Penn Medicine
Lancaster General Hospital

Infection Prevention & Control

Throughout Construction and Renovations

Updated 1/2024

Objectives

After completion of this Infection Prevention & Control Construction Education, participants will be able to:

- List the elements of an Infection Control Risk Assessment and risk mitigation barriers
- Describe infection prevention and control practices related to construction and renovation in healthcare settings
- Discuss the importance of infection prevention and control practices in avoiding construction-related infections

Construction & Renovation Activities in Healthcare
What's the big deal?

Construction and renovation activities can release dust and debris into the environment…

- Releasing bacteria or fungi that can cause infections in patients with weakened immune systems
- Triggering allergies in some patients or staff
- Causing difficulty breathing in some patients or staff
- Clogging medical instruments
- Setting off smoke detectors

Construction in Healthcare: Does it put patients and workers at risk?

Not if everyone follows the ICRA!

Infection Control Risk Assessment (ICRA)

Purpose of ICRA:

To provide parameters for safe design, construction, maintenance, and sustainability in the healthcare environment

- Completed prior to the start of any construction or renovation project
- Infection risks, interventions, and control strategies must be considered in planning for new construction and/or renovation of healthcare facilities
- Developed for all projects that may impact the health of patients
- Document assessment process
- Proactively identify and mitigate infection risks
- Consider patient populations, scope of the project & potential risk of transmission of contaminants
- Collaborative team includes Project Managers, Infection Prevention, Safety Officer, and Contractor Supervisors

Infection Control Risk Assessment

Step 1: Define Risk Group

ICRA Risk Groups

Group I: Lowest

- Office areas
- Non-patient care areas

Group 2: Medium

- Patient Care Areas not included in Group 3 or 4 (only when work can be done off-hours)

Group 3: Medium High

- Emergency Room
- Inpatient Nursing Units
- Observation Unit
- Couplet Care
- Labor & Delivery
- Newborn Nursery
- Pre/Post-op Unit
- Post Anesthesia Care Unit (PACU)
- Radiology
- Cafeteria/Kitchen
- Laboratories

Group 4: Highest

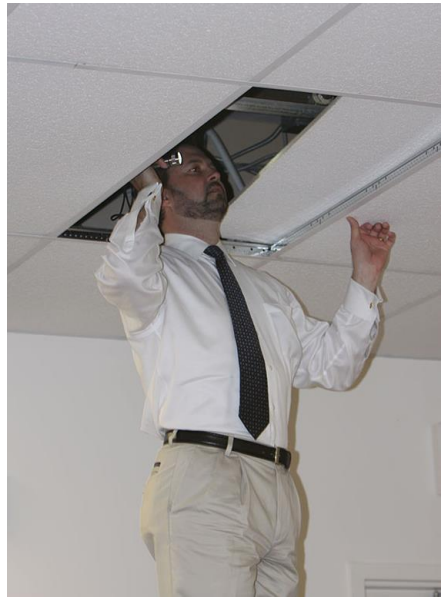
- Operating Room
- Endoscopy
- Cath & EP Labs
- Interventional Vascular Unit
- Anesthesia Work Room
- Sterile Processing Department
- Dialysis Unit
- Radiation Therapy
- Outpatient Infusion Centers
- Ann B. Barshinger Cancer Institute (all areas)
- Oncology Unit
- Critical Care Units
- Pharmacy

Infection Control Risk Assessment

Step 2: Determine Construction Activity Type (A, B, C, D)

Construction Activity Type

Type A: Minimal Dust



Inspections and non-invasive activities:

- Removal of ceiling tiles for visual inspection ONLY.
  - Limited to 1 tile per 50 square feet and ceiling must be replaced at the end of the work day.
- Painting (No sanding)
- Wall covering application
- Electrical trim work
- Minor plumbing
- No removal of sinks or wall cutting
- Planned activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspections

Construction Activity Type

Type B: Low Dust/Short Duration

Small scale, short duration (≤1 day) activities that create minimal dust:

- Installation of telephone and computer cables
- Cabling through ceiling with no more than 2 tiles removed at a time
- Access to chase spaces
- Minor cutting of walls and ceilings where dust migration can be controlled (<1 sq. ft. diameter) for the installation or repair of minor electrical work, ventilation components, telephone wires or other cables
- Sanding of walls for painting or wall covering ONLY to repair small patches

Construction Activity Type

Type C: Moderate-High Dust/Short duration

Work that generates a moderate to high level of dust and cannot be completed in 1 shift:

- Demolition or removal of any fixed building components or assemblies
- Breach in the building shell
- Sanding of walls for more than small patch repair
- Removal of floor coverings and casework
- New wall construction
- Minor ductwork or electrical work above ceilings
- Major cabling activities
- Removal of >50 square feet of ceiling tile
- Cutting holes in existing walls of > 1 square foot
- Any activity that cannot be completed in a single work shift

Construction Activity Type

Type D: High Dust/Long duration

Major demolition and construction projects:

- Heavy demolition or removal of a complete ceiling system
- Removal of drywall ceilings
- New construction requiring consecutive shifts to complete

Infection Control Risk Assessment

Step 3: Identify Class based Risk Level and Construction Activity Type determined in Steps 1 & 2

Lancaster General Health ICRA Matrix

Infection Prevention, in collaboration with LG Health Project Managers, will complete the ICRA and Infection Control Construction Permit paperwork.

It is the responsibility of the contractor to post the Infection Control Construction Permit at the worksite for the duration of the project.

Construction Activity Class Grid Determine Construction Class Required based on Activity Level and Risk Level from ICRA. Note: 1-2 ceiling tiles may be permitted to be removed for cable pulling if Infection Control approves.	**Type A** **Inspections and Non-invasive activities:** Includes, but is not limited to removal of ceiling tile for visual inspection only (limited to 1 tile per 50 square feet and ceiling tile must be replaced at the end of the work day). Also includes painting (but not sanding), wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access into ceilings other than for visual inspection.	**Type B** **Small scale, short duration (1 day) activities, which create minimal dust:** Includes, but is not limited to, installation of telephone and computer cables, access to chase spaces, cutting of walls or ceiling where dust migration can be controlled, and sanding of walls for painting or wall covering to repair small patches.	**Type C** **Any work that generates a moderate to high level of dust or which cannot be completed within 1 day:** Includes, but is not limited to demolition or removal of any fixed building components or assemblies, sanding of wall for painting or wallcovering, removal of floorcoverings, casework, or ceiling tiles, new wall construction, minor ductwork or electrical work above ceilings, major cabling activities, cutting holes in existing walls.	**Type D** **Major demolition and construction projects that generate high levels of dust and require consecutive work shifts:** Includes, but is not limited to, heavy demolition or removal of a complete ceiling system, removal of drywall ceilings, or new construction.
Group 1 Office areas, Non-patient care areas	**Class I** 1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.	**Class II** 1. Obtain Infection Control Construction Permit before work begins. 2. Isolate area with barriers or control cube which provide active means to prevent airborne dust from dispersing into atmosphere. 3. Close all room doors in vicinity of work 4. Seal all holes, pipes, conduits, and unused doors appropriately. 5. May need to block off and seal air vents to prevent contamination of the duct system 6. Water mist work surfaces to control dust while cutting if applicable 7. Contain construction waste for transport in covered containers (lidded or cover secured with strap or tape). 8. Wet mop and/or vacuum work and adjacent areas with HEPA filtered vacuum. 9. Place dust mat at entrance/exit of work area. 10. Wipe surfaces with cleaner/disinfectant as needed. 11. Upon completion of work, restore HVAC system to area.		**Class III** (See instructions for Class III)
Group 2 Patient Care Areas (only when work can be done off hours) (PM&R, Women's Pavilion, Cardiac Rehab, Noninvasive Cardiology, Admission areas, Pulmonary, etc.)			**Class III** 1. Obtain Infection Control Construction Permit before work begins. 2. Isolate area with barriers to provide active means to prevent airborne dust from dispersing into atmosphere. 3. Complete all critical barriers before construction begins including to deck as applicable. 4. Obtain IC Inspection Approval of IC barriers prior to beginning work. 5. Seal all holes, pipes, conduits, and unused doors appropriately. 6. May need to block off and seal air vents to prevent contamination of the duct system	**Class IV** 1. Obtain Infection Control Construction Permit before work begins. 2. Isolate area with barriers or control cube to provide active means to prevent airborne dust from dispersing into atmosphere. 3. Complete all critical barriers before construction begins including to deck as applicable. 4. Obtain IC Inspection Approval of IC barriers prior to beginning work. 5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site. 6. Seal all holes, pipes, conduits, and unused doors appropriately. 7. May need to block off and seal air vents to prevent contamination of the duct system 8. Contain construction waste for transport in covered containers (lidded or cover secured with strap or tape). 9. Place dust mat at entrance/exit of work area. 10. Maintain negative pressure of at least -0.01 within work site utilizing HEPA equipped air filtration units. Negative pressure of at least -0.03 may be required for high risk areas as determined by IC. 11. Provide HEPA vacuum cleaner for personnel to remove any loose soil or debris from clothing prior to exiting the worksite. 12. Do not remove barriers from work area until complete project is checked by Infection Control and thoroughly cleaned by Environmental Services Dept. 13. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. . Additional requirements based on location of work may be required as determined by Infection Control (shoe covers, coveralls, etc.)
Group 3 Emergency Room, Inpatient Nursing Units, Observation Unit, Couplet Care, Labor & Delivery, Nursery, Pre/Post-Op Unit, Post Anesthesia Care Unit, Radiology, Cafeteria/Kitchen, Laboratories				
Group 4 Operating Rooms, Endoscopy, Cath & EP Labs, IVU, Anesthesia work room, Sterile Processing Department, Dialysis Unit, Radiation Therapy (SP), Outpatient Infusion Centers, Ann B. Barshinger	**Class II** (See instructions for Class II)	7. An anteroom may be required as determined by Project Manager and/or Infection Control 8. Contain construction waste for transport in covered containers (lidded or cover secured with strap or tape). 9. Place dust mat at entrance/exit of work area. 10. Maintain negative pressure of at least -0.01 within work site utilizing HEPA equipped air filtration units. Negative pressure requirements may be required for high risk areas as determined by Infection Control. 11. Provide HEPA vacuum cleaner for personnel to remove any loose soil or debris from clothing prior to exiting the worksite. 12. Do not remove barriers from work area until complete project is checked by Infection Control and thoroughly cleaned by Environmental Services Dept.		

Infection Prevention & Control Measures (Class I)

- Execute work by methods to minimize dust from construction operations
- Immediately replace any ceiling tile displaced for visual inspection
- Maintain a clean work area

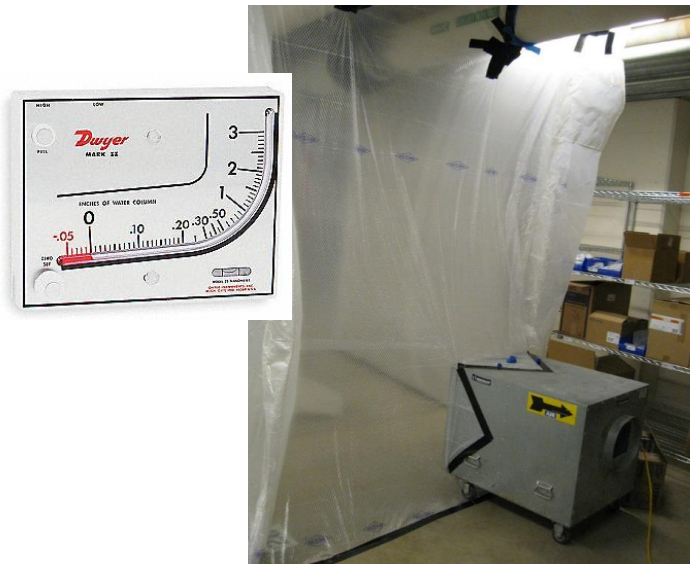
Infection Prevention & Control Measures (Class II)

- Isolate area with barriers or ICRA cart, providing active means to prevent airborne dust from dispersing into atmosphere
- Seal all holes, pipes, conduits, and unused doors
- Close all room doors in vicinity of work
- May need to block off and seal air vents to prevent contamination of duct system
- Water mist surfaces to control dust when cutting
- Contain construction waste before transport in tightly covered container
- Wet mop and/or vacuum with HEPA filtered vacuum before leaving work areas
- Place tacky mat at entrance/exit of worksite
- Plan after construction terminal cleaning
- Upon completion of work, restore HVAC systems to area.
- Maintain a clean work area

Infection Prevention & Control Measures (Class III)

Include all precautions for Class I & II, plus the following:

- Complete all critical barriers before construction begins
- Maintain negative pressure of at least -0.01 within worksite utilizing HEPA equipped air filtration units. Negative pressure requirements may be more stringent for high risk areas as determined by Infection Prevention and/or the Project Manager.
- An anteroom may be required as determined by Project Manager and/or Infection Prevention
- Provide HEPA vacuum cleaner for personnel to remove any loose so or debris from clothing prior to exiting the worksite.
- Do not remove barriers from work area until completed project is checked by Infection Prevention.
- Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.



Infection Prevention & Control Measures (Class IV)

Include all precautions for Class I, II & III plus the following:

- Construct and maintain an anteroom
  - Anteroom should be organized, clean, properly stocked and sealed tightly
  - Tacky mats or wet mats in place
    - Must be changed often
    - If they are dirty, they do not work

- HEPA vacuum cleaner must be available for vacuuming clothing of personnel exiting worksite
- Shoe covers may be required in certain areas (i.e. ORs) as determined by Infection Prevention.

Always obtain Infection Control Construction Permit from Infection Prevention before construction begins for all projects Class II, III, or IV.

Permit must be posted at worksite for duration of the project.

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Infection Control Construction Permit - Attachment A

Location Of Construction:	Contractor Performing Work:	Project Start Date:	Estimated Duration:
Project Name:	ICRA Class:	Description of IC Construction Barrier Plans per ICRA:	
LGH Construction/Facilities Signature:_____ Date: _____			
LGH Infection Control Signature: _____ Date: _____			

Contractors are responsible to ensure that ALL staff and subcontractors working on this project review the infection control construction education located on the LG Health website prior to starting work at LG Health and on a subsequent annual basis.

Any change in or removal of IC Construction Barrier must be approved by IC and/or LGH Construction/Facilities prior to continuation of work. If IC Construction permit requirements are not followed, the project may be temporarily shut down by LGH until compliance is met.

Infection Control Construction Permit must be posted immediately outside the construction area at all times from start to completion of Project.

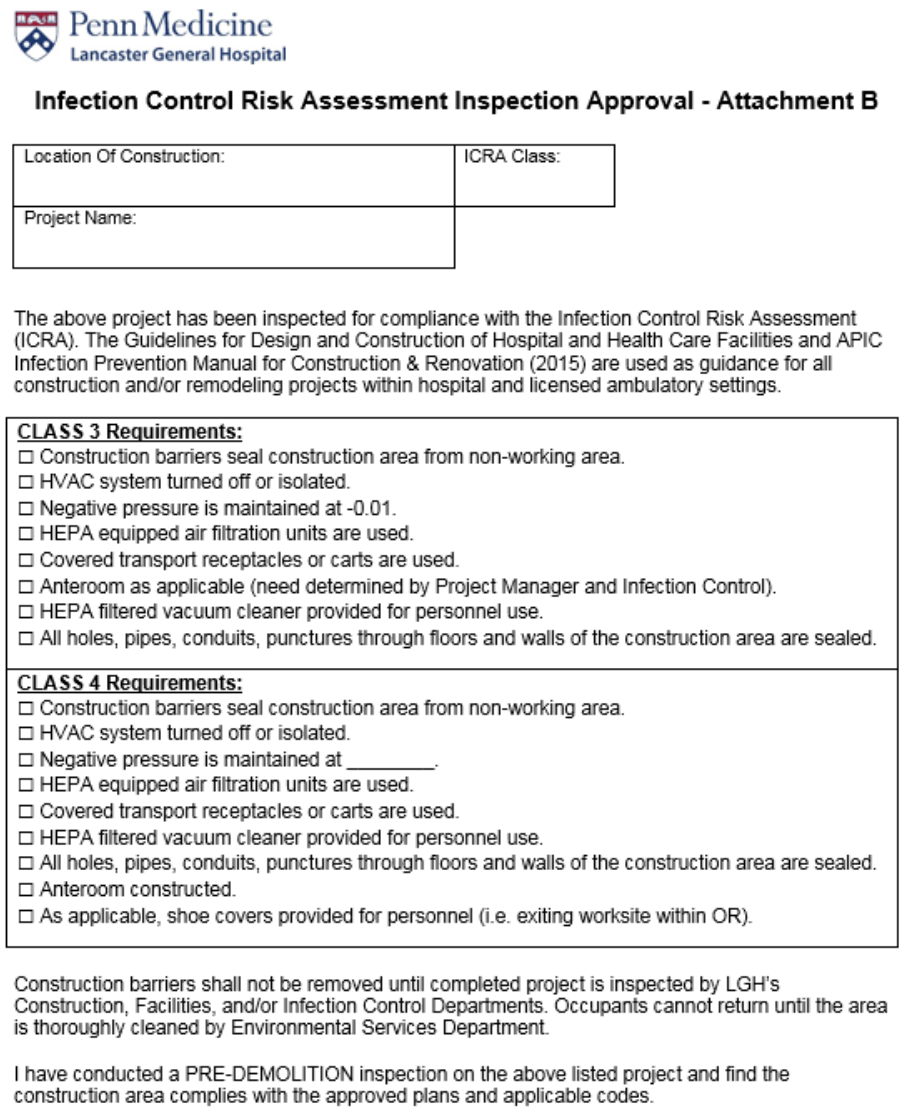
Supplemental IC Construction Permits related to Project

Location	ICRA Class	ICRA Barrier Plans	Date	LGH Project Manager	IC Nurse

ICRA Inspection Approval

Infection Prevention must inspect and approve ICRA barriers prior to start of work for all Class III & IV projects.

Please notify Infection Prevention when ICRA barriers are in place.



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Infection Control Risk Assessment Inspection Approval - Attachment B

Location Of Construction:	ICRA Class:
Project Name:	

The above project has been inspected for compliance with the Infection Control Risk Assessment (ICRA). The Guidelines for Design and Construction of Hospital and Health Care Facilities and APIC Infection Prevention Manual for Construction & Renovation (2015) are used as guidance for all construction and/or remodeling projects within hospital and licensed ambulatory settings.

CLASS 3 Requirements:

- ☐ Construction barriers seal construction area from non-working area.
- ☐ HVAC system turned off or isolated.
- ☐ Negative pressure is maintained at -0.01.
- ☐ HEPA equipped air filtration units are used.
- ☐ Covered transport receptacles or carts are used.
- ☐ Anteroom as applicable (need determined by Project Manager and Infection Control).
- ☐ HEPA filtered vacuum cleaner provided for personnel use.
- ☐ All holes, pipes, conduits, punctures through floors and walls of the construction area are sealed.

CLASS 4 Requirements:

- ☐ Construction barriers seal construction area from non-working area.
- ☐ HVAC system turned off or isolated.
- ☐ Negative pressure is maintained at _____.
- ☐ HEPA equipped air filtration units are used.
- ☐ Covered transport receptacles or carts are used.
- ☐ HEPA filtered vacuum cleaner provided for personnel use.
- ☐ All holes, pipes, conduits, punctures through floors and walls of the construction area are sealed.
- ☐ Anteroom constructed.
- ☐ As applicable, shoe covers provided for personnel (i.e. exiting worksite within OR).

Construction barriers shall not be removed until completed project is inspected by LGH's Construction, Facilities, and/or Infection Control Departments. Occupants cannot return until the area is thoroughly cleaned by Environmental Services Department.

I have conducted a PRE-DEMOLITION inspection on the above listed project and find the construction area complies with the approved plans and applicable codes.

Infection Prevention & Control is Everyone's Responsibility

Who enforces the ICRA Plan?

- Infection Prevention
- Project Managers
- Contractor

Who follows the ICRA Plan?

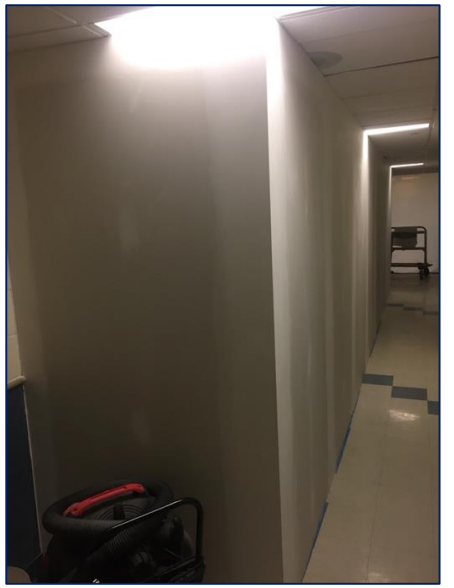
- All contractors and subcontractors
- Construction supervisors
- Construction tradesmen
- LGH Facilities/Maintenance Staff
- Cabling & tele-data installers
- Electricians, plumbers, carpenters, etc.
- Lancaster General Health Staff
- Everyone, including YOU!

Before Construction Starts

- Area under construction needs to be assessed for the following:
  - Medical equipment and supplies need to be removed or covered
  - HVAC system isolated if indicated
  - Designated routes determined for material and debris removal
  - Traffic Control-routing plans are designated for tradesmen, staff and patient flow
- Contact Project Manager or Infection Prevention with any questions.

Infection Control Barriers

- Determined by Infection Prevention & Project Managers based on ICRA Class
- Hard or plastic barrier, or combination of both
  - Closure with zipper or door
  - Impermeable
  - Built from floor to ceiling/deck
  - Seal all penetrations and gaps
  - Built with fire rated/resistant materials
  - If door is in place, this should remain locked when unoccupied



Portable Barriers

- Used only if the work can be fully contained within the cube
- Ensure cube walls extend fully and are tight against the ceiling
- May or may not need negative pressure, depending on the ICRA Class
- Need to be clean and in good repair

Negative Pressure

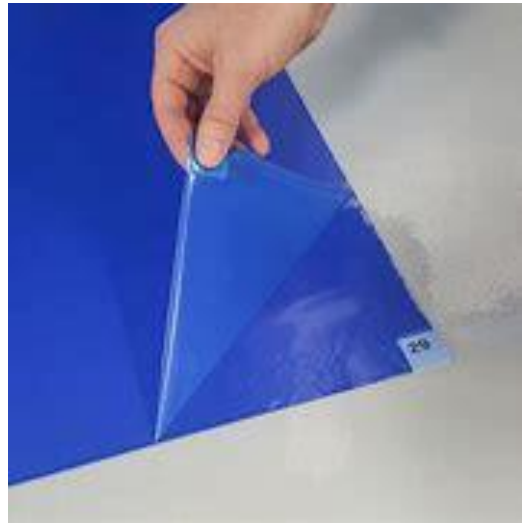
- If negative pressure is required per the ICRA, Contractors are responsible for providing and maintaining HEPA-filtered air filtration machines
- Visual continuous monitoring (manometer) of air pressure is required with daily documentation by contractor.
- Negative pressure must be below -0.01 inches of water or more stringent as determined by Infection Prevention or Project Manager

Plumbing

- Be aware of tanks and piping that may have stagnant water
- Avoid aerosolization (spraying) of water
- Do not create dead legs when removing existing pipes
- Flush systems prior to putting into service

During Construction

- Do not allow dust and debris to accumulate within work area
- Do not leave trash behind in wall/ceiling cavities
- All debris/waste is removed in covered containers via designated route
  - Carts must be clean including the wheels
- Change tacky mats/wet mats frequently to prevent tracking of dust outside of work area
  - Immediately clean any dust tracked outside of work area



Other Considerations

- Construction badges are required & must be visible for all construction workers while on site
- All construction workers must remove dust /debris from their clothing when exiting the work site
- Follow your company's dress code

Infection Prevention will evaluate compliance of ICRA measures on a routine basis

What is wrong with this cart?

What is wrong with this plastic barrier?

If ICRA precautions are not followed, work can be temporarily halted until appropriate measures are in place.

Construction Site Evaluation Tool

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Infection Control Site Compliance Tool - Attachment D

Project Name:	Date / Time:

Documentation occurs within AMP-Tracers IC-Construction Project Tracer

A. Job Site:	Yes	No	N/A	N/O
1. Are signs posted outside construction area to direct pedestrian traffic? (Observation) (Answer: Signs should be posted on the exterior of construction space)				
2. Is dirt/debris contained within construction area? (Observation) (Answer: Surrounding areas are free of dirt, debris and footprints)				
(Observation) (Answer: Sealed plastic with overlay, hard wall barrier with door, closed patient doors, etc.)				
4. Are walk off mats in place, clean, secured to floor, and adequate to contain construction dust? (Observation) (Answer: Select N/A if mats are no required for the project)				
5. Is demolition debris removed/construction materials delivered utilizing the designated route? (Observation/Interview) (Answer: Only designated route is used including the use of the assigned elevator, as applicable)				
6. Is demolition debris being removed from the site in tightly fitted covered carts? (Observation/Interview) (Answer: All carts need to be covered with leaving the construction site)				
7. When transporting debris outside of the construction area, are the wheels of the carts being cleaned before exiting the construction area? (Observation/Interview) (Answer: Wheels are to be cleaned prior to leaving - use of the walk off mat is acceptable - Select N/O if wheel tracks noted in surrounding areas)				
8. Are the demolition chute and dumpster being sprayed with water to maintain dust control? (Observation/Interview) (Answer: Select N/A if conditions do not require)				
9. Are openings of demolition chutes sealed when not in use? (Observation) (Answer: Demolition chutes are to be sealed)				
B. Contractor Safety:				
10. Are contractors wearing required identification? (Observation) (Answer: ID is a LGH supplied badge or hardhat sticker)				
11. Are construction personnel wearing required PPE? (Observation) (Answer: PPE includes hardhat, protective eyewear, footwear, etc.)				
12. Are contractors following safe work practice? (Observation) (Answer: Observe for trip and fall hazards, ladder safety, smoking rules, etc.)				
C: Ventilation:				
13. Is negative air pressure maintained? (Observation) (Answer: Negative pressure is maintained at -0.01-or more stringent as required per ICRA , air quality adequate, no excess				

ICRA/Construction Meetings

LGH Project Mangers report out at regular meetings.

Please keep your LGH Project Manager updated.

Conclusion

- Use the proper techniques, even if it's not the easiest thing to do
- Think before starting a project
- Involve Infection Prevention from the beginning of projects – whether renovations or new construction; large or small
- Don't be afraid to ask questions or stop the work until the appropriate barriers are in place and tight

Ask yourself…

"Do I want my family member treated under these conditions?"

Please do not hesitate to reach out to Infection Prevention!

Infection Preventionists

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