APIC GREAT LAKES

2025 EDUCATIONAL WEBINAR SERIES

Construction ICRA and New Building Planning

May 20, 2025

Housekeeping

- Please mute your line
- Have questions for our speaker? Drop it in the chat to be asked!

Continuing Education (CE)

- There are no CEs available for today's session

Welcome

Kristen VanderElzen, MPH, CIC

Michigan Medicine

Construction ICRA and New Building Planning: Notes from Infection Prevention

Kristen VanderElzen, MPH, CIC
Infection Prevention Project Manager
MM Infection Prevention

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Introduction- Michigan Medicine

Clinical facilities totaling 8M GSF:

- 1,000 Licensed Inpatient Beds
- 72 Licensed ORs

Focus: The Pavilion @ U of M Health 2025: adds

- 690K SF; 12 floors
- Neuroscience & Cardiovascular focus
- 264 Inpatient Beds
- 20 Licensed ORs

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Topics we will cover:

- How to foster a close relationship between Infection Prevention and Facilities Planning/ Design Teams
- Collaboration to establish minimum Design Guidelines for a hospital or health system
- Working with institutional teams and the General Contractor when a new building is being designed and built
- Important Infection Prevention details to monitor during building construction

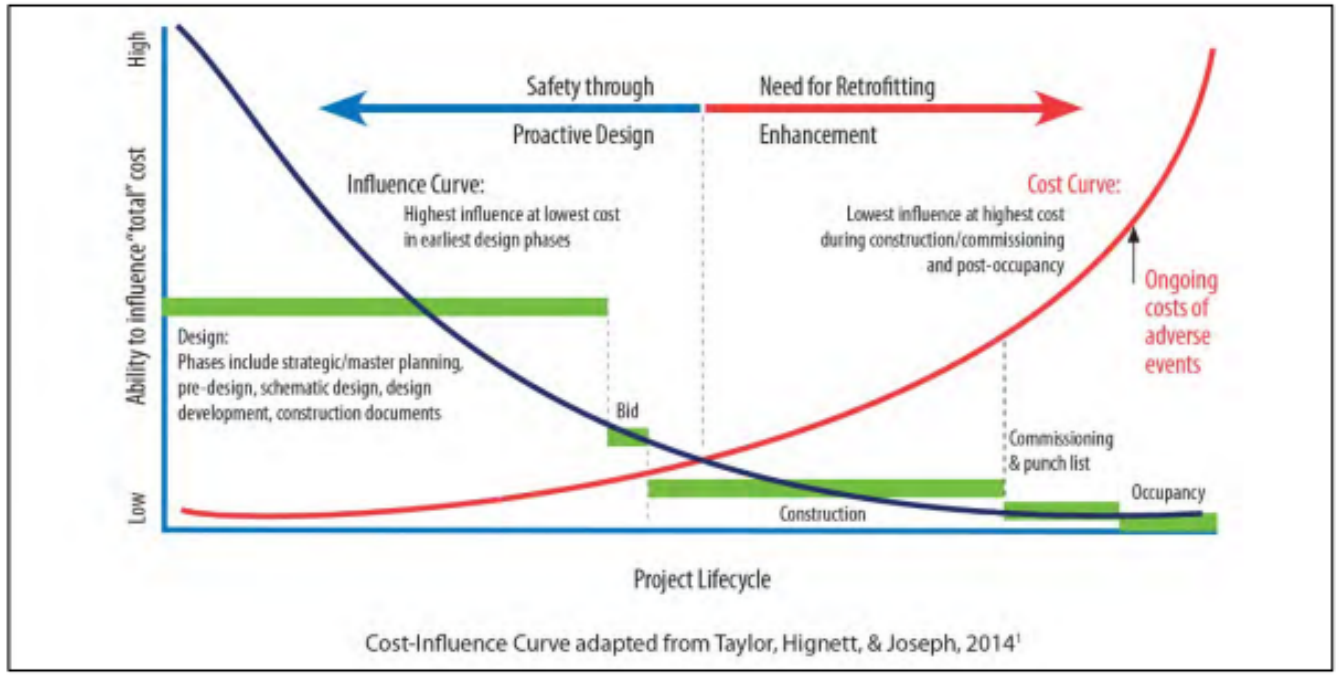
Building Relationships

- Infection Prevention education- Build the case for IP with Engineering and Architectural colleagues
  - Why does it matter?
  - How IP-focused engineering and design helps patient safety
  - How it (can) save money and energy

Collaboration

HRET, STRIVE project, ASHE
2018

Figure 1: Moving Safety Upstream in the Health Care Facility Design Process



Cost-Influence Curve adapted from Taylor, Hignett, & Joseph, 2014[1]

From placing hand sanitizers for optimal use to managing water systems to minimize pathogens, the physical environment plays an important role in infection prevention and control. This publication explores six important topics related to infection prevention and control through the physical environment:

- Infection control risk assessment
- Hand hygiene infrastructure
- Reprocessing
- Cleaning of environmental surfaces
- Water-related environmental infection control
- Flow of patients, personnel, equipment and waste

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Collaboration: Design Guidelines

- University of Michigan – Michigan Medicine, Facilities & Operations; Planning Department website:
  - http://www.med.umich.edu/facilities/plan/dg/index.html
  - Design Guidelines: Best practices required of all consulting Architects & Engineers for plans & specifications.
  - 5.0 Special Building Areas
  - 6.0 Technical Requirements

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Design Guidelines

- 064040-H: ARCHITECTURAL WOODWORK and 220010-H: SUPPLEMENTAL PLUMBING SPECIALTIES define MM Handwashing Sink requirements:
  - Located near entrance to patient/ exam room, corner placement not allowed, outside cubicle curtain, no equipment or bed within 3ft splash zone
  - Minimum size exceeds code
  - Integral solid surface design. If incorporated into counter, provide splash guard, no under sink cabinet allowed
  - Offset grid strainer with no overflow drain
  - Non-splash design
  - Wristblade or footpedal faucets, no automatic eye faucets
  - No aerators, all flow control in base of spout

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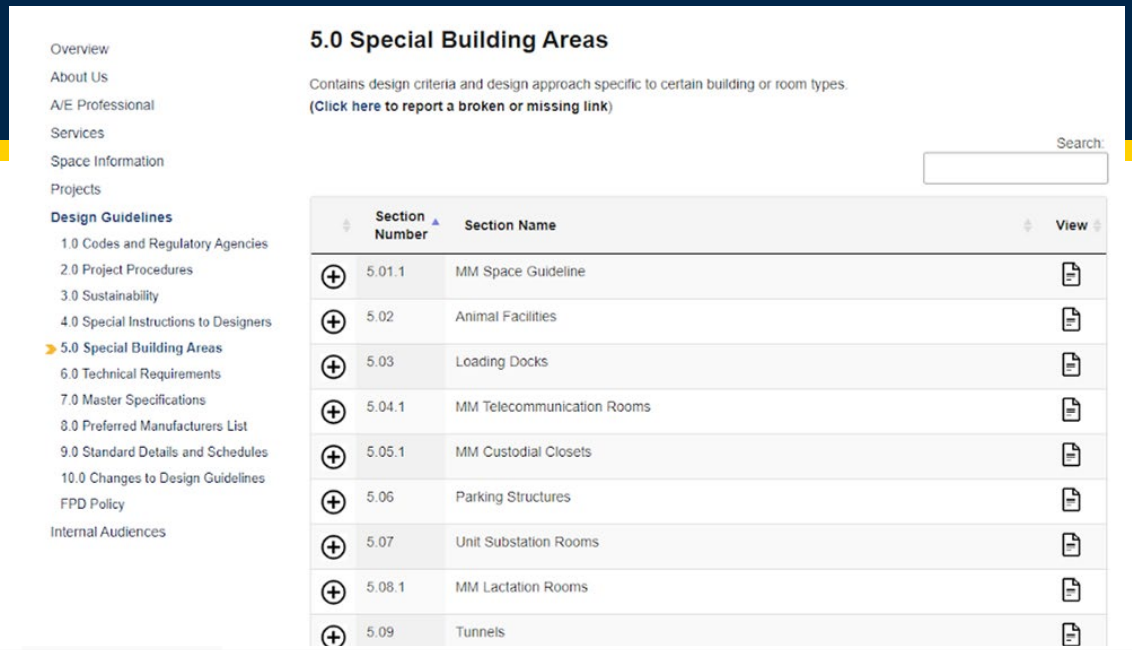
Design Guidelines

5.0 Special Building Areas

- 5.13- MM Healthcare Procedure Room Infection Control Types and Requirements
- 5.14 Patient Care and Support Spaces Room Type Requirements
- 5.16- MM Requirements for Critical Pressure Sensitive Rooms
- 5.17- MM Pharmaceutical Compounding Room Requirements



⊕	5.13	MM Healthcare Procedure Room Infection Control Types and Requirements
⊕	5.14	MM Patient Care and Support Spaces Room Type Requirements
⊕	5.15	MM Patient and Staff Protection: Falls, Bariatrics, Low Vision, Ergonomics
⊕	5.16	MM Requirements for Critical Pressure Sensitive Rooms
⊕	5.17	MM Pharmaceutical Compounding Room Requirements

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Design Guidelines

5.13- MM Healthcare Procedure Room Infection Control Types and Requirements

- Sets minimum Michigan Medicine architectural finishes, mechanical expectations/minimums, and special design features

- Requires investigation into planned procedures, instruments, equipment prior to design of the building

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Design Guidelines: Healthcare Procedure Room Infection Control Types

TABLE 1

Infection Prevention Room Type	Surgical Procedure/ Invasiveness	Common Terminology (1)
1	Invasive, major surgical procedures, above or below fascia, may involve bone or implants, requiring active life support	Operating Room (OR)/Hybrid OR/Class 3 Imaging room/C-Section
2	Invasive, minor surgical procedures, minimally invasive- below fascia, may involve bone or implants.	Procedure Room – Review procedure types with IPE.
3	Cardiac Catheterization, Angiography and Interventional Radiology. Image-guided biopsy; may require active life support	Class 2 Imaging Room, Cardiac Cath/EP Lab, Trauma, Interventional Radiology; minimally invasive surgery
4	Endoscopic, non-invasive	General Endoscopy
5	Bronchoscopy, Triage	Bronchoscopy, Triage
6	Minimally Invasive procedures- above fascia, LDR and LDRP* and percutaneous procedures	Treatment Room
7	Minimally invasive- above fascia only.	Examination Room
(1) Terminology per Facilities Guideline Institute (FGI) and ASHRAE 170 Ventilation of Health Care Facilities.	*Inpatient building only	

TABLE 4: MECHANICAL

Infection Control Room Type	Room Air Pressure	Pressure Monitor	Pressure Control (0.03"-0.10"w.c.)	Min. Air Changes/ Hr. (Outside air)	Min. Air Changes/ Hr. (Total)	Humidity (%RH)	Temperature range (User adjustable) (Note 1)	Final Filtration (MERV)	Air Supply Centered above surgical site	Non-Aspirating Supply	Ducted Air Return	Return Near Floor (Minimum two opposite locations)	Re-circulated Air Units	Hand Wash Sink in Room	Scrub Sinks Outside of Room	Washable Devices (i.e. thermostats, etc)
1	Out/ Positive	Yes	Yes	4	20	30-60	62-73	14	Yes	Yes	Yes	Yes	No	No	Yes	Yes
2	Out/ Positive	Yes	Yes	4	20	30-60	68-73	14	Yes	Yes	Yes	Yes	No	No	Yes	Yes
3	Out/ Positive	Yes	Yes	4	20	30-60	68-73	14	Yes	Yes	Yes	Yes	No	No	Yes	Yes
4	Out/ Positive	N/A	N/A	3	15	30-60	70-75	14	N/A	N/A	Yes	N/A	No	Yes	No	No
5	Out/ Positive	N/A	N/A	2	15	30-60	68-73	14	N/A	N/A	Yes	N/A	No	Yes	No	No
6	In/ Negative	Yes	Yes	2	12	30-60	68-73	14	N/A	N/A	Exh	N/A	No	Yes	No	No
7	Neutral/ Positive	NA	NA	2	6	Max 60 (Note 2)	70-75	NA	NA	N/A	Yes	NA	N/A	Yes	No	No
8	N/A	N/A	N/A	2	6	Max 60	70-75	N/A	N/A	N/A	Yes	N/A	N/A	Yes	No	No

References:
- Minimum Design Standards for Healthcare in Michigan, 2007
- ASHRAE/ASHE Standard 170- Ventilation of Health Care Facilities, 2008
- UMH Infection Control Policy, Surgical Site Infection Prevention, 2008

Notes:
1. Consideration must be given to user requests for elevated temperatures and / or rapid increase of room temperature based on the protocol of the procedures being performed, for example the need to maintain a 90 degree room temperature. Where non-aspirating supply is required, controls must be in place to maintain the air flow pattern (i.e. "sterile field") while the temperature is increased.
2. Confirm minimum and maximum humidity levels with imaging or other equipment.

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Design Guidelines

- 5.16- MM Requirements for Critical Pressure Sensitive Rooms
  - Set minimum room pressure requirements that exceed code
  - Consider commissioning pressurized rooms

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2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

5.16: UMHS - REQUIREMENTS FOR CRITICAL PRESSURE SENSITIVE ROOMS

GENERAL:

The following guidelines are prepared for detailing critically pressurized rooms. Please refer also to Design Guideline 5.13 "Healthcare Procedure Room Infection Control Types and Requirements", 5.14 "Patient Care and Support Spaces Room Type Requirements" and 5.17 "MM Requirements for Pharmaceutical Drug Compounding Areas" for additional information on these types of rooms.

A complete list of pressurized room requirements Michigan Medicine (MM) is required to comply with can be found in the following codes, design standards and operating guidelines:

- State of Michigan Healthcare Code (2018 FGI/ 2017 ASHRAE 170 with State Amendments)
- AAMI ST79- *COMPREHENSIVE GUIDE TO STEAM STERILIZATION AND STERILITY ASSURANCE IN HEALTH CARE FACILITIES*
- USP Standards (797- *PHARMACEUTICAL COMPOUNDING, STERILE PREPARATIONS*, USP 800- *HAZARDOUS DRUGS, HANDLING IN HEALTHCARE SETTINGS & USP 825 RADIOPHARMACEUTICAL COMPOUNDING*)

The purpose of this guideline is to establish good design practice for the design and construction of all pressurized rooms.

In addition, MM has established a list of "critical" pressurized rooms that can have a direct impact on patient care and safety and need to meet the requirements of this guideline:

CRITICAL PRESSURIZED ROOMS

- Operating Rooms (Type 1 Infection Control Room Type per SBA 5.13)
- Procedure Rooms (Type 2 & 3 Infection Control Room Type per SBA 5.13)
- Substerile Service Area
- Airborne Infection Isolation Room & Anteroom
- Protective Environment Rooms & Anteroom
- Pharmacy and Radiopharmaceutical Compounding Areas (see SBA 5.17)
- Cleanrooms (i.e. ISO-7, etc.)
- Nuclear Medicine Labs, including Hot Labs
- Autopsy Rooms
- Sterilizer Equipment Room (CSPD)
- Clean Workroom (CSPD)
- Decontamination Room (CSPD)
- Endoscope Cleaning (CERD)
- Emergency Department Decontamination

Completely enclosing the space and sealing the penetrations is key to the success of achieving the required pressure relationships. Each project must be approached individually. The following are examples of ways to seal the room(s) in order to achieve the required pressure relationships for critically pressurized rooms.

MECHANICAL:

All critical pressurized rooms defined in this guideline shall be provided with local room pressure monitors set to monitor and alarm the relevant room pressure. Room pressure monitor shall be wall mounted outside the room immediately adjacent to the door into the room (See SBA 5.13, 5.14 & 5.17). In some special cases like Operating Rooms (Type 1), Procedure Rooms (Type 2 & 3) and Pharmacy Compounding Rooms, room pressure monitors shall be mounted within the space (See SBA 5.13 & SBA 5.17).

All room pressure monitors shall be integrated into the hospital's building management system (BMS).

For Operating Rooms (Type 1), Procedure Rooms (Type 2 & 3) and Pharmacy Compounding Areas, all doors into the space shall be monitored with fully concealed door contacts, specified by the mechanical engineer and provided by the mechanical systems controls contractor. Door contacts shall relay door position to the room pressure monitor. See SBA 5.13 & 5.17.

A/E shall clearly state the room pressurization requirement on the design drawings and indicate a means of achieving pressurization (i.e. throttle airflow). In all cases, critical pressurized rooms shall be designed and balanced to a room pressure that exceeds the minimum code required value so that the space is not always on the edge of being out of compliance. MM's standards for critical room pressure are as follows (positive or negative per code):

Room Type	Room Design Pressurization	Room Pressure Alarm Setpoint (Code Minimum)
Operating Rooms (Type 1) & Procedure Rooms (Type 2 & 3)	+0.04" to +0.06" wc	+0.01" wc
Pharmacy & Radiopharmaceutical Compounding Areas	See SBA 5.17	
Nuclear Medicine Labs	+0.03" to +0.05" wc	+0.02" wc
All other critical positive pressurized spaces	+0.02" to +0.05" wc	+0.01" wc
All other critical negative pressurized spaces	-0.02" to -0.03" wc	-0.01" wc

Refer to Hospital Controls Specification 230905 "Mechanical Systems Controls" for standards on pressure monitors and alarm management settings.

COMMISSIONING:

AE shall specify a means to test the air-tightness of all critical pressurized rooms, i.e. "blower door" test.

Minimum leakage should be specified in order to maintain the pressurizations listed above, and/or required programmatically. Refer to "ASTM E779-10 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization" and NEEB (National Environmental Balancing Bureau) publications.

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Aspects of Design - Infection Prevention Topics

Design Feature	Effect	Examples
Space/Clearance	Prevent contamination of environment, decrease clutter	Identify end-user needs: sterile set-up; separation of clean and soiled functions;
Surfaces	Improve cleanability and decrease pathogen survival; Improve durability = less construction	New technologies- active disinfection; Quality/durability testing of materials, surfaces
Air	Decrease airborne pathogens	New technologies- active disinfection; Appropriate sizing for use, climate; Proper maintenance and monitoring
Water	Ensure hand washing access; Decrease waterborne pathogens, Ensure water quality is right for reprocessing needs	New technologies- active disinfection; Proper maintenance and monitoring; Styles of fixtures; Location and design of sinks; Water treatment methods (RO/DI, distillation, filtration)
Reprocessing and Storage areas	Assure proper device reprocessing and disinfection or sterilization; prevent contamination of the environment and contamination of the device	Separation of clean and soiled functions; Appropriate features (sinks, lighting, air flow, temperature, etc.)

Collaboration: Facilities Planning and Infection Prevention - Design Features

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Water

“Perhaps the most overlooked, controllable and important source of nosocomial infections is hospital water.”

-American Medical Association

Environmental Contaminants

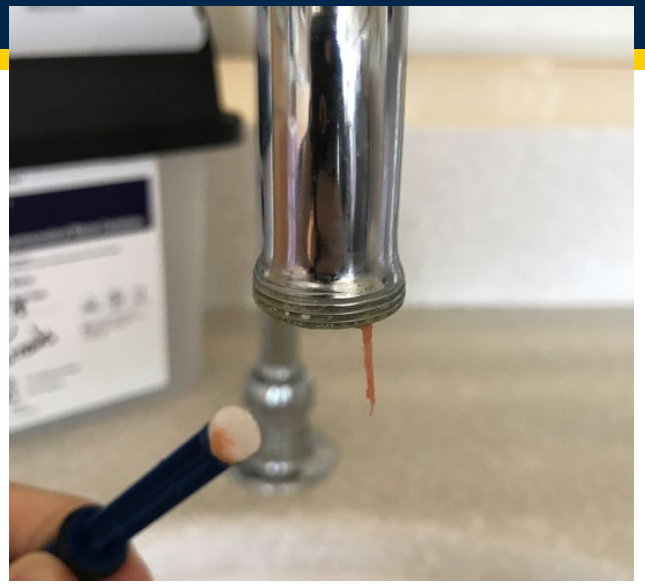
Hota S. et al. Infect Control Hosp Epidemiol. 2009 Jan;30(1):25-33.

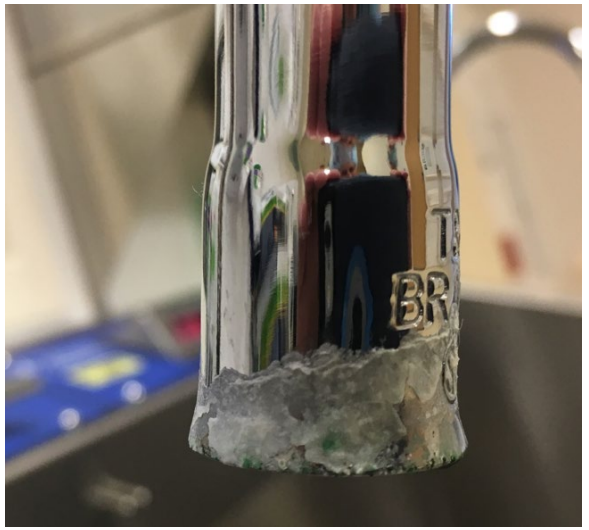
Outbreak of multidrug-resistant Pseudomonas aeruginosa colonization and infection secondary to imperfect intensive care unit room design.

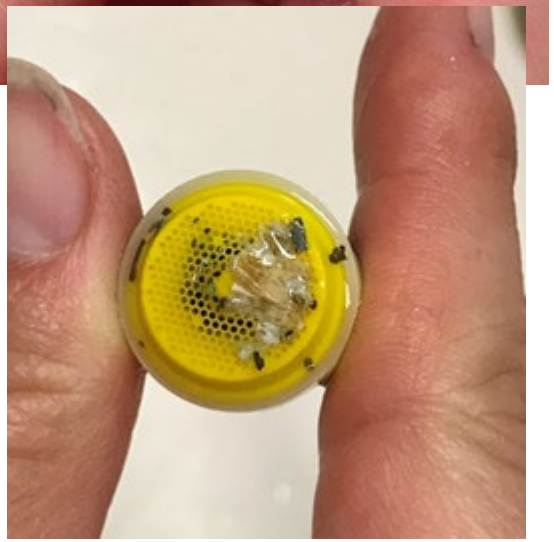
- Seventeen of the infected patients died within 3 months.
- Testing by use of a commercial fluorescent marker demonstrated that when the sink was used for handwashing, *drain contents splashed at least 1 meter from the sink.*
- Various attempts were made to disinfect the drains, but it was only when the sinks were renovated to prevent splashing onto surrounding areas that the outbreak was terminated.
- Occurred in Ontario, Canada

Preventing Waterborne Infections

Faucets and Aerators!







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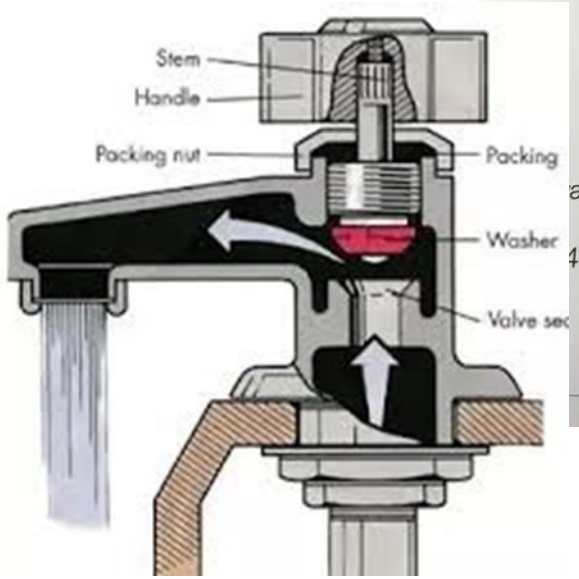
Faucet Design



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Preventing Splash Contamination

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Preventing Splash Contamination

This not that

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Mechanical, Architecture & Interior Design

- Room interiors
  - **Special concerns in OR's, Procedure rooms**
    - Fully cleanable & impervious surfaces; many new products on the market
    - Solid surface floors with continuous moldings
    - Solid ceilings
    - Special ventilation design, know the preferred MERV final filter rating and the location of filters in relation to humidifiers
    - Install redundant air handlers so that maintenance can occur without loss of pressure relationships

Mechanical, Architecture & Interior Design

Miscellaneous

- Carpeting only allowed in non-clinical areas
- All fabrics, furniture, flooring, countertops, etc. must be very cleanable and stand up to frequent use of disinfectants. Consider where bleach use may be common.
- No decorative fountains/ pools
- Cubicle curtains should not get in the way of patient care
- Shower curtains should not be too short or too long

Construction Planning

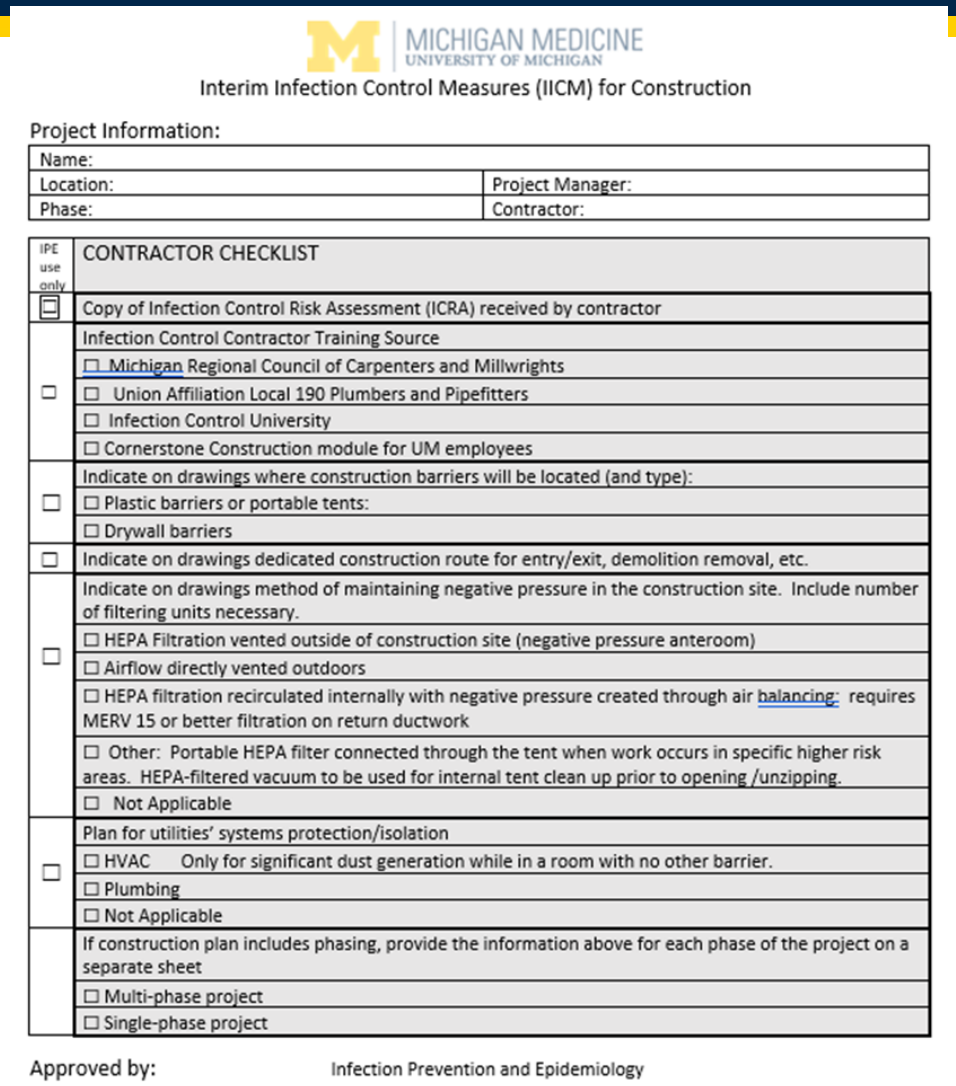
Infection Prevention: Create the summary ICRA for the new building (or space)

- Refer to the ICRA throughout the design and construction process
- Note key points that will need to be reviewed
- Go onsite (with permission) – review the space as it is built
- Identify construction IP safety issues (ductwork not protected, drywall installation, plumbing check)
- Look at mechanical spaces for reference and understanding (air handlers, CSPD)
- Check finishes, seams, cleanability
- Choose locations for wall-mounted items (gloves, hand sanitizer)

Smaller Construction Projects- Beyond ICRA

IICM (Interim Infection Control Measures)

- Contractor needs to share the specific methods for meeting the ICRA requirements, plus their ICRA training status
- Checklist filled out by Infection Prevention



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Interim Infection Control Measures (IICM) for Construction

Project Information:

Name:	
Location:	Project Manager:
Phase:	Contractor:

IPE use only	CONTRACTOR CHECKLIST
☐	Copy of Infection Control Risk Assessment (ICRA) received by contractor
☐	Infection Control Contractor Training Source
	☐ Michigan Regional Council of Carpenters and Millwrights
	☐ Union Affiliation Local 190 Plumbers and Pipefitters
	☐ Infection Control University
	☐ Cornerstone Construction module for UM employees
☐	Indicate on drawings where construction barriers will be located (and type):
	☐ Plastic barriers or portable tents:
	☐ Drywall barriers
☐	Indicate on drawings dedicated construction route for entry/exit, demolition removal, etc.
☐	Indicate on drawings method of maintaining negative pressure in the construction site. Include number of filtering units necessary.
	☐ HEPA Filtration vented outside of construction site (negative pressure anteroom)
	☐ Airflow directly vented outdoors
	☐ HEPA filtration recirculated internally with negative pressure created through air balancing: requires MERV 15 or better filtration on return ductwork
	☐ Other: Portable HEPA filter connected through the tent when work occurs in specific higher risk areas. HEPA-filtered vacuum to be used for internal tent clean up prior to opening /unzipping.
	☐ Not Applicable
☐	Plan for utilities' systems protection/isolation
	☐ HVAC Only for significant dust generation while in a room with no other barrier.
	☐ Plumbing
	☐ Not Applicable
	If construction plan includes phasing, provide the information above for each phase of the project on a separate sheet
	☐ Multi-phase project
	☐ Single-phase project

Approved by: Infection Prevention and Epidemiology

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Infection Prevention - Construction Planning

- Get to know the players: Construction Project Managers
- Area Managers
- Leads for Construction Companies

Pro Tip: Keep IP in the forefront of your hospital's construction planners and project leads.

Educate, Give Feedback, Show how you can prevent issues down the road.

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Questions?

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Q+A

Upcoming APIC-GL Webinars

- **July 8** – IP Collaboration between hospitals & nursing homes
- **Aug 12** – Member Presentations
- **Oct 9** – APIC-GL Fall Conference
- **Nov 4** – NHSN Rebaseline

Please note this schedule is subject to change.
All changes and additional event details will be communicated via email, once confirmed.

Please direct questions to
Kelsey Ostergren – kostergren@mha.org,
Chau Nguyen - chau.nguyen@corewellhealth.org, or
Denise Parr – parrd1@michigan.gov

SAVE THE DATE

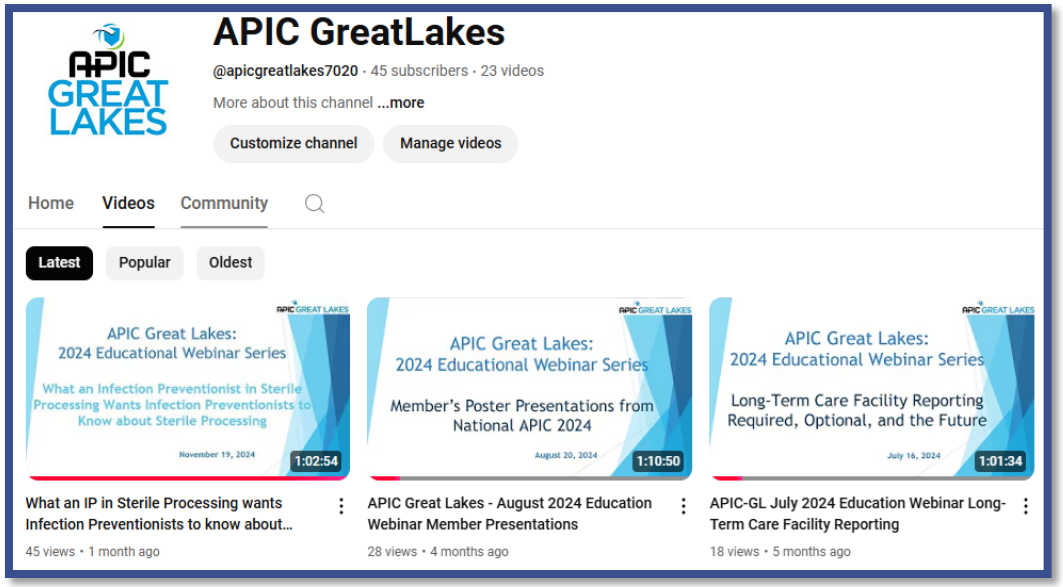
2025 APIC Great Lakes Fall Conference

WHEN: October 9

WHERE: Eagle Eye Golf Club & Banquet Center

Missed a webinar? No worries!

- Check out the APIC- GL YouTube Channel, where you can find recordings of all prior meetings!



- Presentation slides & any supplemental materials can be found on the APIC-GL website

Job Postings

- If you have an open position you would like to post to the APIC-GL webpage, please email us at apicgreatlakes@gmail.com

- Link to job board

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PEER MENTORSHIP ROUNDTABLE

Thank you for joining us today!

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