Guidelines and Standards for Construction and Renovation

Dr Ling Moi Lin
Director
Infection Prevention & Epidemiology
Singapore General Hospital

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

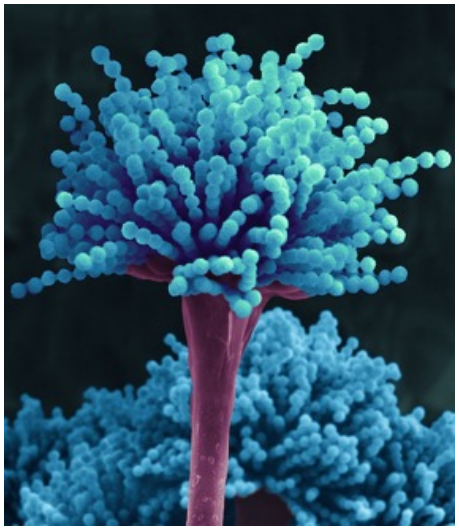
Hospital renovation: the problems

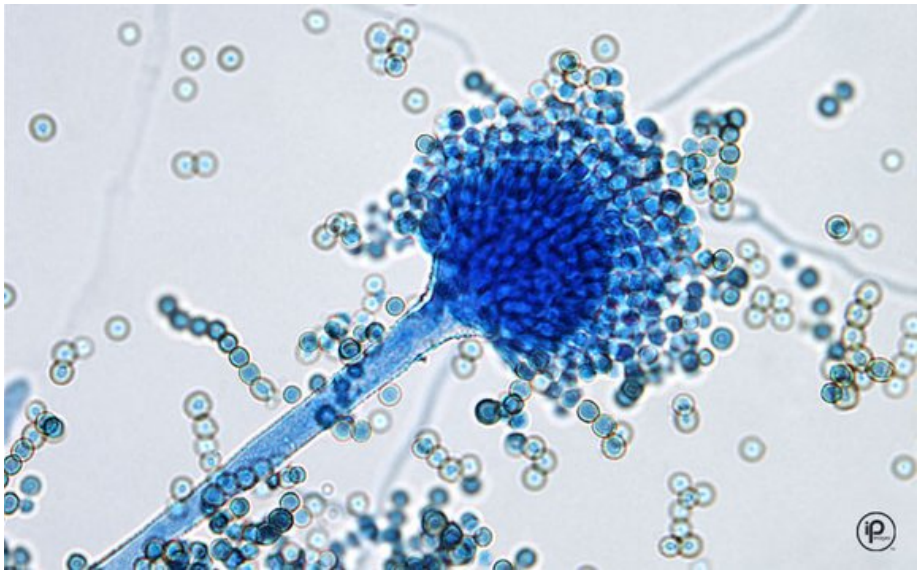
- Construction, renovation or demolition generates vast quantities of dust which contains huge numbers of aerosolized filamentous fungi, such as *Aspergillus*, and sometimes as other potential pathogens, such as *Legionella*

- Moreover, construction can impair air handling systems or contaminate potable water with these pathogens

Hospital renovation: the problem

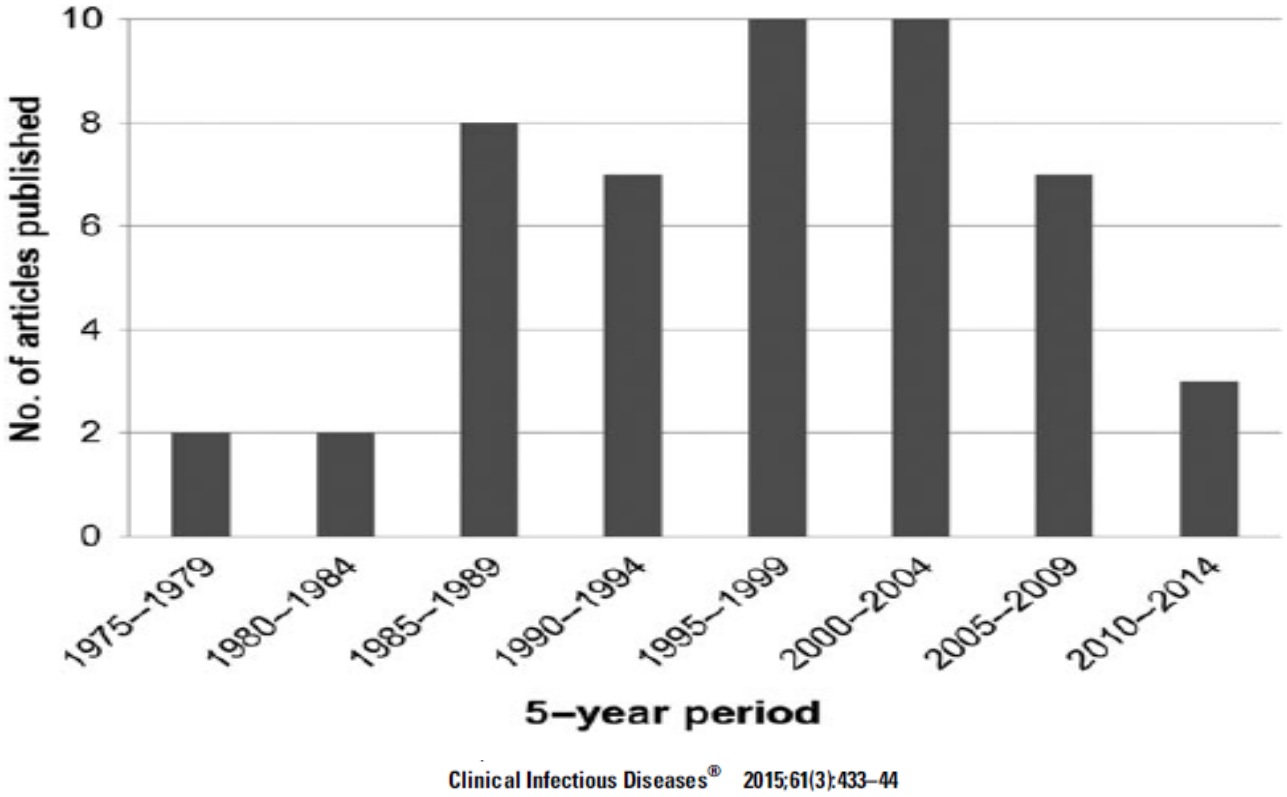
- Hospitals and clinics are filled with patients who are immunocompromised and highly vulnerable to devastating invasive infection with these newly unleashed pathogens





Aspergillus SSI

Are we seeing less fungal outbreaks associated with construction, renovation and demolition?



Clinical Infectious Diseases® 2015;61(3):433–44

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

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

Use of ICRA matrix and plan barrier control measures

Construction bundle

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 (eg, 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

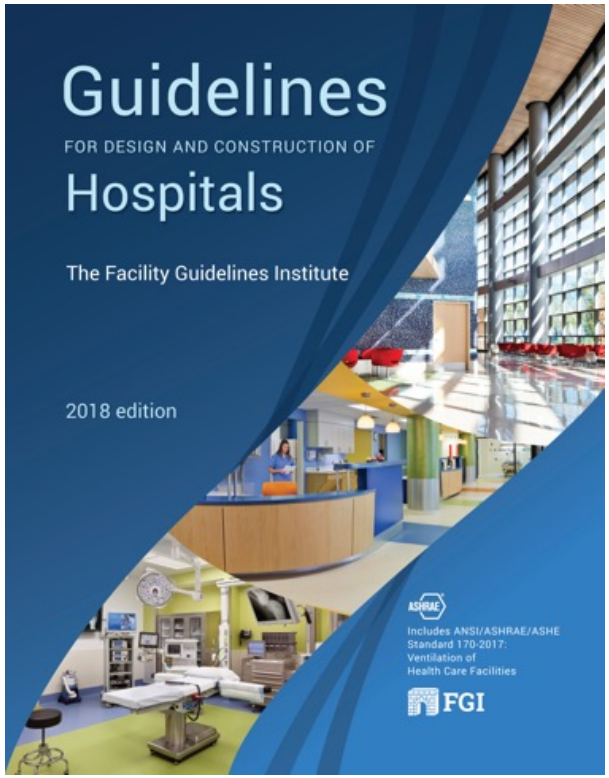
- To be implemented as a bundle of best practices for best results

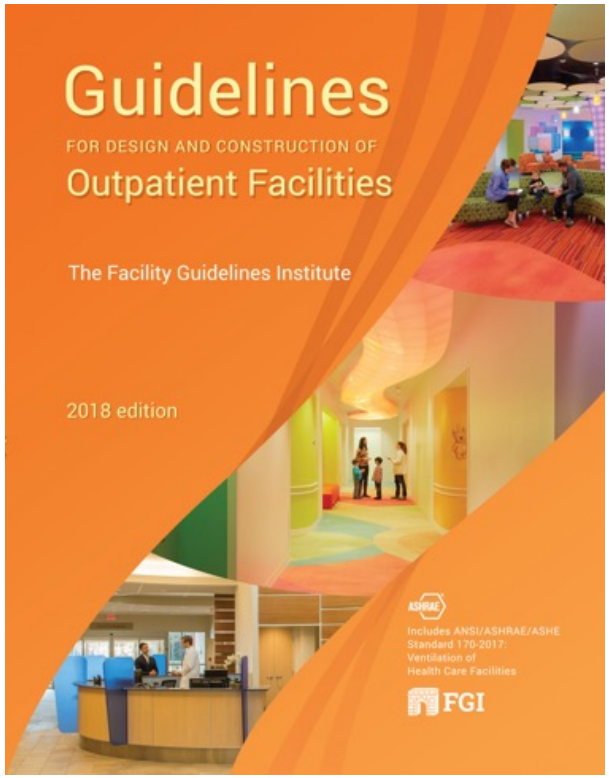
Definitions (Collins English Dictionary)

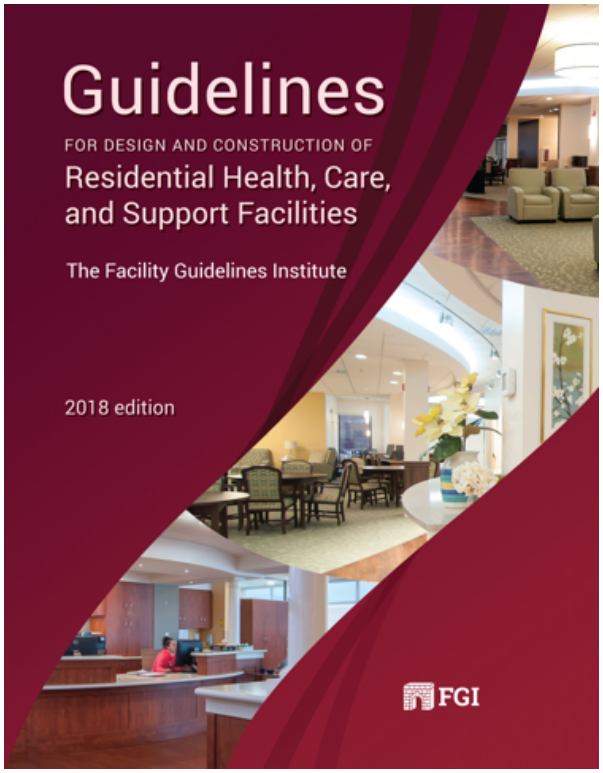
- If an organization issues **guidelines** on something, it issues official advice about how to do it

- A **standard** is a level of quality or achievement, especially a level that is thought to be acceptable

FGI (USA, 2018)

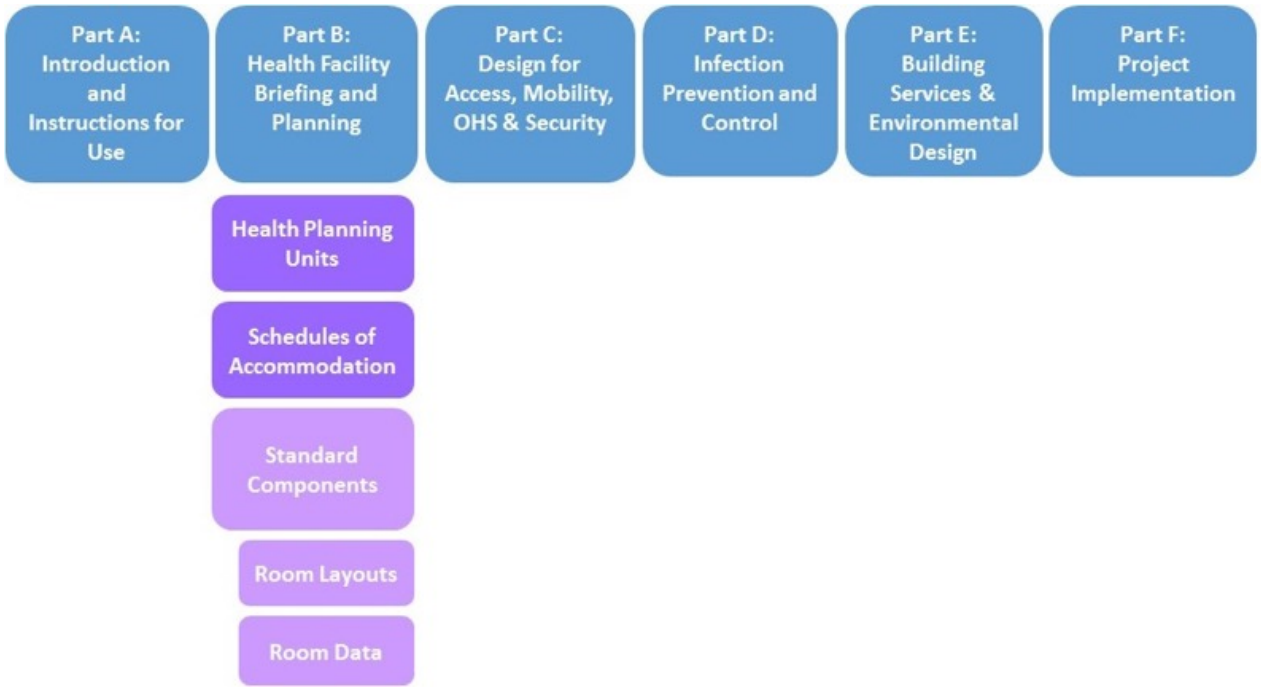

Guidelines
FOR DESIGN AND CONSTRUCTION OF
Hospitals
The Facility Guidelines Institute
2018 edition
Includes ANSI/ASHRAE/ASHE Standard 170-2017: Ventilation of Health Care Facilities
FGI


Guidelines
FOR DESIGN AND CONSTRUCTION OF
Outpatient Facilities
The Facility Guidelines Institute
2018 edition
Includes ANSI/ASHRAE/ASHE Standard 170-2017: Ventilation of Health Care Facilities
FGI

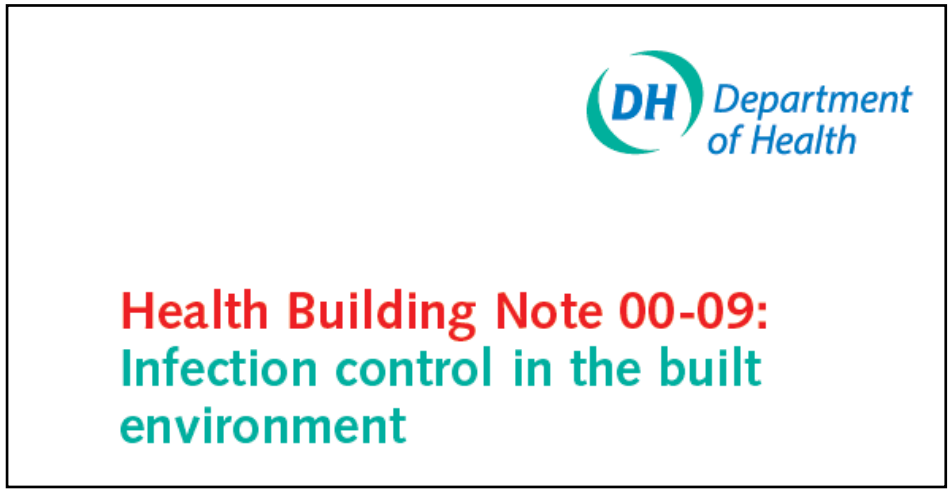

Guidelines
FOR DESIGN AND CONSTRUCTION OF
Residential Health, Care, and Support Facilities
The Facility Guidelines Institute
2018 edition
FGI

Australian guidelines (2016)

- Risk management strategy
  - Risk identification
  - Risk assessment
  - Risk control
  - Monitoring

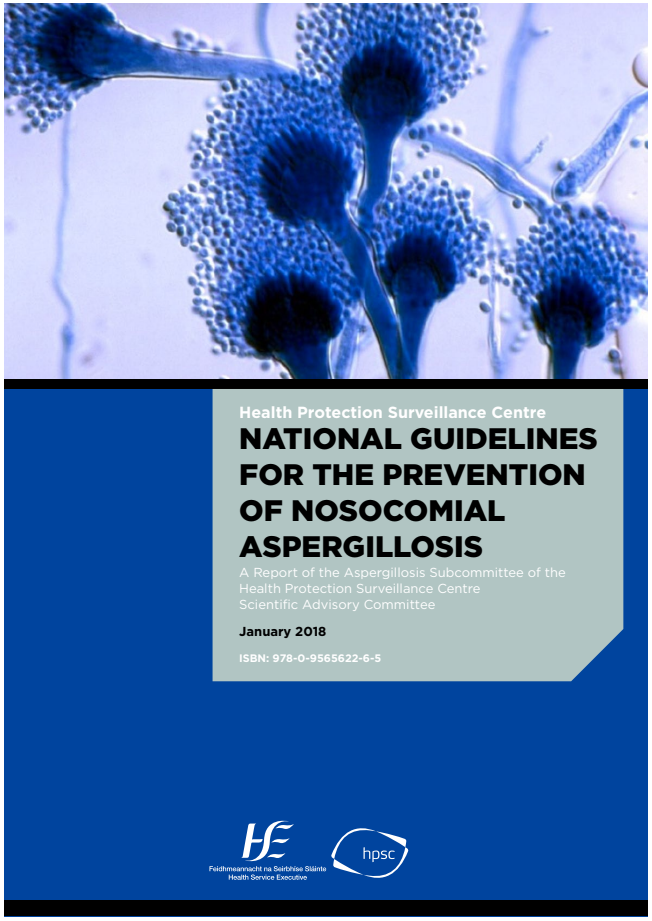


UK Guidance (2013)



"… the infection prevention and control (IPC) team should be consulted throughout every stage of a capital project and their views taken into account…"

Ireland National Guidelines (2018)



Appendix C: Sample Construction Permit

Construction Permit		
Permit No:	**Permit Expiration Date:**	**Project Start Date:**
Location of Construction:		**Estimated Duration:**
Contractor:	**Contact Person:**	**Tel:**
CEO Approval:		
Name:	**Signed:**	**Tel:**
Hospital Technical Services Manager Approval:		
Name:	**Signed:**	**Tel:**
Infection Prevention and Control Personnel Approval:		
Name:	**Signed:**	**Tel:**

Construction/Renovation Activity

Type A2 - Minor Internal Containable Activities
This includes, but is not limited to, minor works on a small scale 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 installation or repair of minor electrical work, ventilation components, telephone wires or computer cables. It also includes minor plumbing as well as minor drilling to allow for the erection of brackets and shelving.

Type B - Major Internal Containable Activities
Any work that generates a moderate level of dust or requires demolition or removal of any fixed building components or assemblies (e.g. counter tops, cupboards, sinks). These include, but are not limited to, activities that require sanding of walls for painting or wall covering, removal of floor-covering, ceiling tiles and stud work, new wall construction, minor duct work or electrical work above ceilings, major cabling activities, and any activity that cannot be completed within a single work shift. This type of activity includes extensive plumbing work. It also includes demolition or removal of a complete cabling system or plumbing and new construction that requires consecutive work shifts to complete.

Type C - Minor External Non-Containable Activities
External construction activities that generates moderate levels of dust or minor excavations. Such activities include, but are not limited to, digging trial pits and minor foundations, trenching, landscaping and minor construction and demolition work.

Type D - Major External Non-Containable Activities
External construction activities that generate large levels of dust. Such activities would include, but are not limited to, major soil excavation, demolition of buildings and any other construction activity not covered under Type C.

Population Risk Groups

Group 1 - No Evidence of Risk
- Staff members/service providers/contractors
- All patients not listed in Groups 2-4 below

Group 2 - Increased Risk
- Patients on prolonged courses of high dose steroids or tumour necrosis factor α antagonists
- Severely immunosuppressed AIDS patients
- Patients undergoing mechanical ventilation
- Non-neutropenic patients on chemotherapy
- Dialysis patients

Group 3 - High Risk
- Neutropenia for less than 14 days following chemotherapy
- Adult acute lymphoblastic leukaemia on high dose steroid therapy
- Solid organ transplantation
- Chronic Granulomatous Disorder
- Neonates in intensive care units
- COPD patients meeting GOLD stage III and IV criteria and in intensive care or high dependency units
- Patients with extensive burns

Group 4 - Very High Risk
- Allogeneic haematopoietic stem cell transplantation:
  - during the neutropenic period
  - with graft-versus-host disease requiring steroid ± other immunosuppressive therapy
- Autologous haematopoietic stem cell transplantation, i.e. during the neutropenic period
- Non-myeloablative transplantation
- Children with severe combined immunodeficiency syndrome (SCID)
- Prolonged neutropenia for greater than 14 days following chemotherapy or immunosuppressive therapy (including acute myeloid leukaemia)
- Aplastic anaemia patients

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*

Ling *et al. Antimicrobial Resistance and Infection Control* (2015) 4:58
DOI 10.1186/s13756-015-0099-7

Antimicrobial Resistance and Infection Control

REVIEW Open Access

APSIC Guidelines for environmental cleaning and decontamination

Moi Lin Ling[1*], Anucha Apisarnthanarak[2], Le Thi Anh Thu[3], Victoria Villanueva[4], Costy Pandjaitan[5] and Mohamad Yasim Yusof[6]

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]

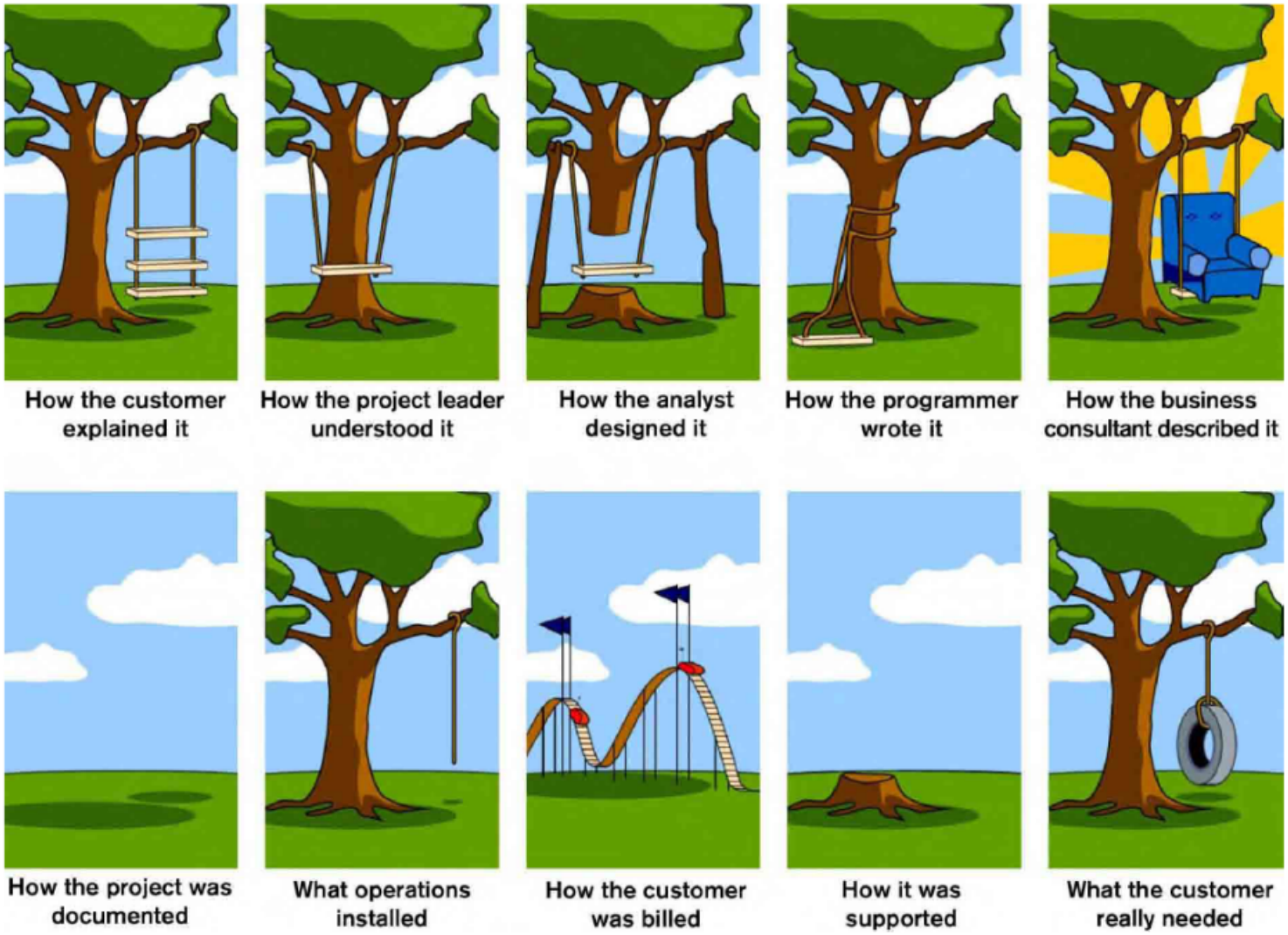
- If corrective measures are not adequate; the Head of Department of Infection Control has the authority to stop further work on the renovation/construction project until corrective measures are adequately addressed. [CIII]

Singapore

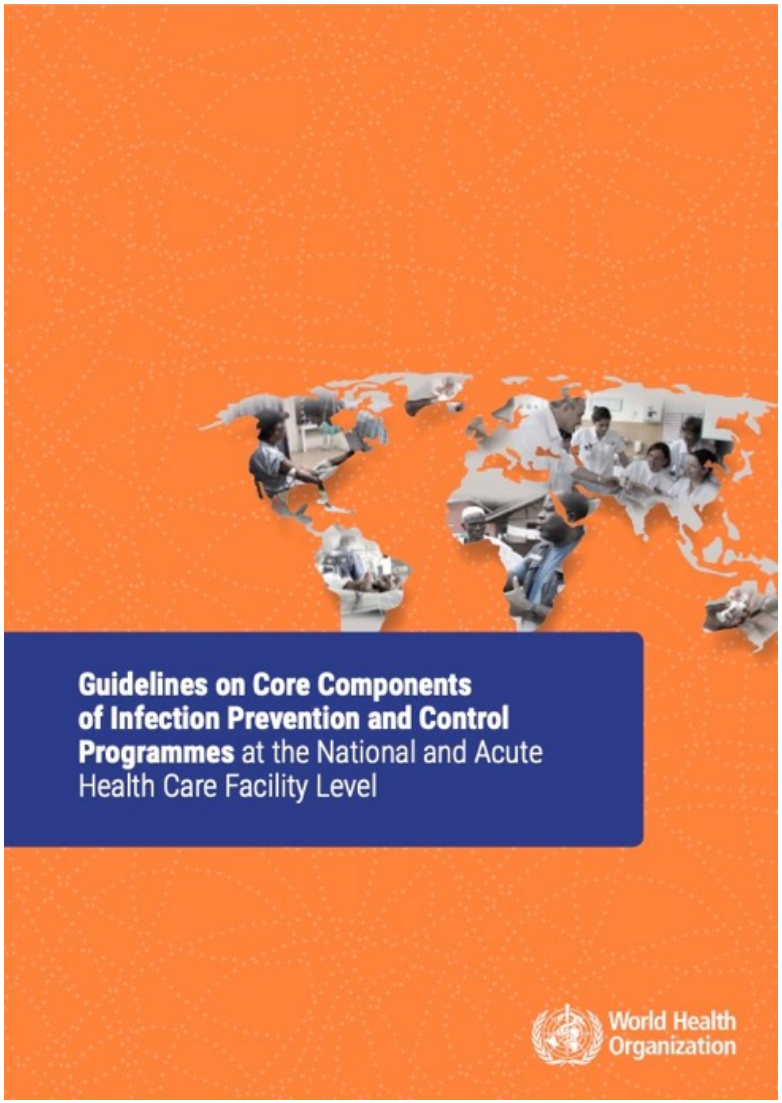
- Singapore Technical Reference (TR 42:2015)
  - Clause 4.3
    - "*The hospital's Infection Prevention and Control (IPC) team should be consulted throughout the project and their advice and recommendations be taken account of and documented. The participation of the IPC Team in all phases of planning,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

- Building Standards (in draft)

- Singapore Standard on Facility Design for Acute General Hospitals (in draft)



From: Projectcartoon.com



***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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ICRA

- Pre-construction: plan

	Construction Project Type			
Patient Risk Group	TYPE “A”	TYPE “B”	TYPE “C”	TYPE “D”
LOW	Class I	Class II	Class II	Class III/IV
MEDIUM	Class I	Class II	Class III	Class IV
HIGH	Class	Class II	Class III/IV	Class IV
HIGHEST	Class II	Class III/IV	Class III/IV	Class IV

- 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