

Infection Prevention & Control is Everybody's Business



References:

- Ballarat Health Service (BHS)—Non clinical Protocol, Infection Control - Construction, Renovation & Maintenance 2014
- Government of South Australia. Infection Prevention and Control during Construction and Renovation: Toolkit December 2014
- Moon K. Infection Control Principles for the Management of Construction, Renovation, Repairs and Maintenance within Health Care Facilities. Bendigo: Loddon Mallee Region Infection Control Resource Centre; 2003, Review 2005
- Kevin Moon. Containment of Dust Borne Contaminants, Construction and Maintenance. The Australian Hospital Engineer—Autumn 2002

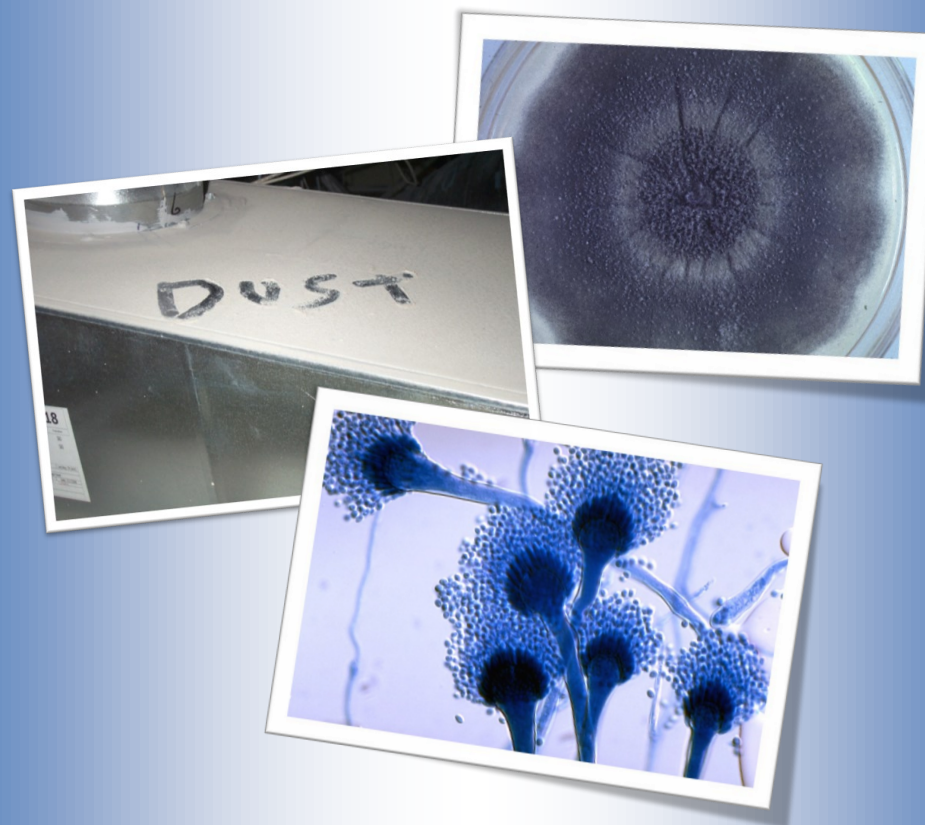
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A Little Yellow Infection Control Book

Infection Prevention During Construction and Renovation

DON'T LET YOUR BARRIERS DOWN!



Grampians Region Infection Control Group

2018



This booklet outlines the important strategies required to prevent the spread of common infections during construction and renovation including regular maintenance works.

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THE ROLE OF AIR SAMPLING

In critical environments, such as operating theatres and protective environments for severely neutropenic patients, the quality of the air supply is important in reducing the potential for infection with airborne microorganisms. Microbiological sampling of the air supply has been suggested as one way of ensuring air quality, but this is controversial and not universally accepted practice.

There is sufficient evidence to support microbiological air sampling in the following circumstances:

- ⇒ As part of the commissioning of a new or refurbished operating theatre or pharmacy clean room
- ⇒ After any major structural refurbishment of the operating theatre suite, particularly involving the air handling system
- ⇒ As part of an investigation of a cluster of fungal infections in immunosuppressed patients.



Reference: Government of South Australia. Infection Prevention and Control during Construction and Renovation: Toolkit December 2014—Appendix 1: Microbiological air sampling: indication and methods.

REMEMBER TO TAKE CARE OF YOURSELF AT WORK

- Always remember your hand hygiene.
- Seek vaccinations where appropriate:
 - ◇ Tetanus
 - ◇ Hepatitis A (plumbers)
 - ◇ Influenza—annual.
- Cover cuts and grazes
- Use PPE where necessary— e.g. protect clothing from dust, shoe covers, gloves when dealing with sewerage/contaminated construction waste.
- Use particulate masks if working in a dusty environment or when handling certain building products.
- Don't come to work if you are unwell with gastro or flu-like symptoms.



SAMPLE MONITORING TOOL

Engineering and contract staff should notify infection control immediately of any breach of construction barriers. If necessary the site will be shut down until barriers are complete and the area has been thoroughly cleaned.

Project _____ Date _____ / ____ / ____

Location of work _____ Time _____

Surveyor _____ Department _____

During the construction/renovation phase dust barriers and other protective measures should be regularly monitored depending on a risk assessment of the area involved, i.e. if high risk areas and patient groups are involved then daily monitoring should occur.

1. Construction barricade	Answer (circle one)		
> dust tight barricades sealed, no penetration	Yes	No	N/A
> dust mats at entrance/exit	Yes	No	N/A
> all access doors close and seal properly	Yes	No	N/A
> all access doors are closed to public	Yes	No	N/A
> ventilation ducts to building site covered	Yes	No	N/A
2. Adjacent areas with staff / patients access	Answer (circle one)		
> ceiling areas intact and dry	Yes	No	N/A
> floor areas clean with no dust tracked	Yes	No	N/A
> walls intact and dry	Yes	No	N/A
> horizontal surfaces dust free	Yes	No	N/A
> vents dust free	Yes	No	N/A
> all ventilation ducts from building site sealed	Yes	No	N/A
> no signs of pest infestation	Yes	No	N/A
3. Traffic flow	Answer (circle one)		
> building contractors accessing site through approved non-patient care areas	Yes	No	N/A
> waste covered and contained prior to removal	Yes	No	N/A
> routine and timing of waste removal as per agreement	Yes	No	N/A

Comments _____

WHY CONSIDER INFECTION PREVENTION AND CONTROL DURING CONSTRUCTION & RENOVATION?

Environmental disturbances which occur during construction or renovation projects pose both airborne and waterborne risks to persons with poorly functioning immune systems.

Construction and renovation projects can generate large amounts of dust and debris.

Dust and debris from construction, renovation or maintenance work sites are not just dirty... they can release dangerous micro-organisms into the healthcare facility. The best way to ensure a safe construction, renovation or maintenance project is through detailed, proactive planning, as well as diligent implementation of controls.

KEY POINTS FOR PROJECT MANAGEMENT

- Partner with infection control (IC) at the start of a project
- Work together as a team
- Assess the risk and determine prevention strategies
- Implement prevention strategies according to risk assessment
- Educate maintenance and construction workers about the risks
- Monitor for compliance — dust barriers and other protective measures should be monitored regularly.
 - ⇒ The frequency of monitoring depends on the risk assessment.
 - ⇒ High risk activities should be monitored daily using an IC checklist to ensure compliance.



KEY RISKS—FUNGI & BACTERIA LADEN DUST

Fungi and bacteria inhabit every nook and cranny of every building we occupy and multiply quickest in warm humid conditions – such as riser shafts, wall cavities with plumbing and ceiling spaces with services.

Dust and debris can carry tiny micro organisms , including fungal spores such as *Aspergillus* species.

- ⇒ *Aspergillus* fungi are commonly found in soil, water and decaying vegetation/dust. They are extremely hardy and have been found in battery acid and at altitudes of 3000 meters.
- ⇒ If disturbed, due to their size and the rough surfaces of the spores, *Aspergillus* can remain suspended in the air indefinitely.
- ⇒ These fungi adapt easily to environments that contain moisture such as decaying cellulose and all unfiltered air.
- ⇒ Many fungi and bacteria are widespread and lay dormant in areas that gather dust e.g. ceilings may contain 1000 CFU/g of fungi (acceptable is 10 CFU/g).

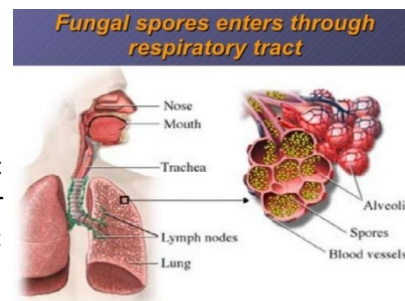
Building and maintenance works disturb these reservoirs and millions of spores may be released into the environment aided by air flow.

These spores may infect vulnerable patients e.g. premature babies, the elderly, patients being treated for cancer, transplant patients, people with poor immunity.

Two types of aspergillosis are observed:

1. allergic aspergillosis
2. invasive aspergillosis

Many develop symptoms much like allergic reactions such as runny nose, itchy eyes, or swelling of the throat in the case of allergic aspergillosis.



People with invasive aspergillosis usually have nose stuffiness, headache, facial discomfort, cough (often with blood), fever, and chest pain.

IMPORTANT POINTS

- ◇ Don't be surprised if infection control (IC) considers your location or project a higher risk than you do!
- ◇ The number of immunosuppressed patients continues to expand into all areas of patient care.
- ◇ The patient population and therefore the risk may vary significantly from one health service to another based on type of services offered.
- ◇ Keep dusty workers inside the barriers—footprints or wheel marks are a clear indicator of poor dust control.
- ◇ A dusty waste cart pushed down a corridor will effectively undo your hard work installing and maintaining protective barriers — lids/covers should be used at all times when transporting waste.
- ◇ Wheels should be wiped free of dust before leaving the construction area.
- ◇ Regularly assess site for breaches of protocol—notify IC immediately if you have any concerns.

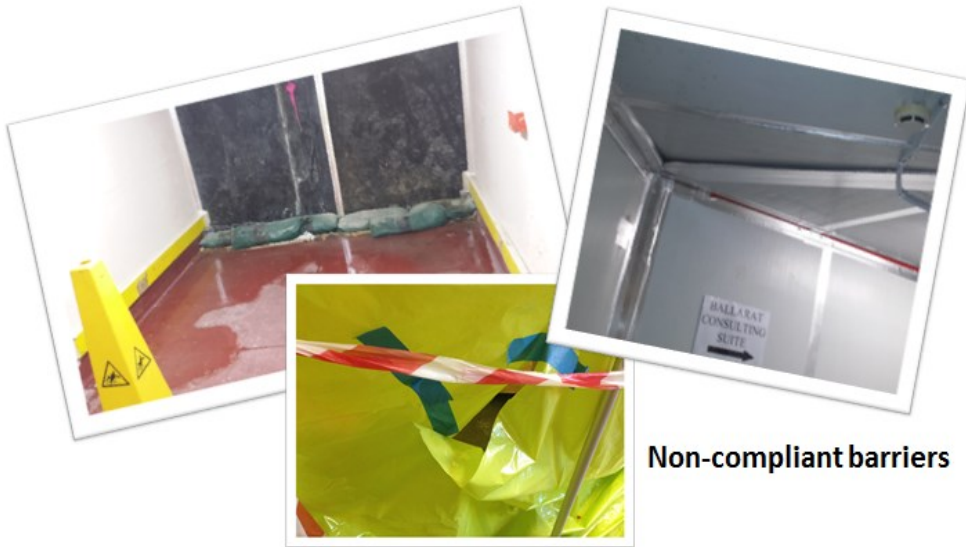
HOW TO DRIVE INFECTION CONTROL CRAZY

- ◇ Project has started but IC has no idea!
- ◇ Zip walls unzipped.
- ◇ Incompletely taped or sealed barriers.
- ◇ Required negative pressure air not working.
- ◇ Unsticky sticky mats.
- ◇ Foot prints / cart tracks down the corridor.

Involve IC from the start to make sure everyone knows what to do.



MONITORING COMPLIANCE IS VITAL



Non-compliant barriers

Dust – a never ending challenge....



DOCUMENTED SOURCE OF SPORES IN CONSTRUCTION SETTINGS —

- False ceilings
- Insulation material
- Roller-blind casings
- Fire-proofing material
- Open windows/doors
- Contaminated carpeting
- Dust from construction sites
- Bird droppings in air ducts supplying high risk patient areas



DEADLY DUST
Taking short cuts can kill!

Aspergillus can make
people sick or
even cause death!



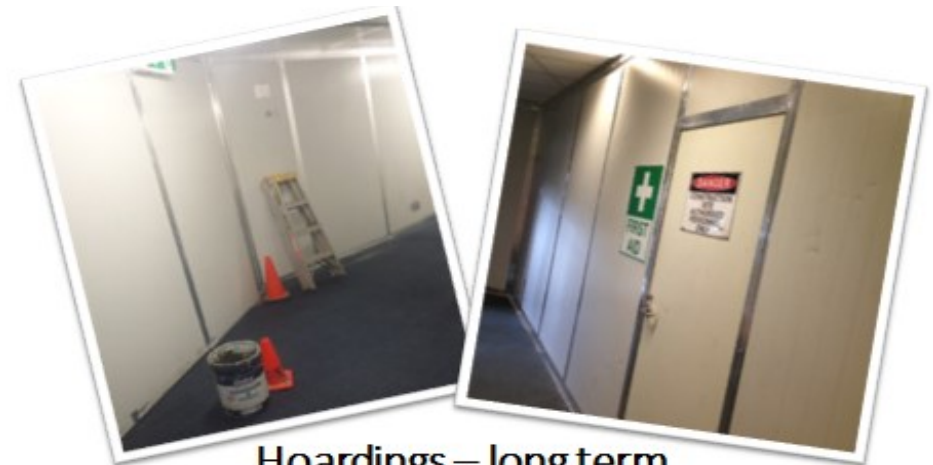
HOW TO PLAN YOUR RENOVATION, MAINTENANCE OR CONSTRUCTION PROJECT

STEP ONE - Determine the construction/renovation type

Type A	<p>Inspection and non-invasive activities: Includes but is not limited to-</p> <ul style="list-style-type: none"> ⇒ Activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection ⇒ Painting (no sanding) ⇒ Minor plumbing or electrical trim work.
Type B	<p>Small scale, short duration activities which create minimal dust: Includes but is not limited to-</p> <ul style="list-style-type: none"> ⇒ Installation of telephone, computer cabling, minor electrical work ⇒ Access to ceiling spaces ⇒ Cutting of walls or ceilings where dust migration can be controlled.
Type C	<p>Activities that generate a moderate to high level of dust: Includes but is not limited to-</p> <ul style="list-style-type: none"> ⇒ Sanding of walls for painting or wall covering ⇒ Removal of floor coverings, ceiling tiles and case work ⇒ Minor duct work or electrical work above ceilings ⇒ Major cabling activities ⇒ New wall construction.
Type D	<p>Major demolition and construction projects: Includes but is not limited to-</p> <ul style="list-style-type: none"> ⇒ Activities that require consecutive work shifts ⇒ Heavy demolition ⇒ Removal of a complete cabling system ⇒ New construction.



Walk off mats



Hoardings – long term

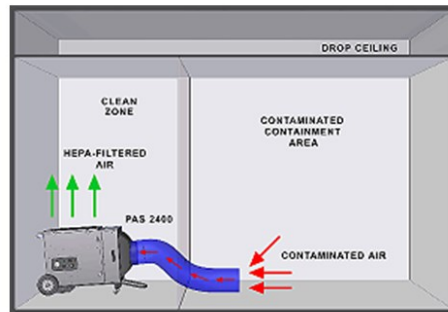


Hoardings - temporary

EXAMPLES OF BARRICADES, HOARDINGS, AND OTHER RISK MITIGATION STRATEGIES

Air handling units

- ◆ Alter or isolate air handling systems
- ◆ Additional filters - HEPA filters
- ◆ Negative pressure



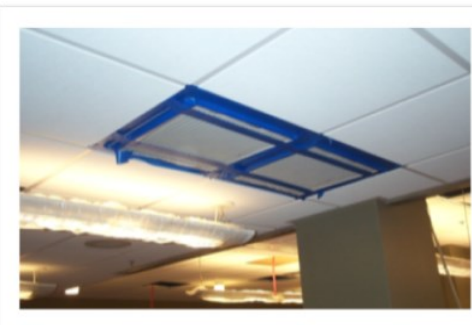
STEP TWO - Determine the patient risk group

Low risk	<ul style="list-style-type: none"> ⇒ Office areas ⇒ Public areas ⇒ Non clinical areas—no patients cared for in these areas
Medium risk	<ul style="list-style-type: none"> ⇒ Unoccupied wards ⇒ Out patient clinics ⇒ Catering services (kitchens) ⇒ Mental health services ⇒ Private consulting suites ⇒ All other patient care areas unless stated below
High risk	<ul style="list-style-type: none"> ⇒ General wards other than those listed in highest risk ⇒ Paediatric and maternity wards ⇒ Emergency department ⇒ Radiology/MRI/Invasive radiology procedures ⇒ Laboratories ⇒ Pharmacy ⇒ Haemodialysis unit
Highest risk	<ul style="list-style-type: none"> ⇒ ICU/CCU/HDU ⇒ Operating suite ⇒ CSSD ⇒ Oncology units/outpatient clinics for patients with cancer ⇒ Wards caring for immunocompromised patients ⇒ Cardiovascular suite ⇒ Endoscopy/bronchoscopy unit ⇒ Special care nursery ⇒ Pharmacy clean room



Depressurised work areas

- ◆ Exhaust outdoors preferred
- ◆ Exhaust indoors
 - Pre-clean discharge area (HEPA vacuum)
 - Secure ceiling tiles
 - Minimise discharge flow rates



Isolate and protect HVAC systems



STEP THREE - Determine the type of risk

Match the construction activity type (A, B, C, D) determined in step 1 with the patient risk group determined in step 2 (low, medium, high, highest) to ascertain the class of precautions (I, II, III, IV)

If you are unsure how to determine the construction activity type or patient risk group please contact your infection control consultant for assistance.

Patient risk group	Construction activity type			
	TYPE A	TYPE B	TYPE C	TYPE D
LOW	I	II	II	III/IV
MEDIUM	I	II	III	IV
HIGH	I	III	III / IV	IV
HIGHEST	I — III	III / IV	III / IV	IV

STEP FOUR - Determine type of precautions required

Task	
Class I	<ol style="list-style-type: none"> 1. Work in a manner to minimise generating dust from construction operations. 2. Immediately after visual inspection completed replace any ceiling tiles displaced.
Class II	<p>In addition to Class I -</p> <ol style="list-style-type: none"> 1. Provide active means to prevent dust in the air from dispersing into the atmosphere. 2. Seal unused doors with masking tape. 3. Water mist work surfaces to control dust while cutting. 4. Isolate HVAC system in areas where work is being performed. 5. Place dust mats at entrance to work area and replace or clean when no longer effective. 6. Contain construction waste before transport in tightly covered containers.

Task	
Class III	<p>In addition to Class II -</p> <ol style="list-style-type: none"> 1. Alter or isolate air handling system in the construction activity area to prevent contamination of entire duct system. Supply ducts and return air ducts should be covered to prevent dust contamination. 2. Where containment is possible, utilise building walls and close all doors (excluding construction access doors) and seal with duct tape to prevent dust and debris escape. 3. Where containment is not possible with existing building walls and doors use one of the following: <ul style="list-style-type: none"> ⇒ Airtight plastic barriers (e.g. Zipwall system) extending from floor to ceiling decking, or ceiling tiles (if not removed) ⇒ Plastic barriers with seams sealed with duct tape to prevent dust and debris escape ⇒ Drywall barriers with seams or joints covered or sealed to prevent dust and debris escape. 4. Maintain negative pressure within work site, if necessary. 5. Direct pedestrian traffic from construction areas away from patient-care areas and limit opening and closing of doors (or other barriers) that may cause dust dispersion, entry of contaminated air, or tracking of dust to patient areas.
Class IV	<p>In addition to Class III -</p> <ol style="list-style-type: none"> 1. Place isolation barriers at penetration of ceiling envelopes, chases and ceiling spaces to stop movement of air and debris. 2. When openings are made into existing ceilings in clinical/laboratory areas, where possible, a decontamination unit should be used, which will seal off openings and fit tightly from ceiling to floor. 3. Construct an anteroom to ensure airflow from the clean area through the anteroom and into the work area. Require all personnel to pass through the anteroom whenever entering or exiting the construction/renovation site to put on or remove disposable coveralls or shoe covers.
<p>Always let infection control (IC) know before the renovation/construction activity is commenced, it will most likely save time and money in the long run.</p> <p>Take a walk with IC—visualising the activity or location will help determine the risk.</p>	