Infection Control Risk Assessment:
The Infection Preventionist’s Role in Construction
Key Concepts

- Use of ICRA is an important element in an infection prevention program
- Should be an integral part of all planning that involves renovation or construction at a healthcare facility
- IPs should have access to and be knowledgeable regarding the Facility Guide Institute (FGI) construction guidelines.
Major Hazards, Implications, and Interventions

• Design-
  – Insufficient planning leading to compromise of air quality and potential for continued environmental contamination

• Mitigation
  – Systematic approach to construction and renovation activity is crucial to improving safety and risk reduction related to chemicals, dust allergens, microorganisms etc
Major Hazards, Implications, and Interventions

• Mitigation (Cont’d)
  – Erection of proper barriers
    • Dust buggy
    • Poly walls with and without zippers
    • Temporary hard walls
ICRA Definition and Purpose

• An ICRA must provide a strategic, proactive design to mitigate environmental sources of microbes and to prevent infectious hazards through architectural design.

• The 2006 Guidelines clarified activities associated with design planning, construction planning, and actual preparation for the construction project referred to as ICRMR (Infection Control Risk Mitigation Recommendations)
ICRA Elements Related to Design Features

- Numbers, location and types of AII and protective environment rooms

- Location of special ventilation and filtration of HVAC serving such areas as ED waiting and intake areas

- Air handling and ventilation needs in surgical services, AII and PE rooms, labs, local exhaust systems for hazardous agents/chemicals, and other areas with special needs
ICRA Elements Related to Design Features (cont’d)

- Water system to limit *Legionella* spp. And other water borne opportunistic pathogens

- Finishes and surfaces
ICRA Elements Related to Building site areas affected by Construction

• Impact of disrupting essential services to patients and employees
• Determination of specific hazards and protection levels for each
• Location of patients based in susceptibility to infection and definition of risks to each
• Impact of potential outages or emergencies and protection of patient during planned or unplanned outages, movement of debris, traffic flow, cleanup, and testing and certification
Preparation for Actual Construction

• Patient placement and relocation
• Standards for barriers and other protective measures to protect adjacent areas
• Temporary provisions for phasing of project
• Protection of occupied patient areas from demolition
• Measures to be taken for training of facility staff, visitors, and construction personnel
Construction Policy, Purpose and Elements

• Annual Review
• Approval by infection control committee and the governing board of trustees
• Ongoing communication of planned and current projects provided by facility manager
Additional CRP Elements

• Authority and Responsibility
• Strategic planning for air and water quality for each building including types of barriers and monitors
• Authority for determining unit closure issues
• Specific expectations for contractor accountability
• Communication linkages, including documentation responsibilities
Additional CRP Elements (cont’d)

• Criteria for emergency work stoppages and processes to stop and start.
• Educational needs for whom and by whom
• Occupational health expectations for contractors
• General traffic patterns
• Transport and manifest approval of waste materials and supplies
Additional CRP Elements (cont’d)

• Noise and vibration issues related to the project
• Emergency preparedness plans for major utility failures
• Phasing and Commissioning
IP Role at the Organization Level

- Facilitation and communication among health agencies facility administration regarding essentials for safe practice and infection control guidelines
- Consultation related to current and future patient populations and care delivery systems
- Evaluation of plans considering policies related to design
IP Role at the Organization Level (Cont’d)

- Determination of impact
- Review of proposed Construction plans
- Determination of environmental monitoring needs
- Determination of types and methods of education provisions for contractors
- Development of IP expectations into initial agreements
Codes, Standards, and Regulations

• Regulatory and accrediting agencies at all levels base licensing and certification decisions on whether or not facilities meet minimum construction standards.

• Usually these relate to the Federal Conditions of Participation from CMS.

• County and local jurisdictions for fire and plumbing safety codes may supersede some regulations and become the authority having jurisdiction.
Ventilation Requirements for Areas Affecting Patient Care in Hospitals and Outpatient Facilities

- Area Designation
- Air Movement Relationship to Adjacent Area
- Minimum Air Changes (AC) of Outdoor Air/hr
- Minimum Total AC/hr
- All Air Exhausted Directly to Outdoors
- Recirculation by Means of Room Units
- Relative Humidity
- Design Temperature
Federal Agencies

- **OSHA** - Occupational Safety and Health Administration (regulates safety)

- **NIOSH** – National Institute for Occupational Safety and Health (workplace safety)

- **CMS** – Centers for Medicare & Medicaid Services (coordinating better care & lower costs)

- **HRSA** – Health Resources & Services Administration (public entities that serve designated medically underserved populations/areas)

- **AIA/FGI** – American Institute of Architecture/Facility Guidelines Institute

- **NFPA** - National Fire Protection Association (codes for fire alarms, life safety codes, etc.)

- **TJC** — The Joint Commission (independent, not for profit organization, accredits and certifies nearly 21,000 health care organizations and programs)

- **ASHE** — American Society for Healthcare Engineering (association for health care facility managers, engineers, and other professionals dedicated to optimizing the health care physical environment).
Traffic

• Contributor to air contamination
• Patient movement should cause minimal exposure of patients to others
• Patients who are in Airborne Precautions should be transported using precautions defined by IP Program
• Visitor traffic routes should minimize contact with patients, and visitors should be assessed for communicable diseases
• Routes for transporting clean and sterile supplies from storage should not allow contact or permit temporary storage near contaminated materials.

• Laundry/Trash chutes are contaminated, and bags can rupture during use.

• Waste transport should be designed for maximum containment
Preparation for Demolition and Construction

• Focus on isolation of the construction area
• Some are classified minor or major based on the number and types of barriers needed
• Permits are issued according to the amount of risk of contamination of the environment exist
• The permit prescribes the needed barriers and precautions that will keep the environment from becoming contaminated
External Excavation Precautions

• Ideally should be done on off hours so that air handlers can be adjusted
• Excavation can produce an enormous amount of dust
• Working during off hours reduces traffic and opening of doors, which reduce the volume of unfiltered air that flows into the building during excavation activity.
Internal Construction and Renovation Activity

• Priority is to protect patient-care areas
• Most important risks of internal construction or renovation include:
  – Dust and debris may carry microbes (*aspergillus*)
  – Ventilation systems may malfunction from accumulation of dust and debris on filters, resulting in decreased airflow and filtration
  – Patient rooms, supplies, equipment and areas where patients may be treated may be contaminated.
Prevention Interventions

• Barrier Placement- isolate the area from occupied areas during construction using sealed, airtight barriers

• Air-filtering- it should be determined if construction area uses fresh/outside or recirculated air; filters should be added or return vents should be covered

• Noise and vibration- potential for vibration or disturbances to dislodge dust collected above suspended or false ceilings should be recognized and the effect of vibration on contamination of plumbing
Prevention Interventions Cont’d

• Ventilation- should be monitored to ensure exhaust maintains negative airflow in construction zone

• Debris Removal- use of a chute with HEPA-filtered negative air machine is preferred for debris removal over use of elevators but is not always possible. If not possible ensure debris is covered during transport
Prevention Interventions Cont’d

- Environmental Air Sampling - indications for taking environmental cultures should be critically reviewed because cultures are unlikely to provide useful information
  - Should only be done by experienced trained staff
Prevention Interventions cont’d

• System Balancing- after completion of construction, the ventilation system should be balanced to design specifications
  – Filters should be examined for plugging or leakage
  – Preventive maintenance or cleaning of ductwork, vents or induction units should have been agreed upon beforehand
• Water Issues-
  – Lines should be flushed thoroughly before occupation
  – Increased risk of loosened internal corrosion and scale during vibration of water pipes
  – Increases potential for water contamination
Prevention Interventions Cont’d

• Contractor Clean Up
  – Contractors should complete removal of partitions
  – Contractors should clean and disinfect according to specific agreements

• Facility Clean Up
  – Staff perform routine cleaning before returning area to service
  – Recleaning and disinfecting of surfaces and equipment may be necessary
External Construction /Major Renovation

• Increased potential for contaminating dust and debris on air filters

• HVAC units may be disrupted and nonfunctional during certain periods of construction

• Medical vacuum systems and water supply may be affected

• Contamination of patient rooms, supplies, equipment, and areas patient may visit may occur.
External Prevention Interventions

- All of the previously discussed interventions and
  - Cleaning of air handlers
  - Schedule utility shut downs for low activity times
  - Plan ahead for utility shut downs.
Review Prep before Occupancy

- The following processes usually are done as part of an operation project team. The facility’s punch list is invaluable. Be sure to check
  - Airflow, pressures, filters, location of air intakes and vents
  - Drains to the sanitary sewer system connected and functioning
Steps 2 weeks Before Moving into New Facility

• Use processing packs to check steam or gas sterilizers
• Verify correct water temperature
• Complete written schedules and procedure for routine maintenance
• Determine transportation systems
• Walk through the facility with local health department facility management
Steps 1 week Before Moving into New Facility

- Evaluate HVAC
- Evaluate laminar air hoods for effective operation
- Open all faucets simultaneously to test drain effectiveness
- Check that aerators are not on designated faucets
- Check floor drains
- Ensure cleaning has been completed.
Steps 1 week Before Moving into New Facility Cont’s

• Ensure that hand hygiene products are in dispensers and that dispensers function properly

• Ensure registered pest control and management are functioning and checked

• Be prepared to intensify surveillance for HAIs and monitoring of infection prevention practices
**Infection Control/Epidemiology Construction Permit**

*Project Manager to complete this section:*

*A barrier may include: empty room with door closed; after hours in empty department with ability to close doors; plastic wall with or without zipper; sheet rock solid wall; dust buggy; or replacement tile with a dust containment system. Barrier is chosen based on project scale and level of risk.*

<table>
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<tr>
<th><strong>Project Name:</strong> BMCM Emergency Department Expansion</th>
<th><strong>Project Manager Contact:</strong> Kolby May Chase Pritchard Chase A. Shimek</th>
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<tbody>
<tr>
<td><strong>Project Location:</strong> Emergency Department and adjacent hallway</td>
<td><strong>Phone #</strong> 214-476-0037 214-926-2709 979-218-2577</td>
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**Contractor Contact:** Bob Guill Phone # 214-326-4452

**Phase** 1 of 3

**Infection Preventionist (IP) selects project class below, based on Construction Risk Assessment Matrix:**

**Class I**

- Use methods to minimize dust
- Seal unused doors with duct tape
- Wipe surfaces with cleaner/disinfectant
- Wet mop and/or vacuum with HEPA-filtered vacuum before leaving work area
- Place dust/sticky mat at entrance/exit
- Contain waste before transport in tightly covered containers

**Class II**

- Use methods to minimize dust
- Seal unused doors with duct tape
- Wipe surfaces with cleaner/disinfectant
- Wet mop and/or vacuum with HEPA-filtered vacuum before leaving work area
- Place dust/sticky mat at entrance/exit
- Contain waste before transport in tightly covered containers
- Complete all barriers before work begins
- IP to list barrier type here: __________ dust buggy __________

**Class III**

- Use methods to minimize dust
- Seal unused doors with duct tape
- Place dust/sticky mat at entrance/exit
- Contain waste before transport in tightly covered containers
- Complete all barriers before work begins
- IP to list barrier type here: __________
- Isolate HVAC system in area where work is being done
- Maintain negative pressure in work site using HEPA air filtration units
- Install manometer and record reading twice a day while work is being done
- Seal holes, pipes, conduits, and punctures appropriately
- Do not remove barriers until complete project is checked by Infection Prevention & Control/Epidemiology and is cleaned by Environmental Services
- Remove barriers carefully to minimize spread of dust and debris

**APPROVAL PROCESS DOCUMENTATION**

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<th>Reviewed by Infection Control/Epidemiology</th>
<th>Date</th>
<th>Signature</th>
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<tr>
<td>4-21-2014</td>
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<td>Brenda Helms</td>
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## INFECTION CONTROL

CONSTRUCTION / RENOVATION
AIR QUALITY / PARTICLE COUNTS

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*Counts for one minute 0.5 micron size
Ceiling Tiles
Construction Inspection Findings
Dirty Vents
Mold & Stains

Staff lounge room
Scuffs on wall/ scuff/missing paint near screw in wall

Staff lounge room
Mold/green and brown stains on ceiling tiles
Torn Chairs
# REMINDERS

## Beds/Stretchers
- No torn or stained mattress or pillows
- Lift mattress off of frame to check for cleanliness and blood or body fluid
- Look under bed at wheels and motor to assure no dust

## Supplies
- Unused patient care supplies are stored and handled appropriately (off floor, 18" from ceiling)
- NO ORIGINAL PACKING BOXES IN CLEAN AREAS
- No dust/ trash in storage supply bins
- No torn or soiled gurney mattress or wheelchairs
- Clean & dirty areas are kept distinctly separated
- NOTHING STORED UNDER SINK
- No eating in work areas
EXAMPLE OF COMMUNICATION

Inspection of OR Surgery Sterile Processing & Supply Area

Date: February 17, 2014

Violations encountered included the following:

Replacing light switch with particle board instead of plywood.

No air filtration machines during construction work.

No Infection Prevention Permit was observed.

No barriers placed to prevent exposure of dust, etc.

No sticky mats placed to prevent dust and particles to be spread on floor.

Dust and Particles found throughout the supply area and Surgery Sterile Processing.

Construction Job for that particular area and the type of construction being performed should have:

1. Airtight plastic barrier that extends from floor to ceiling. Seams must be sealed with duct tape to prevent dust and debris from escaping.
2. Drywall barriers erected with joints covered or sealed to prevent dust and debris from escaping.
3. Seal all penetrations in existing barrier airtight.
4. Barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement of air and debris.
5. Contain work areas outside of construction barriers, including spaces above ceilings, with full height polyethylene sheet barrier, tightly taped.
6. Cleanup dust tracked outside of construction area immediately.
7. Provide active means to prevent air-borne dust from dispersing into atmosphere.
8. Water mist work surfaces to control dust while cutting.
9. Block off and seal air vents.
10. Place dust mat at entrance and exit of work area.

We have asked that an inspection of all supplies and equipment be performed.

Any equipment that is identified as dirty will need to be re-processed.

Supplies should be inspected to determine if there is dirt, particles, and any debris. The supplies that can be salvaged can be wiped with PDI wipes. If there are supplies that are determined dirty and cannot be cleaned, they should be discarded.
QUESTIONS