

# CONSTRUCTION MANAGEMENT AND THE IP

RICHARD VOGEL MS, CIC, FAPIC  
INFECTION CONTROL SPECIALIST

 **NewYork-Presbyterian**

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- Health care facilities are heavily regulated, with numerous federal and local requirements. These regulations extend to construction and renovation projects

# WHO's IN IT?

- Centers for Medicare and Medicaid Services (CMS)
- The Joint Commission (TJC)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- Facility Guidelines Institute (FGI)
- State and Local Departments of Health (DOH)
- National Fire Protection Association (NFPA)
- Local Fire Dept. (NYFD)
- Environmental Protection Agency (EPA)
- Local Department Of Buildings (DOB)
- Federal Drug Administration (FDA)
- Centers for Disease Control (CDC)
- Occupational Safety and Health Administration (OSHA)

# CMS

- 482.42 Condition of participation: Infection control. The hospital must provide a sanitary environment to avoid sources and transmission of infections and communicable diseases. There must be an active program for the prevention, control, and investigation of infections and communicable diseases.
- 482.42 Condition of participation: Infection control.
- Interpretive Guidelines §482.42
  - The infection prevention and control program must include appropriate monitoring of housekeeping, maintenance, (including repair, renovation and construction activities), and other activities to ensure that the hospital maintains a sanitary environment.
  - 482.42(a)(1) - The infection control officer or officers must develop a system for identifying, reporting, investigating, and controlling infections and communicable diseases of patients and personnel.
    - Maintenance of a sanitary physical environment: Ventilation and water quality control issues, including measures taken to maintain a safe environment during internal or external construction/renovation.

# TJC

- TJC Standard EC.02.06.05, addresses the design and construction of health care facilities.
- EC.02.06.05
  - The (organization) manages its environment during demolition, renovation, or new construction to reduce risk to those in the organization.

# TJC

- EC.02.06.05, EPI
  - When planning for new, altered, or renovated space, the (organization) uses one of the following design criteria:
    - State rules and regulations.
    - Guidelines for Design and Construction of Health Care Facilities 2014 edition.
  - When the above rules, regulations, and guidelines do not meet specific design needs, use other reputable standards and guidelines that provide equivalent design criteria.

# TJC

- EC.02.06.05, EP2
  - When planning for demolition, construction, renovation, or general maintenance, the hospital conducts a preconstruction risk assessment for air quality requirements, infection control, utility requirements, noise, vibration, and other hazards that affect care, treatment, and services
- EC.02.06.05, EP3
  - The hospital takes action based on its assessment to minimize risks during demolition, construction, or renovation.



# State and Local Health Codes

- States often develop their own health codes which contain requirements for hospital construction.
- Many cities also have code requirements.
- When there are multiple codes, the most stringent requirements must be met.



# ASHRAE

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) *ASHRAE 170-2013-Ventilation of Health Care Facilities*
  - Included in the FGI Guidelines.
  - Purpose is to define ventilation system requirements to provide environmental control in health care facilities.
  - Standards apply to new construction and alterations to existing buildings.

# ASHRAE

- ASHRAE 170-2017- Ventilation of Health Care Facilities

Table 7.1 Design Parameters—Hospital Spaces

Function of Space	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
<b>SURGERY AND CRITICAL CARE</b>							
Critical and intensive care	NR	2	6	NR	No	30–60	70–75/21–24
Delivery room (Caesarean) (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Emergency department decontamination	Negative	2	12	Yes	No	NR	NR
Emergency department exam/treatment room (p)	NR	2	6	NR	NR	Max 60	70–75/21–24
Emergency department public waiting area	Negative	2	12	Yes (q)	NR	Max 65	70–75/21–24
Intermediate care (s)	NR	2	6	NR	NR	Max 60	70–75/21–24
Laser eye room	Positive	3	15	NR	No	20–60	70–75/21–24
Medical/anesthesia gas storage (r)	Negative	NR	8	Yes	NR	NR	NR
Newborn intensive care	Positive	2	6	NR	No	30–60	72–78/22–26
Operating room (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Operating/surgical cystoscopic rooms (m), (o)	Positive	4	20	NR	No	20–60	68–75/20–24
Procedure room (o), (d)	Positive	3	15	NR	No	20–60	70–75/21–24
Radiology waiting rooms	Negative	2	12	Yes (q), (w)	NR	Max 60	70–75/21–24
Recovery room	NR	2	6	NR	No	20–60	70–75/21–24
Substerile service area	NR	2	6	NR	No	NR	NR
Trauma room (crisis or shock) (c)	Positive	3	15	NR	No	20–60	70–75/21–24
Treatment room (p)	NR	2	6	NR	NR	20–60	70–75/21–24
Triage	Negative	2	12	Yes (q)	NR	Max 60	70–75/21–24
Wound intensive care (burn unit)	NR	2	6	NR	No	40–60	70–75/21–24
<b>INPATIENT NURSING</b>							
All anteroom (u)	(e)	NR	10	Yes	No	NR	NR
All room (u)	Negative	2	12	Yes	No	Max 60	70–75/21–24
Combination All/PE anteroom	(e)	NR	10	Yes	No	NR	NR
Combination All/PE room	Positive	2	12	Yes	No	Max 60	70–75/21–24

Note: NR = no requirement

# NFPA

May 4, 2016: CMS requires health care facilities to meet requirements of 2012 editions of NFPA 101® and NFPA 99

The U.S. Centers for Medicare & Medicaid Services (CMS) has published Medicare and Medicaid Programs; Fire Safety Requirements for Certain Health Care Facilities that requires health care facilities to migrate from using the 2000 edition of *NFPA 101, Life Safety Code* to the 2012 edition, and mandates compliance with provisions of the 2012 edition of NFPA 99, Health Care Facilities Code. Since 1970, hospitals, nursing homes, ambulatory surgical centers and related facilities have needed to demonstrate that their fire and life safety programs satisfied different editions of NFPA 101 in order to meet the requirements of the Conditions of Participation (COP), as defined by CMS. Health care providers that participate in federal reimbursement programs are required to meet the COP expectations.

# NFPA

Section 19.7.9.2 of the 2012 LSC states that the means of egress of any area undergoing construction, repair, or improvements shall be inspected daily for compliance with 7.1.10.1 and shall also comply with **NFPA 241: Standard for Safeguarding Construction, Alteration, and Demolition Operations.**

# NFPA

## NFPA 241

### 8.6.2 Temporary Separation Walls.

- 8.6.2.1 Protection shall be provided to separate an occupied portion of the structure from a portion of the structure undergoing alteration, construction, or demolition operations when such operations are considered as by the AHJ as having a higher level of hazard than the occupied portion of the building.
- 8.6.2.2 1.1 Walls shall have at least a 1-hour fire resistance rating.
- 8.6.2.3 1.2 Opening protectives shall have at least a 45-minute fire protection rating.
- 8.6.2.4 Nonrated walls and opening protectives shall be permitted when an approved automatic sprinkler system is installed and operational .

# NFPA



# NFPA

## NFPA 241

Annex A 8.6.2.4. Construction Tarpaulins will not be considered appropriate barriers or openings protectives.

What is a Construction tarpaulin and is this enforceable?





# The Association for Professionals in Infection Control and Epidemiology (APIC)

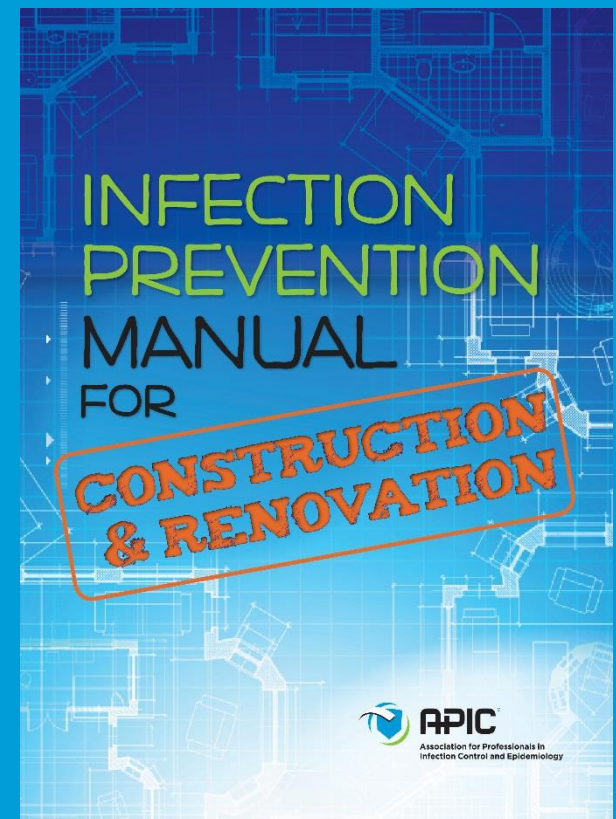
APIC is the leading professional association for infection preventionists (IPs) with more than 15,000 members.

Our mission is to create a safer world through the prevention of infection. This is achieved by the provision of better care to promote better health at a lower cost.

# APIC

## APIC's IP Manual for Construction and Renovation

- Covers topics such as ICRA, water and mold issues, dust control
- Sample Policies and procedures
- Educational material for patient populations



# APIC

## Forms & Checklists for Infection Prevention, Volume 2

### SECTION 4 | Construction and Renovation

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## Centers for Disease Control and Prevention *Guidelines for Environmental Infection Control in Health Care Facilities*

- Recommendations for the control of infectious disease transmission associated with the healthcare environment.
- Published in 2003, but remains a useful guide for many issues related to facility design, construction, and operation.
- Construction, Renovation, Remediation, Repair, and Demolition
  - A. Establish a multidisciplinary team that includes infection-control staff to coordinate demolition, construction, and renovation projects and consider proactive preventive measures at the inception; produce and maintain summary statements of the team's activities.
  - B. Educate both the construction team and health-care staff in immunocompromised patient-care areas regarding the airborne infection risks associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores.
  - C. Incorporate mandatory adherence agreements for infection control into construction contracts, with penalties for noncompliance and mechanisms to ensure timely correction of problems.



Centers for Disease Control and Prevention *Guidelines for Environmental Infection Control in Health Care Facilities*

Construction, Renovation, Remediation, Repair, and Demolition

- D. Establish and maintain surveillance for airborne environmental disease (e.g., aspergillosis) as appropriate during construction, renovation, repair, and demolition activities to ensure the health and safety of immunocompromised patients.
- E. Implement infection-control measures relevant to construction, renovation, maintenance, demolition, and repair.
- F. Use airborne-particle sampling as a tool to evaluate barrier integrity.
- G. Commission the HVAC system for newly constructed health-care facilities and renovated spaces before occupancy and use, with emphasis on ensuring proper ventilation for operating rooms, All rooms, and PE areas.
- H. No recommendation is offered regarding routine microbiologic air sampling before, during, or after construction, or before or during occupancy of areas housing immunocompromised patients.



Centers for Disease Control and Prevention *Guidelines for Environmental Infection Control in Health Care Facilities*

Construction, Renovation, Remediation, Repair, and Demolition

- I. If a case of health-care--acquired aspergillosis or other opportunistic environmental airborne fungal disease occurs during or immediately after construction, implement appropriate follow-up measures.
- J. If no epidemiologic evidence exists of ongoing transmission of fungal disease, conduct an environmental assessment to find and eliminate the source.

# Facility Guidelines Institute (FGI)

## Facility Guidelines Institute (FGI) 2018 Edition

- Provides requirements for the design of specific features and areas of interest to IPs.
- Guidelines for the Design and Construction of Hospitals
  - Guidelines for the Design and Construction of Residential Healthcare and Support Facilities.
  - Guidelines for the Design and Construction of Outpatient Facilities

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- The Infection Control Risk Assessment (ICRA) is included under the Safety Risk Assessment Section.
- ICRA requirements are identical in the Outpatient Guidelines. Some elements are present in the Residential Guidelines, but are less prescriptive.
  - Forty-two states use the *Guidelines* in some form.
    - Some states adopt the whole document and a few automatically update to the new edition when it is published.
    - Other states only use part of the document and some use it as a reference.



# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- ICRA Requirement
  - ...an infection control risk assessment shall be a part of integrated facility planning, design, construction, and commissioning activities and shall be incorporated into the safety risk assessment.

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- ICRA Considerations
  - At a minimum, the ICRA shall address the following:
    - - Design elements
    - - Construction elements

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- ICRA Considerations
  - Design elements:
    - - The number, location, and type of airborne isolation, protective environment rooms.
    - - Special heating, ventilation, and air-conditioning needs.

# FGI



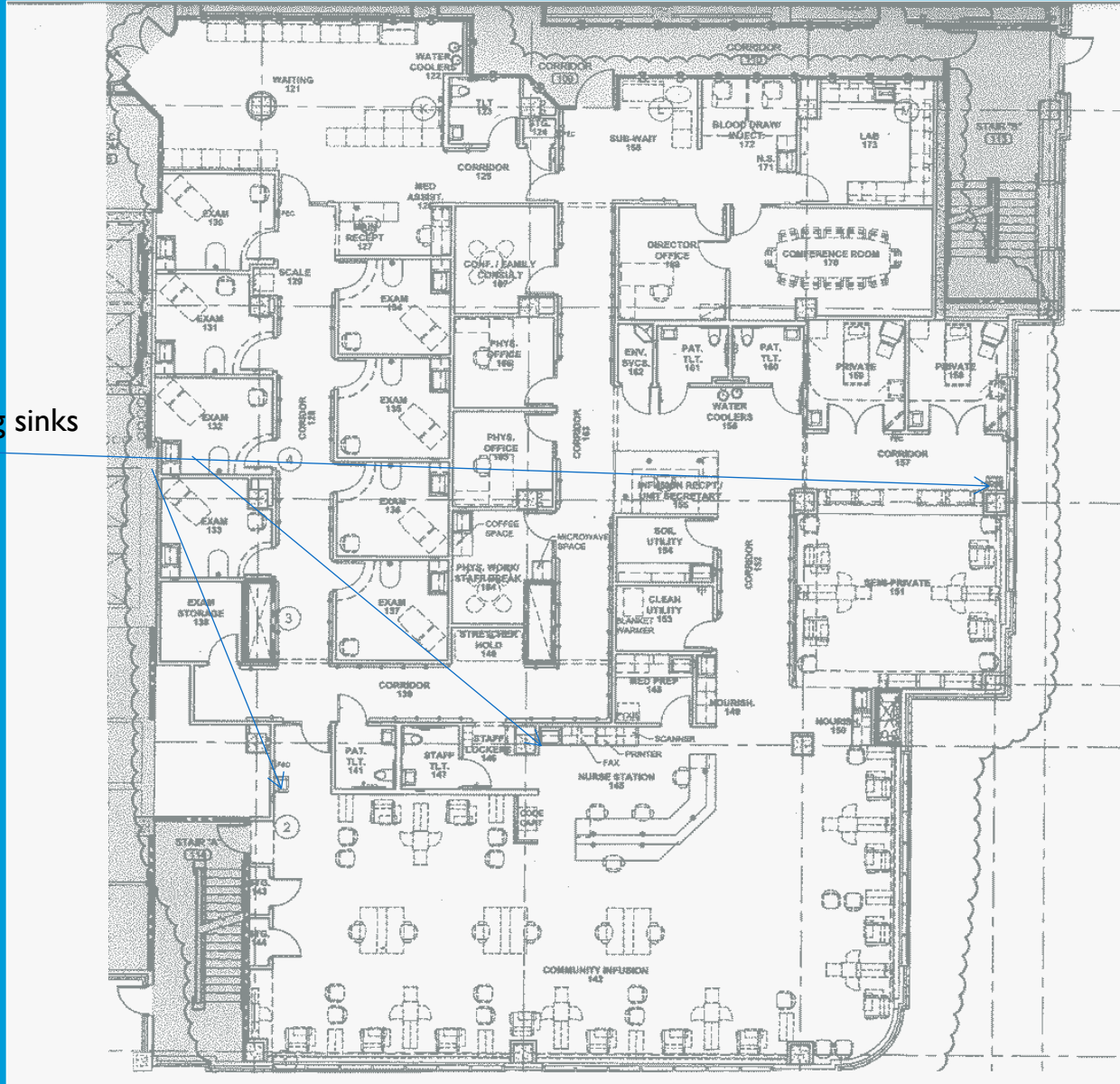
# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- ICRA Considerations
  - Design elements:
    - Water/plumbing systems.
      - - The minimum number, location, and type of plumbed hand-washing stations.
      - - Hand sanitation dispensers.
      - - Emergency first-aid equipment.
      - - Assessment of the risk from transmissible waterborne pathogens and strategies to mitigate the risk.
    - Selection of surfaces and furnishings.

# FGI

Hand washing sinks



FGI



# Design Standards

- Healthcare facilities should develop design standards for all areas of the facility.
- Specification for materials used in projects including flooring, types of sinks and other fixtures, ceiling tiles, wall coverings, fabrics, furniture and even paint colors. Cleanability, durability, and sustainability must be considered.
- Should be developed by a multidisciplinary team.



Room Specific Guidelines

## DESIGN STANDARDS

The Design Standards have been prepared for and issued by [REDACTED] as a source for basic design guidelines and is intended for use by consultants and their design teams. The information contained within these standards define the different [REDACTED] departments and respective contact names to aid the design team during the preparation and information gathering process leading to the development of the construction documents.

### Room Specific Guidelines

#### Design Guidelines

Title	Modified Date	Description
<a href="#">Selected Architectural Specifications</a>	5/6/2015	pdf
<a href="#">Room Specific Design Guidelines</a>	5/6/2015	pdf
<a href="#">Door and Hardware Schedule</a>	5/6/2015	pdf
<a href="#">ABHR document</a>	5/6/2015	pdf

#### Architectural Standards

Title	Modified Date	Description
<a href="#">Furniture Standards</a>	12/1/2015	pdf
<a href="#">Interior Finishes</a>	8/29/2014	pdf
<a href="#">Millwork Details</a>	3/12/2018	pdf
<a href="#">Millwork Specs (Laminate)</a>	3/15/2013	pdf
<a href="#">Millwork Specs (Wood)</a>	2/22/2013	pdf
<a href="#">Negative Isolation Room</a>	5/10/2011	pdf
<a href="#">Risk Reduction Standards</a>	6/21/2011	pdf
<a href="#">Space Planning Assumptions and Guidelines</a>	7/25/2014	pdf
<a href="#">Vibration Standards</a>	8/21/2012	pdf
<a href="#">Computer Workstation Design Standard</a>	10/10/2014	pdf
<a href="#">Roof Matrix</a>	5/6/2015	pdf
<a href="#">Sign Design Manual</a>	1/29/2015	pdf R1-CS6
<a href="#">Attic Stock + OM Manual Requirements</a>	5/6/2015	pdf
<a href="#">Automatic Door Standard</a>	1/5/2018	pdf

**Mechanical Standards Contact:**

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- ICRA Considerations
  - Construction elements:
    - - Impact to patients and employees.
    - - Hazards and protection levels for each designated area.
    - - Location of the patients according to their susceptibility to infection.

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- Infection Control Risk Mitigation
  - Infection Control Risk Mitigation Recommendations (ICRMRs).
    - Written plans shall describe specific methods by which transmission of airborne and waterborne biological contaminants will be avoided during construction and commissioning.
  - ICRMR Planning
    - ICRMRs shall be prepared by the ICRA team.

# FGI

## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- Infection Control Risk Mitigation
  - ICRMR Content
    - Patient placement
    - Standards for barriers and other protective devices
    - Provisions for construction or modification of HVAC and water systems
    - Protection from demolition
    - Training
      - Staff, visitors, and construction workers

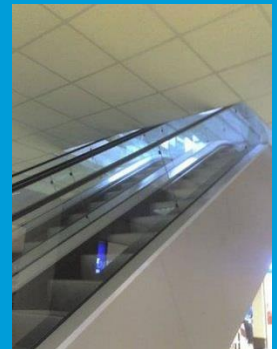
# Infection Control Risk Assessment (ICRA)

“ ... a multidisciplinary, organizational process that focuses on reducing risk from infection throughout facility planning, design, and construction (including renovation) activities”

(FGI Guidelines)

# Components of the ICRA

- Construction Activity Types
- Infection Control Risk Groups
- Performance Components



# Infection Control Risk Assessment

## Matrix of Precautions for Construction & Renovation

**Step One: Using the following table, identify the Type of Construction Project Activity (Type A-D)**

TYPE A	<p><b>Inspection and Non-Invasive Activities.</b> Includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>▪ removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet</li> <li>▪ painting (but not sanding)</li> <li>▪ wallcovering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.</li> </ul>
TYPE B	<p><b>Small scale, short duration activities which create minimal dust</b> Includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>▪ installation of telephone and computer cabling</li> <li>▪ access to chase spaces</li> <li>▪ cutting of walls or ceiling where dust migration can be controlled.</li> </ul>
TYPE C	<p><b>Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies</b> Includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>▪ sanding of walls for painting or wall covering</li> <li>▪ removal of floorcoverings, ceiling tiles and casework</li> <li>▪ new wall construction</li> <li>▪ minor duct work or electrical work above ceilings</li> <li>▪ major cabling activities</li> <li>▪ any activity which cannot be completed within a single work shift.</li> </ul>
TYPE D	<p><b>Major demolition and construction projects</b> Includes, but is not limited to:</p> <ul style="list-style-type: none"> <li>▪ activities which require consecutive work shifts</li> <li>▪ requires heavy demolition or removal of a complete cabling system</li> <li>▪ new construction.</li> </ul>

## Step Two:

Using the following table, *identify the Patient Risk Groups* that will be affected.

If more than one risk group will be affected, select the higher risk group:

Low Risk	Medium Risk	High Risk	Highest Risk
<ul style="list-style-type: none"><li>▪ Office areas</li></ul>	<ul style="list-style-type: none"><li>▪ Cardiology</li><li>▪ Echocardiography</li><li>▪ Endoscopy</li><li>▪ Nuclear Medicine</li><li>▪ Physical Therapy</li><li>▪ Radiology/MRI</li><li>▪ Respiratory Therapy</li></ul>	<ul style="list-style-type: none"><li>▪ CCU</li><li>▪ Emergency Room</li><li>▪ Labor &amp; Delivery</li><li>▪ Laboratories (specimen)</li><li>▪ Newborn Nursery</li><li>▪ Outpatient Surgery</li><li>▪ Pediatrics</li><li>▪ Pharmacy</li><li>▪ Post Anesthesia Care Unit</li><li>▪ Surgical Units</li></ul>	<ul style="list-style-type: none"><li>▪ Any area caring for immunocompromised patients</li><li>▪ Burn Unit</li><li>▪ Cardiac Cath Lab</li><li>▪ Central Sterile Supply</li><li>▪ Intensive Care Units</li><li>▪ Medical Unit</li><li>▪ Negative pressure isolation rooms</li><li>▪ Oncology</li><li>▪ Operating rooms including C-section rooms</li></ul>



# Step 3

## Determine the Class of Precautions

- C. Match the **Construction Project Class (A,B,C,D)** with the **Patient Risk Group (Group 1, 2, 3, 4)** to find the **Type of Precautions (I, II, III, IV)** required.

CONSTRUCTION ACTIVITY→		TYPE "A"	TYPE "B"	TYPE "C"	TYPE "D"
RISK LEVEL	↓				
Group 1	LOW Risk	I	II	II	IV
Group 2	MEDIUM Risk	I	II	III	IV
Group 3	HIGH Risk	I	II	III/IV	IV
Group 4	HIGHEST Risk	II	III/IV	III/IV	IV

# Barrier For Dust Control



**Door Closed**

**Tight to ceiling and walls**

# Barrier For Dust Control



**Zipper closed**

**Sticky mat**

**Tight to ceiling and walls**

# Barrier For Dust Control



# Creating Negative Pressure



# Creating Negative Pressure



**Exhausting HEPA filtered air**

# Educational Material

## Staff Guide for Infection Prevention During Construction

### Infection Control Risk Assessment (ICRA)

#### Key Points

- An Infection Control Risk Assessment (ICRA) is a plan created for all new construction and renovation projects at the Hospital.
- ICRA plan protects patients, visitors and staff from the risks associated with construction.
- Dust barriers are designed and built to contain dust and other airborne particles. Negative pressure is the most important component of dust protection

#### ICRA Signage

For barriers that will be in place for more than 72 hours

Other Signage:



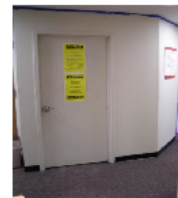
For problems contact the Project Manager

#### What to expect

- Proper barriers for dust control will be erected to protect patients, staff and visitors
- Depending upon the type and length of the construction project, the barriers may be either plastic or solid.



Tight to ceiling  
- Tight to walls  
- Proper signage  
- Zipper closed  
- Sticky mat



Tight to ceiling  
- Tight to walls  
- Proper signage  
- Door closed  
- Hard partition

# FGI

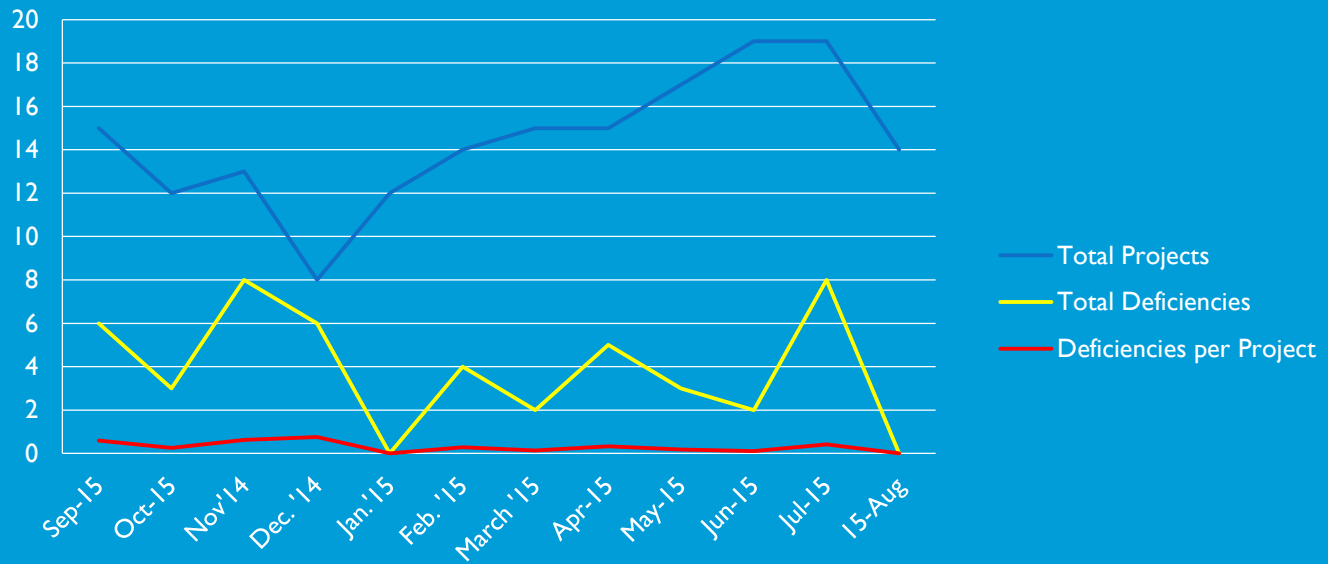
## *FGI Guidelines for the Design and Construction of Hospitals 2018*

- Infection Control Risk Mitigation
  - Monitoring Plan and Procedures
    - The governing body shall provide monitoring plans for effective application of ICRMRs during the course of the project



# MONITORING

## ICRA DEFICIENCIES TREND ROLLING 12 MONTH PERIOD



# MONITORING

## ICRA Compliance

		ICRA Compliance 1st Quarter 2018												
		Jan-18			Feb-18			Mar-18			2018 TOTALS			
		No	Yes	Compliance	No	Yes	Compliance	No	Yes	Compliance	No	Yes	Compliance	
Site Clean	East	0	42	100%	0	34	100%	0	40	100%	0	116	100%	
	West	0	17	100%	0	27	100%	1	28	97%	1	72	99%	
Barriers Intact	East	1	41	98%	0	34	100%	1	39	98%	2	114	98%	
	West	0	17	100%	0	27	100%	3	25	89%	3	69	96%	
Mats Clean	East	1	41	98%	1	33	97%	3	37	93%	5	111	96%	
	West	0	17	100%	2	25	93%	1	27	96%	3	69	96%	
HEPA Working	East	1	17	94%	1	13	93%	0	12	100%	2	42	95%	
	West	0	12	100%	2	18	90%	1	24	96%	3	54	95%	
Neg. Pressure	East	0	42	100%	0	34	100%	3	37	93%	3	113	97%	
	West	1	16	94%	0	27	100%	1	27	96%	2	70	97%	
			<90%			90%-95%			>95%					

# Healthcare Regulatory Insights: Will You Comply?

Sylvia Garcia-Houchins, MBA, RN, CIC

Director, Infection Prevention and Control

The Joint Commission

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## Mold Prevention



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## Key Elements

### Planning and Monitoring

- Involve Infection Preventionist from concept through commissioning
- Ensure **all** elements outlined in FGI 2014 are addressed
- Project specific protective measures including the responsibilities of each party (governing body, designer, contractor, and facility staff)
- Assigned responsibility for monitoring compliance
- Written procedures for suspension of work

### Ventilation of Construction Zone

- Dedicated (isolated) ventilation/exhaust system for the construction area
- Barriers maintained at 0.03 inches of water with airflow from clean to dirty with visual display (FGI 2014)
- System cleaned prior to occupancy if existing building HVAC system used

### Disaster Plans for Emergencies

- Written plans for HVAC shutdown, water outage or leaks, etc



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# QUESTIONS?



# Thank You!