Construction and Maintenance

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Objectives

Infection Preventionists (IPs) will:

1. Review the infection risks associated with construction and maintenance
2. Understand risk mitigation strategies

Key Terms

Infection Control Risk Assessment (ICRA)

A process to assess the impact of construction and renovation work in healthcare facilities on infection control programs and practices, and to ensure that new construction is designed to meet the needs of the anticipated patient population.

Construction

Construction, renovation, demolition, excavation or maintenance activity that involves cutting, drilling, or grinding, disruption of ventilation or plumbing systems, or otherwise may impact patients, staff, or visitors.

Construction Risks

Construction-Related Infection Risks	Non-Infectious Construction Impacts	Flooding Risks
• Mold spores dispersed by air movement during construction • Waterborne pathogens from stagnant plumbing systems • Disruption of biofilms in existing plumbing due to construction activity	• Excessive noise and vibration disturbing patients • Odors from construction activities affecting occupants • Interference with traffic flow within the facility • Risks heightened in patient care areas where relocation isn't possible	• Water damage inside and outside the construction zone • Flooding can increase infection risk if not addressed promptly • Workers must know water shutoff valve locations • Flood response plans should be in place prior to construction

ICRA Role and Responsibilities

Who Completes the ICRA?

- Team represented by infection prevention, safety, engineering, and healthcare professionals (HCP) representing the areas of the facility likely to be affected by the construction.

IP Role

- Assess the needs and risks of the patient, staff, and visitor population that will be affected by the construction;
- Address the infection prevention needs of the patients and HCP that will occupy the space after construction; and
- Provide evidence-based guidance on infection prevention to the project design team.

ASHE ICRA Sample

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Matrix of Precautions

Step One:
Using Table 1, Identify the Activity Ty

Table 1 - Activity Type:

Type A	**Inspection and n** Includes but is not li • Removal of limited expo • Limited buil suppressior that does n • Clean plum
Type B	**Small-scale, sho** Includes but is not li • Work condu barriers, ins electrical ch • Fan shutdo • Installation • The remova • Controlled s debris.
Type C	**Large-scale, long debris.** Includes but is not li • Removal of • New drywal • Renovation • Non-existing • The remova • Dry sanding • Work creati • Any activity
Type D	**Major demolition** Includes but is not li • Removal or • Removal/ins • Invasive lar • Renovation

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Step Two
Using Table
affected, se

Table 2 - F

Low Risk **Non-patien such as:**
• Public h gatheri on clini • Office a clinical • Breakro clinical • Bathroo rooms units. • Mechan not on • EVS clo clinical

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ASHE ICRA 2.0™

Step Three:

Match the Patient Risk Group (*Low, Medium, High, Highest*) from Step Two with the planned Construction Activity Project Type (*A, B, C, D*) from Step One using Table 3 to find the Class of Precautions (*I, II, III, IV or V*) or level of infection control activities required. The activities are listed in Table 5 – Minimum Required Infection Control Precautions by Class.

Table 3 - Class of Precautions:

Patient Risk Group	Project Type TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III*
MEDIUM Risk Group	I	II	III*	IV
HIGH Risk Group	I	III	IV	V
HIGHEST Risk Group	III	IV	V	V

Infection control permit and approval will be required when Class of Precautions III (Type C) and all Class of Precautions IV or V are necessary.

Environmental conditions that could affect human health, such as sewage, mold, asbestos, gray water and black water will require Class of Precautions IV for LOW and MEDIUM Risk Groups and Class of Precautions V for HIGH and HIGHEST Risk Groups.

***Type C [Medium Risk groups] and Type D [Low Risk Groups] work areas [Class III precautions] that cannot be sealed and completely isolated from occupied patient care spaces should be elevated to include negative air exhaust requirements as listed in Class IV Precautions.**

ICRA Insights

- **Engage early** in the design phase to identify and mitigate infection risks
- Collaborate with:
  - **Construction teams**
  - **Clinical staff**
- Influence selection of:
  - **Materials**
  - **Designs** to reduce infection risk
- During construction:
  - Assist in identifying infection risks
  - Help develop **written Infection Control Risk Mitigation Recommendations**
    Validate **implementation and effectiveness** of ICRMRs
- Report to infection control committee

Biggest Concern: Dust Control

- **Higher dust levels** increase the risk of contaminants escaping containment
- **HEPA filters** are highly efficient but not 100%; minimize dust inside the containment
- Maintenance of HEPA filters:
  - **Properly installed and undamaged**
  - **Periodically inspected and certified**
- **Pre-filters** collect large dust and must be:
  - **Checked frequently**, especially during demolition and wall preparation
  - **Replaced** as needed to ensure airflow

Infection Control Risk Mitigation Strategies

- Patient locations relative to construction and any potential need for patient relocation
- Construction phases and their impact on plumbing and ventilation systems
- Containment barriers
- Effect of the construction on traffic flow, access to exits, and operation of life safety systems
- Any training required for staff, construction workers, patients, or visitors
- Directions on bathroom and eating facilities available for construction workers
- Requirements that new materials being installed be clean and free from water damage
- Transport of materials and debris

Barrier Systems “Containment”

- Barriers are installed to contain **dust** and **potentially infectious microorganisms** during construction

- Barrier materials may include:
  - Flame-retardant plastic sheeting
  - Rigid plastic panels
  - Drywall board

Air Pressure in Containment Area

- Exhausting air from a contained construction space creates **reduced air pressure** (negative pressure)
- **Negative pressure** draws air **from adjacent clean areas into the workspace**
- Exhaust air is released **outdoors** and **filtered through a HEPA filter** before recirculating indoors
- High-risk areas: minimum 0.03 inches of water lower pressure than adjacent spaces (per FGI Guidelines)
- Too little negative pressure – ineffective containment
- Too much – may collapse barriers (e.g., plastic sheeting)
- Document pressure with:
  - Digital monitors (automatic logging)
  - Manual gauges (regular logging)
- Use alarms in sensitive areas for real-time alerts on pressure failures

Ventilation Isolation in Construction Zones

- **Seal air supply and return grills** within contained construction areas to prevent cross-contamination
- **Wrap or inspect active return air ducts** passing through construction to prevent leaks
- **Use exterior exhaust fans** to help create negative pressure; add filters to reduce dust intake
- **Shut off internal exhaust fans** that push air out, to avoid contaminant leaks from pressurized ducts
- **Verify adjacent area ventilation balances** after containment setup

Role of Infection Prevention (IP)

- **IP collaborates** with construction and project teams -ICRAs
- IP **does not direct construction methods**, but verifies infection control compliance
- Best practices:
  - **Interdisciplinary site rounds**
  - **Periodic audits** for compliance
  - **Training/competency requirements** for workers on infection prevention
- Consider:
  - **TB screening, vaccination**, and symptom-based worker restrictions
  - **Third-party consultants** for ongoing ICRMR oversight in large projects

References

- American Society for Healthcare Engineering (ASHE) (n.d.). *ASHE ICRA 2.0™ Toolkit*. Retrieved May 9, 2025, from https://www.ashe.org/icra2
- APIC Text of Infection Control and Epidemiology (2019, May 27). Construction and Renovation. Retrieved May 9, 2025, from https://text.apic.org/toc/infection-prevention-for-support-services-and-the-care-environment/construction-and-renovation