Guidelines and Standards for Construction and Renovation

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Considerations for building healthcare facilities

• Safety and satisfaction of patients and staff
  • Layout, air quality, hand washing facilities, lighting to reduce errors
  • Move towards healing design
    ◦ Natural light, noise reduction, access to nature

• Needs of the community
  • Changing demographics

• Incorporate technology

• Environmental issues
  • Building green, lower energy costs
Hospital renovation: the problems

• Construction, renovation or demolition generates vast quantities of dust which contains huge numbers of aerosolized filamentous fungi, such as *Aspergillus*, and sometimes as other potential pathogens, such as *Legionella*

• Moreover, construction can impair air handling systems or contaminate potable water with these pathogens
Hospital renovation: the problem

- Hospitals and clinics are filled with patients who are immunocompromised and highly vulnerable to devastating invasive infection with these newly unleashed pathogens
Aspergillus SSI
Are we seeing less fungal outbreaks associated with construction, renovation and demolition?
Survivor of mold outbreak sues UPMC claiming negligence
January 4, 2016 7:48 PM

Patient seriously ill with new fungal infection at Glasgow superhospital
27 Jan 2019
Joint Commission International standards

- Facility and Management and Safety (FMS) standards
  - Facility compliance
  - Risk management
  - Safety and security
  - Hazardous materials
  - Emergency management

- Fire safety
- Equipment safety
- Water and utilities
- Systems testing
- Infection prevention and control
  - International Patient Safety Goal 5 is to reduce healthcare associated infections
Standard FMS

• FMS 4: The hospital plans and implements a program to provide a **safe** physical facility through inspection and planning to reduce risks.

• FMS 4.1: The hospital plans and implements a program to provide a **secure** environment for patients, families, staff and visitors.

• “Construction and renovation pose additional risks to the safety of patients, families, visitors and staff, and include risk related to infection control, ventilation, traffic flow, garbage/refuse, and other risks. A preconstruction risk assessment is helpful in identifying these potential risks, as well as the impact of the construction project on services provided. The risk assessment should be performed during all phases of construction.”
CDC guidelines (2003)

Box 4. Suggested members and functions of a multi-disciplinary coordination team for construction, renovation, repair, and demolition projects

<table>
<thead>
<tr>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection-control personnel, including hospital epidemiologists</td>
</tr>
<tr>
<td>Laboratory personnel</td>
</tr>
<tr>
<td>Facility administrators or their designated representatives, facility managers</td>
</tr>
<tr>
<td>Director of engineering</td>
</tr>
<tr>
<td>Risk-management personnel</td>
</tr>
<tr>
<td>Directors of specialized programs (e.g., transplantation, oncology and ICU* programs)</td>
</tr>
<tr>
<td>Employee safety personnel, industrial hygienists, and regulatory affairs personnel</td>
</tr>
<tr>
<td>Environmental services personnel</td>
</tr>
<tr>
<td>Information systems personnel</td>
</tr>
<tr>
<td>Construction administrators or their designated representatives</td>
</tr>
<tr>
<td>Architects, design engineers, project managers, and contractors</td>
</tr>
</tbody>
</table>

Use of ICRA matrix and plan barrier control measures
Construction bundle

- To be implemented as a bundle of best practices for best results

1. Hospital epidemiology (infection control) should be notified by plant engineering prior to any renovation/construction activities in the healthcare facility.
2. Conduct an ICRA for all renovation/construction activities: implement recommended prevention strategies as guided by the ICRA.
3. Focus prevention efforts on control of airborne dissemination of fungal spores (e.g., barriers, containment, air handling, portable HEPA filters).
4. Consider impact of renovation/construction on the involved hospital unit plus adjacent units on the same floor, and hospital units on floors above and below the renovation/construction activities.
5. Maintain surveillance for healthcare-associated filamentous fungal infections during renovation/construction. Investigate any cases to see if they are related to renovation/construction and determine if prevention efforts need to be revised.
6. Visit renovation/construction sites regularly to assure compliance with recommended prevention activities.

Clinical Infectious Diseases 2015:61(3):433–44
Definitions (Collins English Dictionary)

• If an organization issues **guidelines** on something, it issues official **advice** about how to do it

• A **standard** is a level of quality or achievement, especially a level that is thought to be **acceptable**
Australian guidelines (2016)

- Risk management strategy
  - Risk identification
  - Risk assessment
  - Risk control
  - Monitoring
UK Guidance (2013)

Health Building Note 00-09: Infection control in the built environment

“… the infection prevention and control (IPC) team should be consulted throughout every stage of a capital project and their views taken into account…”
Appendix C: Sample Construction Permit

<table>
<thead>
<tr>
<th>Construction/Renovation Activity</th>
<th>Population Risk Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type A2 - Minor Internal Containable Activities</strong></td>
<td><strong>Group 1 - No Evidence of Risk</strong></td>
</tr>
<tr>
<td>This includes, but is not limited to, minor works on a small scale</td>
<td>- Staff members/service providers/contractors</td>
</tr>
<tr>
<td>where dust containment is achieved by using dust barriers and a HEPA-filtered vacuum. Activities that require access to conduit spaces, cutting of walls, woodwork or ceilings where dust migration can be controlled. For example:</td>
<td>- All patients not listed in Groups 2-4 below</td>
</tr>
<tr>
<td>include ventilation components, telephone wires or computer cables. It also includes minor plumbing work, where dust drilling is allowed for the erection of brackets and shelving.</td>
<td></td>
</tr>
<tr>
<td><strong>Type B - Major Internal Containable Activities</strong></td>
<td><strong>Group 2 - Increased Risk</strong></td>
</tr>
<tr>
<td>Any work that generates a moderate level of dust or requires</td>
<td>- Patients on prolonged courses of high-dose steroids or tumour necrosis factor α</td>
</tr>
<tr>
<td>demolition or removal of any fixed building components or</td>
<td>- Antagonists</td>
</tr>
<tr>
<td>equipment (e.g. counter tops, cupboards, sinks). These include, but</td>
<td>- Severely immunosuppressed ABD patients.</td>
</tr>
<tr>
<td>are not limited to, activities that require sanding of walls for</td>
<td>- Patients undergoing mechanical ventilation</td>
</tr>
<tr>
<td>painting or wall covering, removal of floor covering, ceiling</td>
<td>- None-myelopoenetic patients on chemotherapy</td>
</tr>
<tr>
<td>lining and trim work, new wall construction, minor dirt work or</td>
<td>- Dialysis patients</td>
</tr>
<tr>
<td>electrical work above ceiling,重大 demolition or removal of</td>
<td></td>
</tr>
<tr>
<td>aggressive panels within a single work shift. This type of activity</td>
<td></td>
</tr>
<tr>
<td>includes demolition or removal of a complete cabling system or</td>
<td></td>
</tr>
<tr>
<td>plumbing and new construction that requires consecutive work shifts</td>
<td></td>
</tr>
<tr>
<td>to complete.</td>
<td></td>
</tr>
<tr>
<td><strong>Type C - Minor External Non-Containable Activities</strong></td>
<td><strong>Group 3 - High Risk</strong></td>
</tr>
<tr>
<td>External construction activities that generate moderate levels of</td>
<td>- Neutropenia for less than 14 days following chemotherapy</td>
</tr>
<tr>
<td>dust or minor excavations. Such activities include, but are not</td>
<td>- Adult acute lymphoblastic leukaemia on high-dose steroid therapy</td>
</tr>
<tr>
<td>limited to, digging trial pits and minor foundation, trenching,</td>
<td>- Solid organ transplantation</td>
</tr>
<tr>
<td>landscaping, and minor construction and demolition work.</td>
<td>- Chronic Granulomatous Disorder</td>
</tr>
<tr>
<td><strong>Type D - Major External Non-Containable Activities</strong></td>
<td>- Renovate intensive care units</td>
</tr>
<tr>
<td>External construction activities that generate large levels of</td>
<td>- Patients meeting GOLD stage III and IV criteria and intensive care or high dependency units</td>
</tr>
<tr>
<td>dust. Such activities would include, but are not limited to,</td>
<td></td>
</tr>
<tr>
<td>major soil excavation, demolition of buildings, and any other</td>
<td></td>
</tr>
<tr>
<td>construction activity not covered under Type C.</td>
<td></td>
</tr>
</tbody>
</table>
Canadian Standards Association (CSA)

• Z8000 Canadian Health Care Facilities
• Z8001 Commissioning of Health Care Facilities
• Z317.1 Special Requirements for Plumbing Installations in Health Care Facilities
• Z317.2 Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities
• Z317.11 Area Measurement for Health Care Facilities
• Z317.13 - Infection Control During Construction, Renovation, and Maintenance of Health Care Facilities
CSA standard

• Plan a proactive approach

• Build multi-skilled Infection Control Team

• Assess and manage the risks

“A well-managed site MDT with site knowledge and appropriate expertise shall be involved throughout a construction project beginning at the initiation stage” Clause 6.2.1.1
APSIC Guidelines: Environmental Cleaning and Decontamination (2013)

• Chapter 8: Infection Control During Construction & Renovation
Recommendations

• Prior to any construction or renovation activity, patients who are at risk should be identified as high risk, medium risk and low risk patients. [BIII]

• Pre-construction and renovation consultation should be carried out in advance between all the stakeholders. [BIII]

• During construction activities, it is necessary to contain or minimize dispersal of dust. [BIII]

• Once the project is started, the Infection Control Team shall conduct rounds in order to verify infection control compliance. [BIII]

• If corrective measures are not adequate; the Head of Department of Infection Control has the authority to stop further work on the renovation/Construction project until corrective measures are adequately addressed. [CIII]
Singapore

• Singapore Technical Reference (TR 42:2015)
  • Clause 4.3
    • “The hospital’s Infection Prevention and Control (IPC) team should be consulted throughout the project and their advice and recommendations be taken account of and documented. The participation of the IPC Team in all phases of planning, construction and renovation of the unit is essential.”

• Building Standards (in draft)

• Singapore Standard on Facility Design for Acute General Hospitals (in draft)
Core component 8: Built environment, materials and equipment for IPC at the facility level

- 8a. General principles
- 8b. Materials, equipment and ergonomics for appropriate hand hygiene

GOOD PRACTICE STATEMENT

- Patient care activities should be undertaken in a clean and/or hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR, including all elements around WASH infrastructure and services and the availability of appropriate IPC materials and equipment.

- The GDG emphasized the need for infection preventionists to be involved in planning all these activities and systems and in the design of buildings and infrastructures in health care facilities.
To minimize risk of HAIs

• Active contribution by IPC professionals

• Proactive risk assessment and plan before construction to mitigate the risk of construction dust and debris causing contamination and infections in patients, hospital staff, and construction workers during a healthcare construction project
  • Infection control risk assessment (ICRA) matrix

• Control measures implemented

• Monitoring to assess efficacy of control measures
Challenges

• Implementation of program
  • IPC to be involved
    • Professionalism and expertise
  • Engaging staffs to perform risk assessment with IPC
  • Effective barrier measures
  • Successful outcome – zero healthcare associated *Aspergillus* infection
Building expertise within the IPC Team

• Who should be trained?
  • All?
  • Specialist in team?

• Learning from others who already have a program running

• Learning from workshops
What it takes

• Inquiring mind

• Willingness to learn

• Keep updated
Pre-construction

• Facilitation of proper practices
  • Do the plans allow for proper flow of work processes that facilitate proper infection control measures?
  • Is it designed for safe and efficient environment?
  • Balancing use of materials – efficient and easy to clean

• Be familiar with regulatory agencies' requirements for these types of elements, as well as a basic understanding of architectural code requirements for the space

• Consulted when room furnishings are chosen
ICRA

• Pre-construction: plan

• Just prior to construction
  • Reviewed with contractors
  • Education regarding basic IPC measures may need to be provided prior to the start of construction date
During construction

• Conduct daily rounds to ensure all elements of the ICRA are being met

• Checklist
  • Barriers / hoarding
  • Ventilation - negative pressure air ventilation
  • Debris Removal
Building expertise

• Mentoring IPCNs

• Bringing them to meetings to shadow and learn
  • Most things are best learnt through experience
    • Every renovation project is an opportunity for learning
Reaching out

• Create awareness and understanding

• Gain their respect
  • Know your stuff
  • Be humble

• Engaging them as partners in project / team member
Conclusion

• Building / renovation in healthcare IS DIFFERENT from that at other places

• Difference is we have immunocompromised patients in the facility
  • They need good indoor air quality

• IPC is responsible for prevention of healthcare associated infections related to construction and building
  • WE NEED TO BE INVOLVED!
Thank you