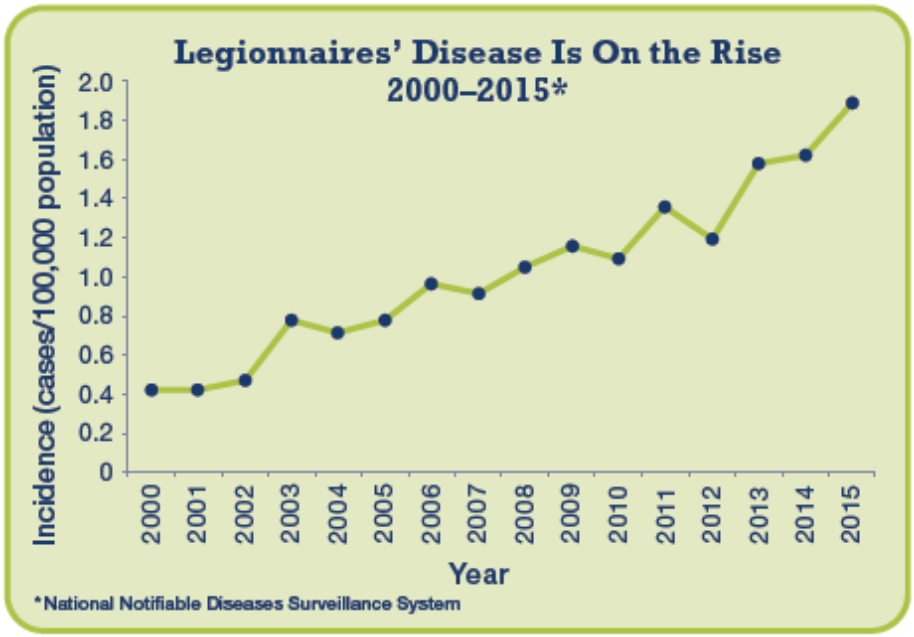
Why Are Water Management Plans Needed

- More Legionella pneumophila in the environment
- More susceptible patient population
- Increased awareness and testing
- 2018 CDC reported 9,933 cases
- Many more suspected but not diagnosed



In the United States, reported cases of Legionnaires' disease have increased by nearly four and a half times since 2000. More illness occurs in the summer and early fall but can happen any time of year.

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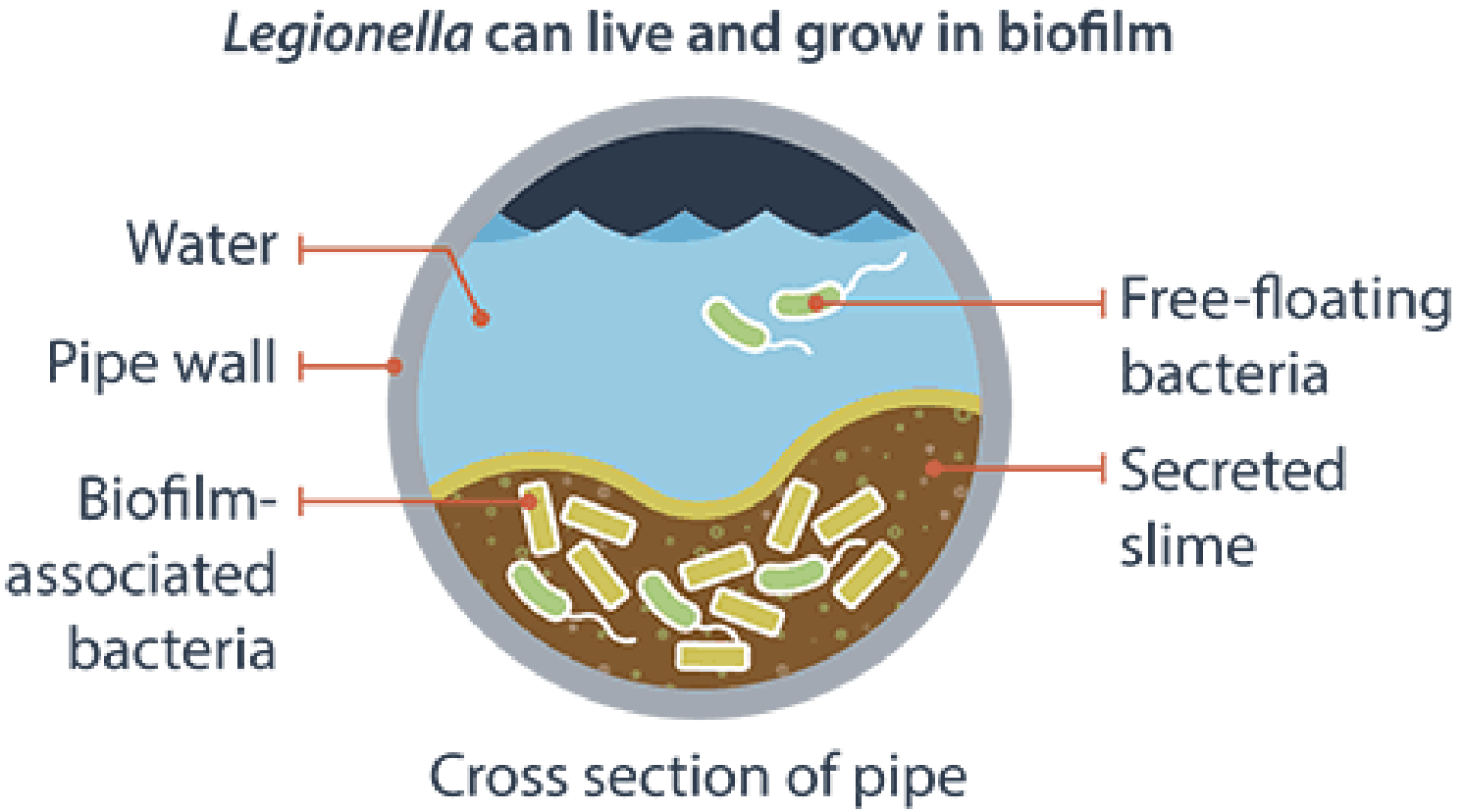
Legionella



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Waterborne Management Program
The Healthcare Statistics

- 75% of hospitals have a water management program
- 77% of hospitals have not implemented their water management program

- ***1 in 4 patients who acquire their infection in a healthcare facility will die***

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Internal and External Factors

- Construction
- Water main breaks
- Changes in municipal water quality
- Biofilm
- Scale and sediment

- Water temperature fluctuations
- pH fluctuations
- Inadequate levels of disinfectant
- Changes in water pressure
- Water stagnation

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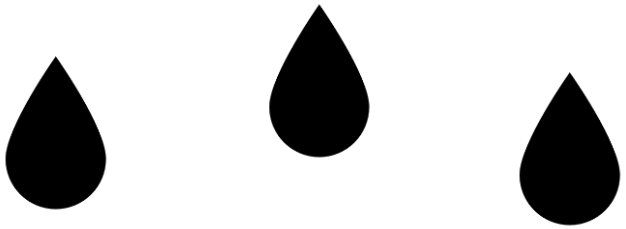
Potential Sources of Contamination

- Cooling towers and evaporative condensers
- Dialysis water and equipment
- Hydrotherapy tanks and pools
- Heating and cooling equipment
- Equipment that is connected to main water systems (such as endoscope reprocessors and dental unit water lines)



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CMS

- In June 2017, the Centers for Medicare & Medicaid Services (CMS) released a survey and certification memo stating that healthcare facilities should develop and adhere to ASHRAE-compliant water management programs to reduce the risk for *Legionella* and other pathogens in their water systems

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CMS

- Applies to:
  - Hospitals
  - Critical access hospitals
  - Long-term care

Implement a plan that reduces Legionella, and other opportunistic water pathogens

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/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.*

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CMS Requirements – Water Management Plan

- Establish a Water Management Team (Multidisciplinary)
- Perform a Water System Survey and Prepare Diagrams of building water systems
- Conduct a Facility Risk Assessment to identify areas where Legionella and other waterborne pathogens could grow and spread in the facility water systems

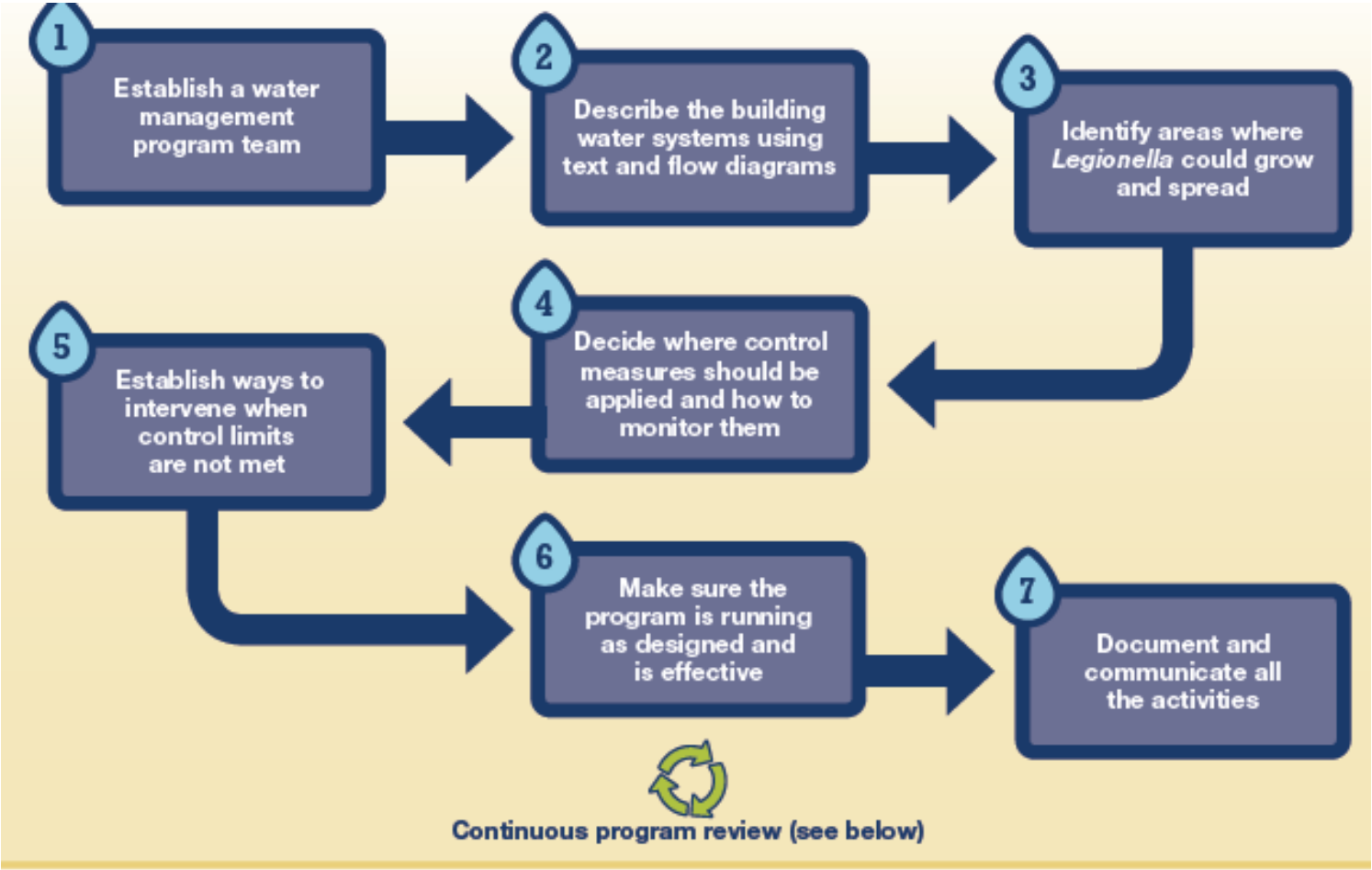
Water Management Plan

- Establish acceptable ranges for control measures and operations
- Implement a water management program that considers ASHRAE industry standard and the CDC tool kit, and identify control measures
- Perform verification and validation

CMS – Water Management

- Document measurements and corrective actions
  - Risk Assessment
  - Control Measures
  - Acceptable Limits
  - Corrective Actions/Contingency Planning
  - Standard Operating Procedures
- Review and update as needed

Key Points



CDC Toolkit 6/5/2017

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Establishing a Multidisciplinary Team

- Environment of Care
- Infection Prevention
- Facility Engineer
- Architect
- Clinical Staff
- Topic Experts

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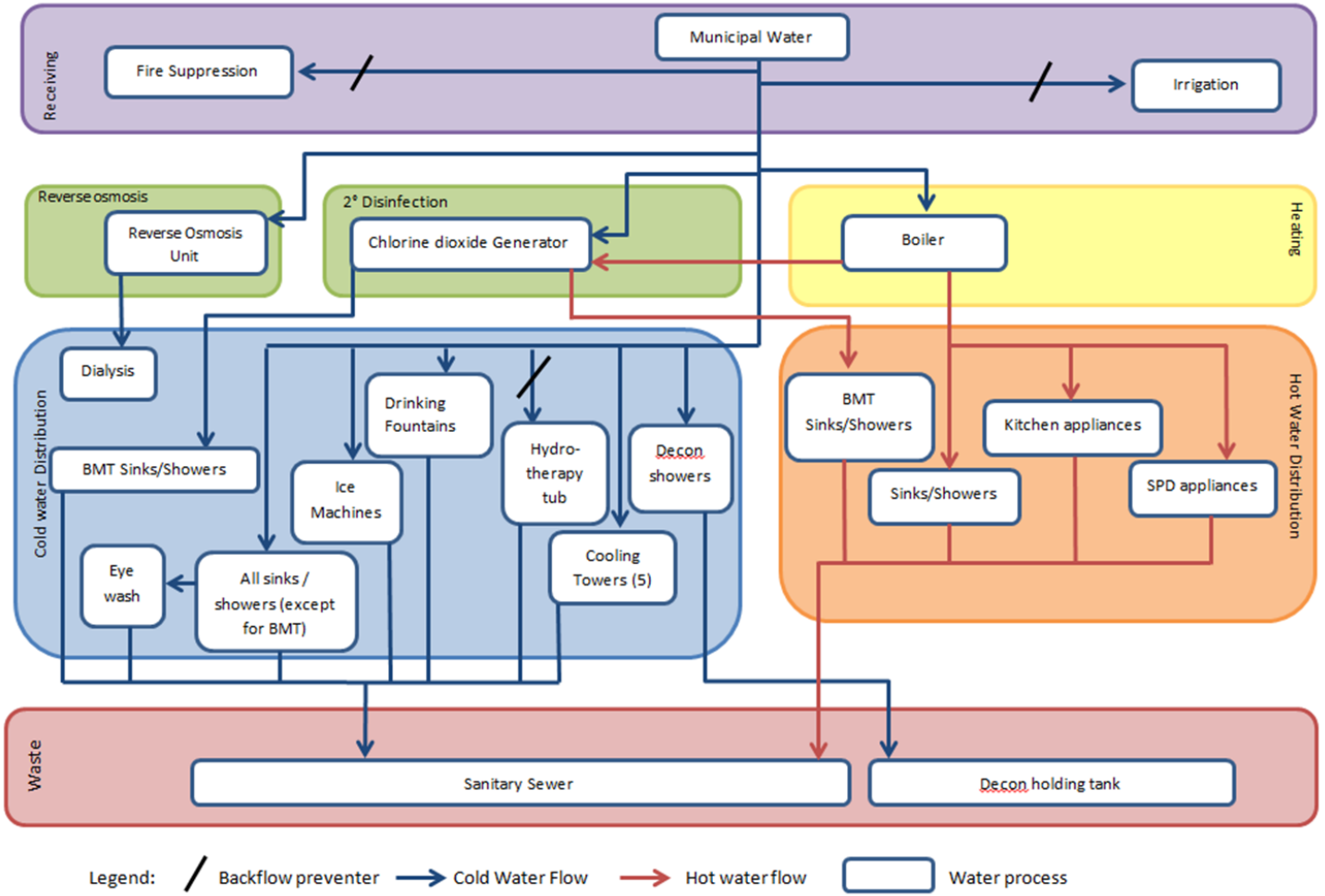
Describe the Building's Current Water System



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Building Factors to Consider

- Structure and size
- Age
- Location and surrounding conditions
- Unique areas of risk for *Legionella* growth and spread
- Susceptibilities of the people found within

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Cooling Tower

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Inside Slime

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Identify Where Legionella & Other Pathogens Grow – Risk Assessment

- Hospital water systems
- Showers
- Faucets
- Sinks
- Ice Machines
- Water baths
- Eyewash Stations

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What's Wrong with this Picture?

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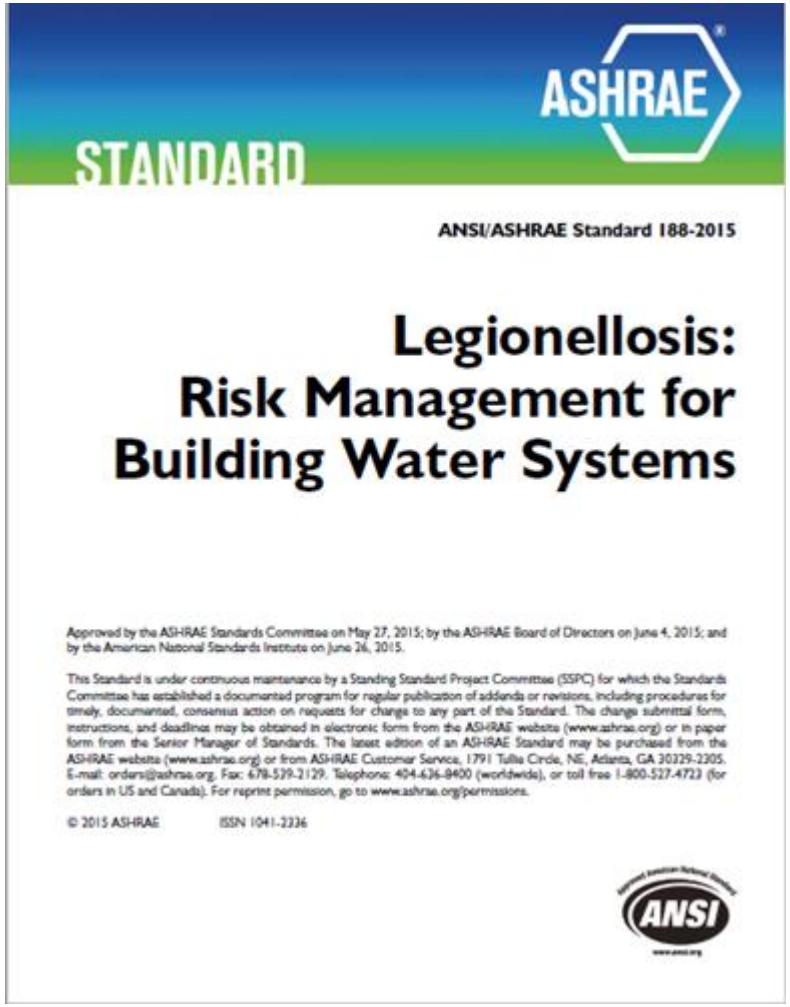
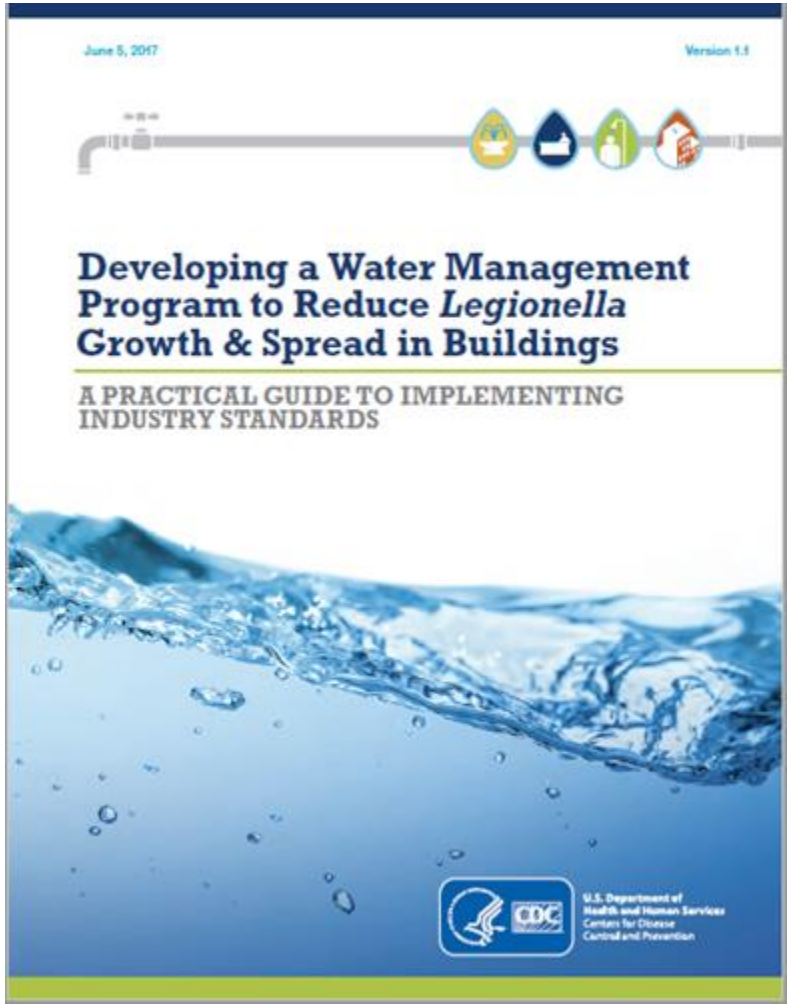
Consider CDC Toolkit and ASHRAE 188





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Acceptable Ranges of Water Management Program

- Testing protocols and acceptable ranges for control measures
- Take corrective action when results of testing and/or control limits are not maintained

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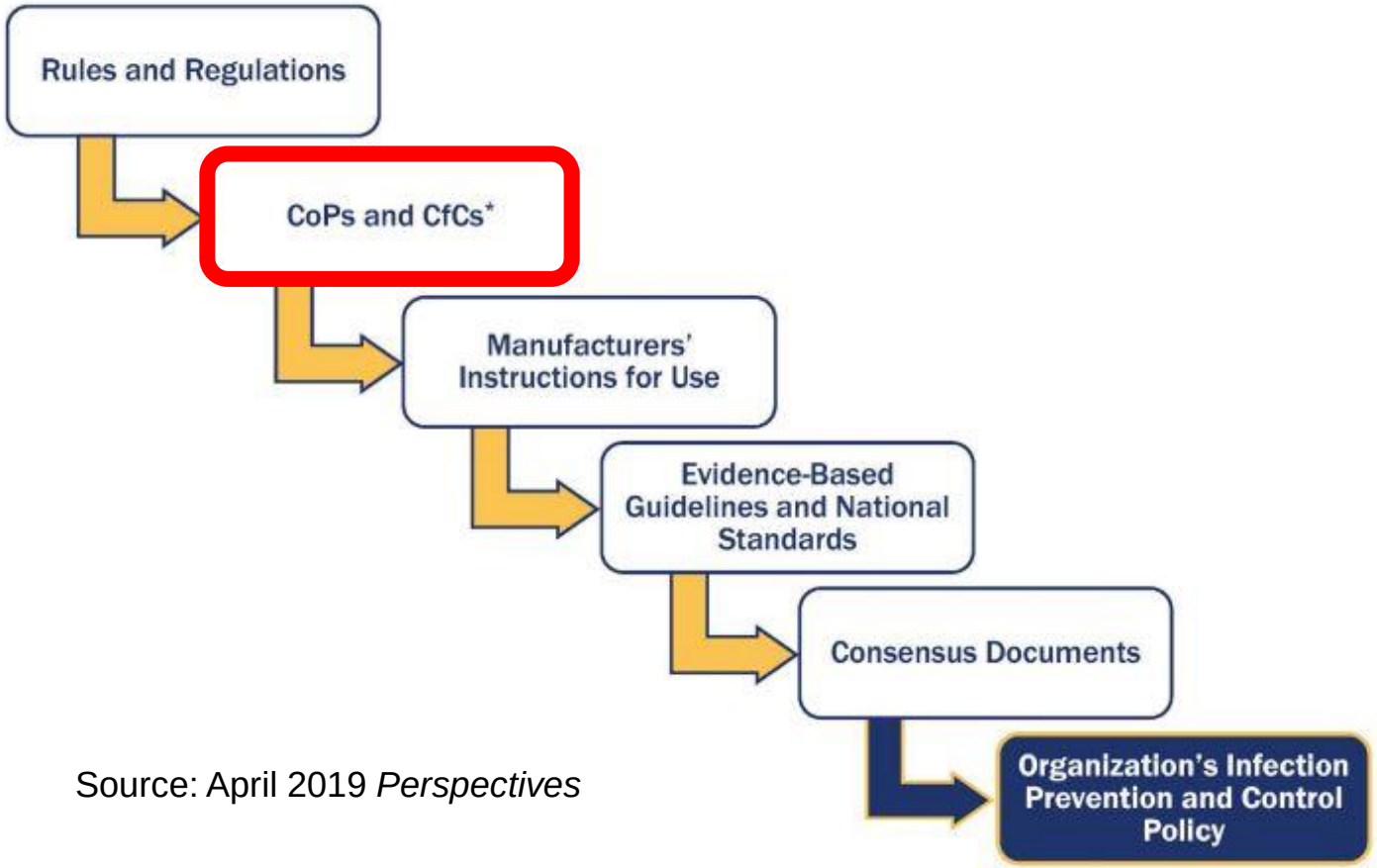
Applicable Requirements
The Joint Commission's Scoring?



Source: April 2019 *Perspectives*

** For organizations that use Joint Commission accreditation for deemed status purposes or that are required by state regulation or directive, Conditions of Participation (CoPs) and/or Conditions for Coverage (CfCs) should be reviewed for applicable mandatory requirements.*

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What IC Should Know

- Basic components of water systems in health care facilities
- Types and modes of transmission of waterborne infectious diseases in health care facilities
- Strategies for preventing and controlling waterborne microbial contamination, transmission, and acquisition

Strategies For Preventing and Controlling

- Contingency plans for provision of potable water during periods of contamination or disruption
- Risk assessment for *Legionella* in cooling towers and potable water performed annually or more often if indicated
- Implementation of a surveillance program to detect health care-associated infections resulting from *Legionella* spp.

Strategies For Preventing and Controlling

- A program for inhibiting the growth of *Legionella* spp. in the potable water system and in cooling towers
- A program for maintaining and monitoring dialysis system water and dialysate quality
- Adherence to the Association for the Advancement of Medical Instrumentation (AAMI) standards for hemodialysis

Strategies For Preventing and Controlling

- An inventory of all water inlets connected to main water lines, such as water fountains, ice machines, dental units, and automated endoscope reprocessors, dialysis boxes
- Be part of the team, and include other members as part of your team

Keep Facilities Staff Engaged with IC

- Periodically invite facilities personnel to IPC Committee or other applicable meetings to discuss the water management program they have in place
- Educate the safety committee on existing program including data and proactive plan

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Know Your Regulations

- Options may vary depending upon state and local building codes, water treatment regulations, healthcare accreditation and survey requirements, and public health reporting requirements
  - For example, anti-scald regulations may limit maximum allowable water temperatures

The Joint Commission Standards

Standard EC.01.01.01

- The hospital has a written plan for managing its utility system

Standard EC.02.01.01

- The organization manages safety and security risks.

Standard EC.02.05.02

- The organization manages risks associated with its utility systems

Standard EC.02.05.05

- The organization inspects, tests, and maintains utility systems

Standard IC.01.03.01

- The organization identifies risks for acquiring and transmitting infections

Standard IC.01.05.01

- The organization has an infection prevention and control plan

Standard IC.02.01.01

- The organization implements its infection prevention and control plan

Standard IC.03.01.01

- The organization evaluates the effectiveness of its infection prevention and control plan

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Notes To Consider

- Refer to the Centers for Disease Control and Prevention's "Water Infection Control Risk Assessment" (WICRA for Healthcare Settings) as a good example for performing a water-related risk assessment
- Consider incorporating basic practices for water monitoring
  - Water temperature
  - Residual disinfectant
  - PH

Culturing

- The Joint Commission and CMS do not require culturing for *Legionella* or other waterborne pathogens. Testing protocols are at the discretion of the hospital unless required by law or regulation

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Construction & Renovation

Joint Commission Resources

Construction Creates Risks

- Construction and renovation projects in the healthcare environment can pose risks of particulate-borne disease transmission
- Mold spores can become airborne or tracked through the hospital by construction workers
- Interruption of water system during construction have to led HAIs (Aspergillus, Legionella, Pseudomonas)
- Work being done right beside patient care

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Facilities Guidelines Institute

- The Facility Guidelines Institute (FGI) is a nonprofit organization that works to develop guidelines for designing and building hospitals and other health care facilities
- The infection preventionist (IP) should have access to and knowledge of the applicable guidelines for design and construction of healthcare facilities
- 2022 version recently released (every 4 years)
- Which version has your state adopted?

Planning Phase

Preconstruction / Design

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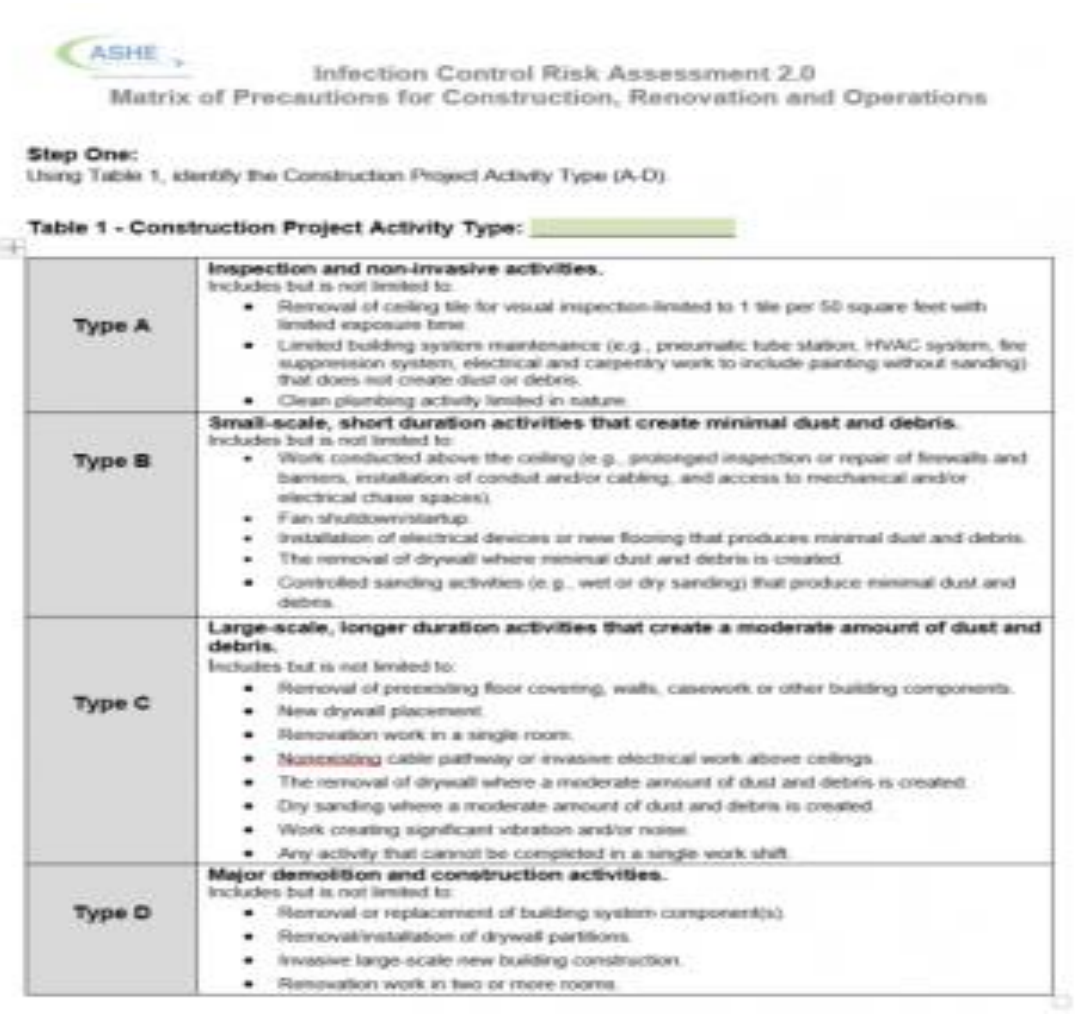
Infection Control Risk Assessment

- Systematic process that determines level of risk to patients and defines controls to reduce risk
- Each project is unique and must be evaluated
- Use a multidisciplinary team approach to incorporate infection control into the project
- Conduct a walk through of the space as part of ICRA activity

ICRA 2.0



ASHE

Infection Control Risk Assessment 2.0
Matrix of Precautions for Construction, Renovation and Operations

Step One:
Using Table 1, identify the Construction Project Activity Type (A-D)

Table 1 - Construction Project Activity Type:

Type A	**Inspection and non-invasive activities.** Includes but is not limited to: • Removal of ceiling tile for visual inspection limited to 1 tile per 50 square feet with limited exposure time. • Limited building system maintenance (e.g., pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding) that does not create dust or debris. • Clean plumbing activity limited in nature.
Type B	**Small-scale, short duration activities that create minimal dust and debris.** Includes but is not limited to: • Work conducted above the ceiling (e.g., prolonged inspection or repair of firewalls and barriers, installation of conduit and/or cabling, and access to mechanical and/or electrical chase spaces). • Fan shutdown/startup. • Installation of electrical devices or new flooring that produces minimal dust and debris. • The removal of drywall where minimal dust and debris is created. • Controlled sanding activities (e.g., wet or dry sanding) that produce minimal dust and debris.
Type C	**Large-scale, longer duration activities that create a moderate amount of dust and debris.** Includes but is not limited to: • Removal of preexisting floor covering, walls, casework or other building components. • New drywall placement. • Renovation work in a single room. • Nonexisting cable pathway or invasive electrical work above ceilings. • The removal of drywall where a moderate amount of dust and debris is created. • Dry sanding where a moderate amount of dust and debris is created. • Work creating significant vibration and/or noise. • Any activity that cannot be completed in a single work shift.
Type D	**Major demolition and construction activities.** Includes but is not limited to: • Removal or replacement of building system component(s). • Removal/installation of drywall partitions. • Invasive large-scale new building construction. • Renovation work in two or more rooms.

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ICRA 2.0

- American Society for Health Care Engineering (ASHE) 2022
- Expands the risk categories from four to five
- Adds more examples for each section to help assess potential problem areas
- Check list style is more user-friendly

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Points to Consider

- Disruption of essential services
- Relocation or placement of patients
- Barrier placements to control airborne contaminants
- Debris cleanup and removal
- Traffic flow
- Phasing and budget

Isolation Rooms

- Determine the number, location, and types of isolation rooms for airborne infection isolation (AII) and protective environments (PE) when the FGI Guidelines* or local risk assessment requires them

*FGI requires an infection control program review prior to starting design

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Isolation Room Considerations

- The patient population, mission, and program goals of the facility
- Experience with communicable diseases
- Other available resources within the community
- General note: up until now, the number of Airborne Infection Isolation (AII) rooms has been established by TB risks. COVID-19 has caused a shift in this thought process

Handwashing/Sanitization

- The number, location, and types of handwashing stations and hand sanitation dispensers, when the FGI Guidelines* or local risk assessment requires them

*FGI Guidelines establish the minimum number, types, and locations of handwashing stations, with the need for additional stations determined by the ICRA

Sinks- Consider the Purpose

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Surface Finishing and Furnishing Material

- Ideal surfaces and materials are:
  - Durable
  - Compatible with the facility's cleaning and disinfection practices
  - Resistant to damage from moisture
  - Impermeable to body fluids (patient care areas)

Education and Accountability

- Educate staff and construction workers about the importance of adhering to infection control measures, i.e., barrier maintenance during the project
- Include language in the construction contract requiring construction workers and subcontractors to participate in infection-control training

Construction Phase

Moving Patients

- Identify target patient populations for relocation based on the risk assessment
- Arrange for the transfer in advance to avoid delays
- At-risk patients should wear protective respiratory equipment (e.g., a high-efficiency mask) when outside their protective environment rooms

Travel and Traffic

- Determine appropriate alternate routes from the risk assessment
- Designate areas (e.g., hallways, elevators, and entrances/exits) for construction worker use
- Do not transport patients on the same elevator with construction materials and debris

Barriers

- Appropriate Barrier Containment
  - Use prefabricated plastic units or plastic sheeting for short-term projects that will generate minimal dust
  - Use durable rigid barriers for ongoing, long-term projects
- FGI Guidelines 2014 A1.2-3.2.3.3(2)d: Ventilation of the Construction Zone
  - Requires a much higher pressure for airborne isolation to protect from the construction zone

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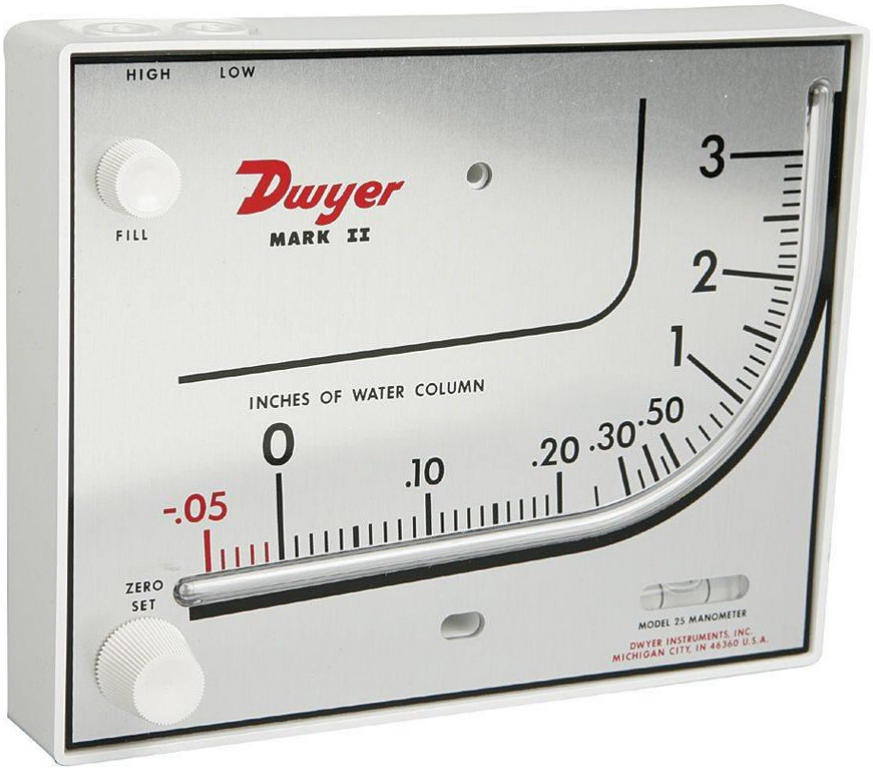
Establish Proper Ventilation

- Shut off return air vents in the construction zone, if possible, and seal around grilles
- Exhaust air and dust to the outside, if possible
- If recirculated air from the construction zone is unavoidable, use a pre-filter and a HEPA filter before the air returns to the HVAC system
- When vibration-related work is being done that may dislodge dust in the ventilation system or when modifications are made to ductwork serving occupied spaces, install filters on the supply air grilles temporarily

Establish Proper Ventilation

- Set pressure differentials so that the contained work area is under negative pressure
- Use air flow monitoring devices to verify the direction of the air pattern
- Exhaust air and dust to the outside, if possible
- Monitor temperature, air changes per hour (ACH), and humidity levels (humidity levels should be < 65%)
- Use portable, industrial-grade HEPA filters in the adjacent area and/or the construction zone for additional ACH
- Keep windows closed, if possible

Manometers



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Control Solid Debris

- When replacing filters, place the old filter in a bag prior to transport and dispose as a routine solid waste
- Clean the construction zone daily or more often as needed
- Designate a removal route for small quantities of solid debris

Control Solid Debris

- Mist debris and cover disposal carts before transport (i.e., leaving the construction zone)
- Designate an elevator for construction crew use. (If possible, consider scaffold stairs and/or buck hoists in lieu of using indoor routes for materials and supplies)
- Use window chutes and negative pressure equipment for removal of larger pieces of debris while maintaining pressure differentials in the construction zone
- Schedule debris removal to periods when patient exposure to dust is minimal

Buckhoist

Scaffold Stairs

Control Water Damage

- Make provisions for dry storage of building materials
- Do not install wet, porous building materials (i.e., Sheetrock)
- Replace water-damaged porous building materials if they cannot be completely dried out within 72 hours

Control Dust in Air and on Surfaces

- Monitor the construction area daily for compliance with the infection control plan
- Protective outer clothing for construction workers should be removed before entering clean areas
- Use mats with tacky surfaces within the construction zone at the entry; cover sufficient area so that both feet make contact with the mat while walking through the entry
- Construct an anteroom as needed where coveralls can be donned and removed
- Clean the construction zone and all areas used by construction workers with a wet mop

Control Dust in Air and on Surfaces

- If the area is carpeted, vacuum daily with a HEPA filter-equipped vacuum
- Provide temporary essential services (e.g., toilets) and worker conveniences (e.g., vending machines) in the construction zone as appropriate
- Damp-wipe tools if removed from the construction zone or left in the area
- Ensure that construction barriers remain well sealed; use particle sampling as needed
- Ensure that the clinical laboratory is free from dust contamination

Post-Construction

Complete the Project

- Flush the main water system to clear dust-contaminated lines
- Terminally clean the construction zone before the construction barriers are removed
- Check for visible mold and mildew and eliminate (i.e., decontaminate and remove), if present
- Verify appropriate ventilation parameters for the new area as needed

Complete the Project

- Do not accept ventilation deficiencies, particularly in special care areas
- Clean or replace HVAC filters using proper dust-containment procedures
- Remove the barriers and clean the area of any dust generated during this work

Complete the Project

- Ensure that the designated air balances in the operating rooms (ORs) and protective environments (PEs) are achieved before occupancy
- Commission the space as indicated, particularly in the OR and PE (proctected environment), ensuring that the room's required engineering specifications are met

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Before Occupancy

- The ICRA and contract documents should detail how the containment barriers are to be removed and construction space cleaned
- Facility staff should perform a terminal cleaning of the space before returning to the area to service
- Clean any ducts that were not adequately sealed and became contaminated with construction dust before returning them to service

United Brotherhood of Carpenters ICRA Awareness Training

- https://icrahealthcare.com/training/
- A complimentary 8-hour training offered to healthcare professionals and contractors who work in an occupied facility
- goal is to provide a workforce of ICRA-trained hospital professionals and contractors to ensure that patient safety continues to be everyone's number one priority

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In Summary

- Infection control is an integral member of the team whether the project is small or large
- IP's job is to verify that work is conducted in a manner that adequately controls the risk of potential infections and complies with the mitigation recommendations from the ICRA

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