I want to begin with the premise that patients can leave the hospital sicker than they arrived if construction crews don’t use established precautions to control infection during new construction or major renovations. In fact, it is estimated that there are at least 5000 construction-related infections that occur every year in healthcare facilities.
INCIDENCE OF INVASIVE ASPERGILLOSIS IN AT-RISK GROUPS

<table>
<thead>
<tr>
<th>Host Group</th>
<th>Incidence of invasive aspergillosis</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allogenic bone marrow transplantation</td>
<td>5-10%</td>
<td>57.6%</td>
</tr>
<tr>
<td>Autologous bone marrow transplantation</td>
<td>0-5%</td>
<td></td>
</tr>
<tr>
<td>Peripheral blood stem-cell transplantation</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Cytotoxic therapy-induced granulocytopenia</td>
<td>Up to 70%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Kidney transplantation</td>
<td>0-3%</td>
<td>55.9%</td>
</tr>
<tr>
<td>Liver transplantation</td>
<td>1-15%</td>
<td></td>
</tr>
<tr>
<td>Heart/lung transplantation</td>
<td>0-20%</td>
<td></td>
</tr>
<tr>
<td>Heart transplantation</td>
<td>0-25%</td>
<td></td>
</tr>
</tbody>
</table>

DOCUMENTED SOURCE OF SPORES IN CONSTRUCTION SETTINGS

- General construction and renovation work
- Disturbance of soil resulting from earth works associated with building construction and site development
- Removal of suspended ceiling tiles
- Removal of fibrous insulation material or fire-stopping
- Opening up of service distribution shafts
- Improper maintenance and operation of ventilation systems
8 cases of invasive fungal sinusitis and 5 deaths

4 cases of surgical and burn wound aspergillosis

Outside of packaging contaminated with dust
JOINT COMMISSION

EC.02.06.05 – The hospital manages its environment during demolition, construction or renovation (d/c/r) to reduce risk to those in the organization

▸ EP 1 – When planning for new, altered or renovated space, use one of the following design criteria
  ▵ State rule and regulations
  ▵ When above rules, regulations and guidelines do not meet specific design needs, use other reputable standards that provide equivalent criteria

STATE RULES

10A NCAC 13B .6200 – Construction Requirements (.6201 -
EC.02.06.05 – The hospital manages its environment during demolition, construction or renovation (d/c/r) to reduce risk to those in the organization

EP 2 – When planning for d/c/r, hospital conducts a preconstruction risk assessment for air quality, infection control... and other hazards that affect care, treatment and services
FGI 2014 GUIDELINES

1.2-3 Safety Risk Assessment

► Proactive
► Multidisciplinary
► Documented assessment process

ICRA REQUIREMENTS

► Identify and plan safe design elements
► Identify and plan for internal and external building areas and sites that will be affected during construction/renovation
► Identify potential risk of transmission of airborne and waterborne biological contaminants during construction/renovation and commissioning
► Develop infection control risk mitigation recommendations to be considered
ICRA CONSIDERATIONS

Design Elements

- Number and location of AII and PE rooms
- HVAC needs
- Number and location of Hand washing stations and hand sanitation dispensers
- Impact on water system
- Surfaces and finishes
OTHER ICRA CONSIDERATIONS

Construction Elements

- Disrupting essential services
- Specific hazards and protection levels
- Location of patients
- Impact of moving debris, traffic flow, and spill clean-up
- Assessment of construction activities
- Location of known hazards
JOINT COMMISSION

EC.02.06.05 – The hospital manages its environment during demolition, construction or renovation (d/c/r) to reduce risk to those in the organization

▶ EP 3 – Hospital takes action based on it assessment to minimize risk during d/c/r.

RISK MITIGATION

Infection Control Risk Mitigation Recommendations (ICRMR) Planning
▶ Patient placement and relocation
▶ Barriers and other protective measures
▶ Temporary provisions or phasing for construction/ modification of HVAC and water supply systems
▶ Protection from demolition
▶ Training for staff, visitors, and construction personnel
▶ Debris and traffic flow, clean-up, elevator use for construction materials and workers.
▶ Bathrooms and food for construction workers
▶ Instillation of clean materials (ductwork, drywall, wood/paper/fabric materials) that have not been damaged by water
RISK MITIGATION

Monitoring plan and procedures

- Governing body provides monitoring plans for effective application of ICRMRs during course of project
  - Written procedures for emergency suspension of work
  - Protective measures indicating the responsibilities of each party (governing body, contractor, designer, and monitor)

DETERMINING CONTROL MEASURES

Identify type of Construction

- Type A – Inspection and non-invasive activities
- Type B – Small scale, short duration, limited dust
- Type C – Requires demolition and removal of fixtures, moderate to high dust
- Type D – Major demolition and construction
DETERMINING CONTROL MEASURES

Patient Risk Groups

- Low risk – Office areas, public areas
- Medium risk – Outpatient clinics, cafeterias, public corridors
- High risk – All inpatient nursing units (except ICU/Stepdown), ER, L&D, etc.
- Highest risk – All ICUs and Stepdowns, Oncology, Surgical suites (OR, PACU), Transplant clinics

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Type A</th>
<th>Type B</th>
<th>Type C</th>
<th>Type D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>I</td>
<td>II</td>
<td>II</td>
<td>III/IV</td>
</tr>
<tr>
<td>Medium</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
</tr>
<tr>
<td>High</td>
<td>I</td>
<td>II</td>
<td>III/IV</td>
<td>IV</td>
</tr>
<tr>
<td>Highest</td>
<td>I-III</td>
<td>III/IV</td>
<td>III/IV</td>
<td>IV</td>
</tr>
</tbody>
</table>
### INFECTION CONTROL PRECAUTIONS BY CLASS

#### During Construction | Upon Completion
---|---
1. Minimize raising dust | 1. Clean work area upon completion
2. Replace displaced ceiling tiles | |

#### During Construction | Upon Completion
---|---
1. Provide active means to prevent airborne dust dispersal | 1. Wipe work surfaces with disinfectant
2. Water mist surfaces | 2. Contain waste before transport in covered containers
3. Seal unused doors | 3. Wet mop or Vacuum (HEPA filtered) before leaving
4. Sticky mat at entrance | 4. Restore HVAC system
5. Seal air vents | |
6. Isolate HVAC system | |
## INFECTION CONTROL PRECAUTIONS BY CLASS

### During Construction | Upon Completion
---|---
ALL CLASS I, II plus  
1. Isolate HVAC  
2. Construct critical barriers  
3. Maintain negative pressure, HEPA equipped air filtration units  
4. Contain construction waste in tightly covered containers  
  | 1. Do not remove barriers until project completed, inspected and cleaned  
  | 2. Remove barriers carefully to minimize dust dispersal  
  | 3. Vacuum (HEPA filtered) work area  
  | 4. Wet mop area w/ disinfectant  
  | 5. Restore HVAC

### During Construction  
1. Seal all holes, pipes, and conduits  
2. Construct Anteroom at entrance, must vacuum off prior to exiting or wear coveralls  
3. All personnel wear shoe covers. Covers removed at exit  

### During Construction | Upon Completion
---|---
ALL CLASS I, II, III plus  
  | 1. Do not remove barriers until project completed, inspected and cleaned  
  | 2. Remove barriers carefully to minimize dust dispersal  
  | 3. Vacuum (HEPA filtered) work area  
  | 4. Wet mop area w/ disinfectant  
  | 5. Restore HVAC
CONTROLLING AIR FLOW

Ventilation of the Construction Space
Airflow into the construction zone from occupied spaces by dedicated ventilation/exhaust system for the construction area

- Location of exhaust discharges, fresh air intakes, sealing of existing air ducts
- Use of existing building systems
- Pressure differential of at least 0.03 inch water gauge (7.0 pascals)
- Visible display of negative pressure
Sealed Air Vents

MOBILE CONTAINMENT
EDUCATION AND TRAINING

Five groups for whom training is important
1. Construction company supervisory personnel
2. Construction workers
3. Hospital staff impacted by construction projects
4. Healthcare facility maintenance and engineering personnel
5. Healthcare project manager

SUMMARY

The IP should be involved in all construction projects from planning to completion
Common challenge – Lack of engagement or support from administration and getting support for IP involvement in construction activities
► Need to comply with regulatory agencies (State, FGI and TJC)
► Demonstrate value of the program
► Demonstrate how IP input results in an enhanced outcome and/or where the lack of input resulted in adverse outcomes