

Building a Safe Future: Integrating Infection Prevention Measures in Construction Practices

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Objectives

- Describe the steps within the Infection Control Risk Assessment 2.0 for construction and remediation
- Apply the Infection Control Risk Assessment 2.0 in the patient care setting
- Identify the Infection Control Risk Assessment 2.0 project type using real life scenarios





What is an infection control risk assessment

- Assessment done at project design prior to any work being done
 - Define the activity
 - Identify patient risk
 - Define class of precautions
 - Assess surrounding area
 - Establish mitigation plan





ASHE ICRA 2.0

- Who developed the Infection Control Risk Assessment 2.0 (ICRA 2.0)
- What type of projects does it include
 - New Construction
 - Renovation
 - Maintenance operations
 - Emergency situations
- What facilities should use
 - CMS licensed facilities





Why do an ICRA 2.0

- When implemented correctly they work
- According to the FGI Guidelines
 - “the goal of the assessment is to “describe how an organization determines the risk the transmission of various infectious pathogens”





Pre- construction risk assessment (PCRA)

- Done in early phase of project
- What are the potential risk or impacts to
 - Patients
 - Staff
 - Visitors
- What are the potential risk or impacts to
 - Med-gas
 - Electrical
 - Plumbing





How is an ICRA 2.0 developed

- Multidisciplinary team that includes ALL stakeholders
 - Care staff/Department Manager
 - Facilities manager
 - Contractor
 - Infection prevention
 - Leadership
 - Safety Officer
 - Environmental Services



Define the activity

- Consider
 - How invasive/disruptive is the work
 - Timeline for the project
 - Area(s) impacted

Step One:
Using Table 1, Identify the Activity Type (A-D).

Table 1 - Activity Type: _____

Type A	Inspection and non-invasive activities. Includes but is not limited to: <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• Removal of preexisting floor covering, walls, casework or other building components.• New drywall placement.• Renovation work in a single room.• Non-existing 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: <ul style="list-style-type: none">• 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.



Identify patient risk

- Consider
 - Type of patient and care provided within the facility
 - Infection risk to patients that result from the project

Step Two:

Using Table 2, identify the Patient Risk Group(s) that will be affected. If more than one risk group will be affected, select the higher risk group.

Table 2 - Patient Risk Group:

Low Risk	Medium Risk	High Risk	Highest Risk
Non-patient care areas such as:	Patient care support areas such as:	Patient care areas such as:	Procedural, invasive, sterile support and highly compromised patient care areas such as:
<ul style="list-style-type: none">• Public hallways and gathering areas not on clinical units.• Office areas not on clinical units.• Breakrooms not on clinical units.• Bathrooms or locker rooms not on clinical units.• Mechanical rooms not on clinical units.• EVS closets not on clinical units.	<ul style="list-style-type: none">• Waiting areas.• Clinical engineering.• Materials management.• Sterile processing department - dirty side.• Kitchen, cafeteria, gift shop, coffee shop, and food kiosks.	<ul style="list-style-type: none">• Patient care rooms and areas• All acute care units• Emergency department• Employee health• Pharmacy - general work zone• Medication rooms and clean utility rooms• Imaging suites: diagnostic imaging• Laboratory.	<ul style="list-style-type: none">• All transplant and intensive care units.• All oncology units.• OR theaters and restricted areas.• Procedural suites.• Pharmacy compounding.• Sterile processing department - clean side.• Transfusion services.• Dedicated isolation wards/units.• Imaging suites: invasive imaging.



Precaution class

- Consider
 - What precautions are needed
 - What work needs an independent ICRA vs standing order

Patient Risk Group	Activity 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



Assessing surrounding locations

- Consider
 - Will other areas be affected
 - Below
 - Above
 - Lateral
 - Impact on the health care system

Table 4 - Surrounding Area Assessment

Unit Below:	Unit Above:	Unit Lateral:	Unit Behind:	Unit in Front:
Risk Group:	Risk Group:	Risk Group:	Risk Group:	Risk Group:
Contact:	Contact:	Contact:	Contact:	Contact:
Phone:	Phone:	Phone:	Phone:	Phone:
Additional Controls: <input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization <input type="checkbox"/> Vertical Shafts <input type="checkbox"/> Elevators/Stairs	Additional Controls: <input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization <input type="checkbox"/> Vertical Shafts <input type="checkbox"/> Elevators/Stairs	Additional Controls: <input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization <input type="checkbox"/> Vertical Shafts <input type="checkbox"/> Elevators/Stairs	Additional Controls: <input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization <input type="checkbox"/> Vertical Shafts <input type="checkbox"/> Elevators/Stairs	Additional Controls: <input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization <input type="checkbox"/> Vertical Shafts <input type="checkbox"/> Elevators/Stairs
Systems impacted: <input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Hot/Cold Water	Systems impacted: <input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Hot/Cold Water	Systems impacted: <input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Hot/Cold Water	Systems impacted: <input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Hot/Cold Water	Systems impacted: <input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Hot/Cold Water
Noise & Vibration Mitigation Strategies				
<input type="checkbox"/> Use diamond drills instead of powder-actuated fasteners. <input type="checkbox"/> Schedule noise-making periods with adjacent spaces. <input type="checkbox"/> Use beam clamps instead of shot. <input type="checkbox"/> Prefab where possible. <input type="checkbox"/> Use tin snips to cut metal studs instead of using a chop saw. <input type="checkbox"/> Install metal decking with vent tabs, then use cellular floor deck hangers. <input type="checkbox"/> Consider compression style fittings instead of soldering, brazing or welding. <input type="checkbox"/> Wet core drill instead of dry core or percussion. <input type="checkbox"/> Instead of jackhammering concrete, use wet diamond saws. <input type="checkbox"/> Use HEPA vacuums instead of standard wet/dry vacuums. <input type="checkbox"/> Use mechanical joining system sprinkler fittings instead of threaded. <input type="checkbox"/> Where fumes are tolerated, use chemical adhesive remover (flooring glue) instead of mechanical. <input type="checkbox"/> To remove flooring, consider abrasive blasting instead of using a floor scraper. <input type="checkbox"/> Use electric sheers instead of reciprocating saw for ductwork cutting. <input type="checkbox"/> Install exterior man/material lifts.				
Ventilation & Pressurization Mitigation Strategies				
<input type="checkbox"/> HEPA to exterior. <input type="checkbox"/> Install temporary ductwork. <input type="checkbox"/> Utilize temporary HVAC equipment. <input type="checkbox"/> Vacate the area. <input type="checkbox"/> Install temporary partitions. <input type="checkbox"/> Use carbon filtration to filter odors.				
Impact to Other Systems Mitigation Strategies				
<input type="checkbox"/> Schedule outages. <input type="checkbox"/> Provide temporary systems. <input type="checkbox"/> Back-feed electricity or medical gases.				



Mitigation plan

Table 5 - Minimum Required Infection Control Precautions by Class | Before and During Work Activity

Class of Precautions	Mitigation Activities (Performed Before and During Work Activity)
Class I	<ol style="list-style-type: none"> 1. Perform noninvasive work activity as to not block or interrupt patient care. 2. Perform noninvasive work activities in areas that are not directly occupied with patients. 3. Perform noninvasive work activity in a manner that does not create dust. 4. Immediately replace any displaced ceiling tile before leaving the area and/or at end of noninvasive work activity.
Class II	<ol style="list-style-type: none"> 1. Perform only limited dust work and/or activities designed for basic facilities and engineering work. 2. Perform limited dust and invasive work following standing precautions procedures approved by the organization. 3. This Class of Precautions must never be used for construction or renovation activities.
Class III	<ol style="list-style-type: none"> 1. Provide active means to prevent airborne dust dispersion into the occupied areas. 2. Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door. 3. Remove or isolate return air diffusers to avoid dust from entering the HVAC system. 4. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 5. If work area is contained, then it must be neutrally to negatively pressurized at all times. 6. Seal all doors with tape that will not leave residue. 7. Contain all trash and debris in the work area. 8. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 9. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 10. Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.
Class IV	<ol style="list-style-type: none"> 1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling or, if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type). 4. Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air. 5. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 6. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 7. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 8. Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 9. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 10. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable. 11. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator. 12. Contain all trash and debris in the work area.

	<ol style="list-style-type: none"> 13. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 14. Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suits is acceptable. 15. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 16. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 17. Consider collection of particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.
Class V	<ol style="list-style-type: none"> 1. Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling, or if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements. 2. All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor. 3. Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type). 4. Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area. 5. Personnel will be required to wear disposable coveralls at all times during Class V work activities. Disposable coveralls must be removed before leaving the anteroom. 6. Remove or isolate return air diffusers to avoid dust entering the HVAC system. 7. Remove or isolate the supply air diffusers to avoid positive pressurization of the space. 8. Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized. 9. Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows does not require HEPA-filtered air. 10. If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. 11. Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is <u>not acceptable</u>. 12. Install device on exterior of work containment to continually monitor negative pressurization. To assure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator. 13. Contain all trash and debris in the work area. 14. Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. 15. Worker clothing must be clean and free of visible dust before leaving the work area anteroom. 16. Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed. 17. Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled. 18. Consider collection of particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.



Approval

- Who is needed to ensure that the ICRA is complete and agreed upon
 - Infection prevention
 - Facilities Project Manager
 - Lead Contractor
 - Environmental Services
- What documentation is required
- Where is it posted
- How is it communicated





What if there is an event

- Review pressure differential
- Implement corrective engineering measures
- Conduct prospective review for other cases
- If epidemiologic evidence of ongoing transmission
 - Collect environmental samples
 - Decontaminate structural materials with ant-fungal biocide
 - If able perform subtyping



What is the barrier to ICRA 2.0

- Time
- Cost
- Disruption of services
- Understanding of the need
- Coming into the project late
- Inability to meet requirements



Scenario

- A fire sprinkler head went off on the 4th floor of your hospital. As the team worked to turn the sprinkler off water intrusion occurred on the fourth floor and down to the third floor of the facility. Upon further review the third floor is an open bay with 15 intensive care patients currently receiving care and drop ceiling is no longer intact. What do you do?
 - What mitigation strategies do you do first
 - What barriers are needed



Scenario

- You're the IP for an outpatient infusion center. The center does not own the building. The property management company wants to change the flooring at the entrance and lobby of the building. What do you do?
 - What mitigation strategies do you do first
 - What barriers are needed



Scenario

- You are the IP at a skilled nursing facility. There is a plan underway to renovate resident rooms. This construction has not started but it has been discussed at some of the leadership meetings you are a part of. What do you do?
 - What part of pre-planning should you be a part of
 - What type of barriers will likely be needed



Scenario

- You're an IP at an acute care facility that is building a new addition to the facility. This addition will be connected to the hospital via a pedway that will have to be built. What do you do?

- What risk mitigation strategies do you need?



Scenario

- You're an IP at an ambulatory surgery clinic. A project has been underway for weeks and is not thought to be completed for at least three more. You are doing rounds and find that the barriers have been breached and the adjacent OR spaces are not holding positive pressure. What do you do?
 - What risk mitigation strategies do you need?
 - Who should be involved?



References

- [Guidelines for Environmental Infection Control in Health-Care Facilities \(cdc.gov\)](#)
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- [ASHE ICRA 2 TM form 0.pdf](#)
- [ASHE ICRA 2 TM permit.pdf](#)
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