



## When to Call in the Big Guns (Infection Prevention and Control Emergencies)

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### Objectives

- 1. Frontal Assault:** dust, mould, stagnant water
- 2. Minimize Casualties:** Identify susceptible patients
- 3. Formulate Strategic Advances:** managing construction activities/emergencies



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### In the News

- **2001 Montreal's Royal Victoria Hospital** - airborne mould and Aspergillus infections closed down most of the operating rooms - 40 year-old air handling units serving the procedure rooms.
- **2003 Mould at Foothills, Alberta** - toxic *Stachybotrys chartarum* mould was detected on dialysis unit 27 at the Foothills Hospital - measures to handle mould contamination may have been inadequate as 68 of 103 nurses and other staff continue to suffer from symptoms, ranging from nosebleeds, to asthma to debilitating headaches.
- **2005 Seven Oaks, Ontario** -between September 1, 2005 when the first residents fell ill, until October 13, 2005 when the outbreak was contained, approximately 135 people had contracted Legionnaires' Disease and 23 people died, including residents, visitors and staff members.



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## Construction-related Infection Control

### WHY ARE WE CONCERNED?

- Construction and extended maintenance projects in a hospital provide the greatest potential for introducing contaminants that can lead to hospital acquired infections
- Minor work can cause serious infections, in susceptible patients




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What do we mean when we use the term "construction"?

- Demolish, build, renovate, maintain
- Anything that may create dust or disturb dust

Construction – includes erection, alteration, dismantling, demolition, structural maintenance, painting, land clearing, earth moving, grading, excavating, digging, boring, drilling, blasting or concreting, the installation of any machinery or plant or any work or undertaking in connection with a project but does not include any work or undertaking underground in a mine.

Occupational and Safety Act – ON, Reg 213/91




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## Due Diligence

- Employers must take all reasonable measures to protect the health and safety of workers:
  - Includes a duty to protect against exposure to potentially harmful substances such as mould.
  - Measures for the immediate & safe removal of any mould growth in buildings
  - Ensure the protection of workers, occupants & surrounding environment.




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### 1. Frontal Assault

- Organisms dispersed during construction activities through dust, water, air currents and clothing
- Spores inhaled by patients, staff and workers
- Patients susceptible to infection
- High mortality in the immunocompromised
  
- Primary culprits... Legionella and Aspergillus



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### Activities that have caused infections:

- Soil excavation
- HVAC systems – air intakes, exhaust grills that have not been covered, demolition of ducts, failure to maintain negative air and filters
- Open or improperly sealed windows near demolition
- Carpeting that becomes contaminated
- Construction dust that enters an elevator shaft
- Disturbance/removal of ceiling tiles
- Construction dust that contaminates supplies



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### Germ of note in buildings



Photo: J. Michael Miller-CDC



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**Aspergillus**

- Mould, spreads fast!
- Found in dust, soil, decayed vegetation
- Fungal spores when inhaled can cause pneumonia
- Damage to airways of the lungs
- Fungal balls and abscesses in the lungs, can spread through the blood to the brain, kidneys or other organs
- Often fatal

Photo: JMichaelMiller-CDC



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**Legionella pneumophila**

**Legionnaire's Disease**

- Gram Negative bacteria naturally occurring in water
- Found in stagnant water, poorly maintained water systems and cooling towers
- aspiration/inhalation of bacteria causes pneumonia/respiratory failure



Image: PHIL.cdc.gov/DrBanySFields



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**Toxin Producing Fungi**

- Fungus such as Stachybotrys chartarum or S. atra
- 'Black Mould'
- Even limited quantities make people ill



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**Key Ingredient**

- Many construction materials contain enough organic material to grow mould when wet.
- Impossible: eliminate mould spores & nutrients from the construction process
- **Possible:** control the element that promotes growth - MOISTURE



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**Skill Testing Question #1**

The definition of construction includes the following activities:

- A. Maintenance and Demolition
- B. Demolition Only
- C. New Builds
- D. Renovation and Maintenance
- E. All of the above



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**Skill Testing Question #2**

Infection Prevention and Control (IPAC) is an important part of the construction process as it:

- A. Creates a photo opportunity with the CEO
- B. Reduces the cost of construction
- C. Gives the ICP the opportunity to choose construction materials
- D. Protects vulnerable clients/patients/residents
- E. Protects the safety of all in the facility



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## 2. Minimize Casualties

What are the risks to soldiers and civilians?

- Immunocompromised?
- Pre-existing respiratory conditions?
- Location of work to be done
- Containment?
- Traffic flow?




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### Legionnaire's Disease in Hospital Under Construction

- September 2002, Kitchener-Waterloo

- 3 cases: 2 construction worker's & 1 patient

- Source never confirmed but believed related to work done on the roof




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### Aspergillus Infections related to Construction

- 2001: Montreal Hospital

- 2 patients died and many more ill

- Dust entered the air ducts – spread!




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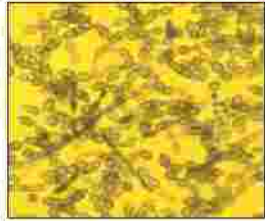
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### Demolition

- Removal of ducts, false ceiling, glass fibre insulation
- Work on roller-blind casings
  
- 22 cancer patients infected, 18 died.



Magnified mold spores.

Ref: Health Canada: Construction Related Nosocomial Infections In Patients in Health Care Facilities, July 2001



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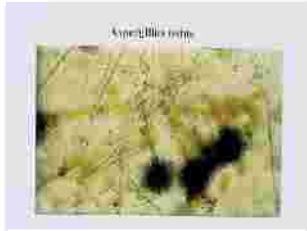
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### Outside Construction

- Road construction
  
- Air conditioner heavily contaminated with Aspergillus spores
  
- 10 cancer patients infected, all 10 died



Ref: Health Canada: Construction Related Nosocomial Infections In Patients in Health Care Facilities, July 2001



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### Role and Responsibilities of IPAC

#### Risk Assessment – initial and ongoing

regular visits to the site:

- changes are managed; preventative measures are adhered to
- cleaning is maintained
- area is safe and approved before occupation
- communication in a timely manner
- concerns addressed
- documentation is carried out

CRP = client/resident/patient



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**Skill Testing Question #3**  
Which work area or population would be considered low risk with respect to construction and renovation activities?

- A. Office area
- B. Long Term Care activity area
- C. Kitchen area
- D. Outpatient Clinic area



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**Skill Testing Question #4**  
When should IPAC be involved in construction?

- A. During construction
- B. At the beginning and end of construction
- C. During construction meetings
- D. Before client/patient/resident occupation of the construction area
- E. All of the above



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**Skill Testing Question #5**  
Which of the following responsibilities are not part of the ICP's role during construction?

- A. Chair construction team meetings
- B. Act as role model for safe work procedures
- C. Provide educational resources for team
- D. Assist in the development of construction policies and procedures



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### 3. Operation Identification

#### Before Construction Begins

Infection Control Risk Assessment (ICRA) is completed

To determine potential risk of transmitting pathogens. It addresses:

- type of construction
- population (staff & patients) risk groups




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#### Preventative Measures Analysis

- It reveals what level of preventative measures will be needed during the construction, renovation or repair work

Population Risk Group	Construction Activity Type			
	Type A	Type B	Type C	Type D
Group 1	I	II	II	III/IV
Group 2	I	II	III	IV
Group 3	I	III	III/IV	IV
Group 4	III*	III/IV	III/IV	IV

\* When the Population Risk Group is Group 4 and the Construction Activity is Type A, the infection prevention and control department should be consulted to determine the appropriate preventive measure (I, II, or III)




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#### What to watch out for

- Water damage
- Odours
- Visible mould
- Dust



- Open ceiling tiles
- Increased dirt in vents
- No open windows if excavation nearby




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**Components of Safe Construction in Health Care**

**Monitoring the site**

- Everyone should be aware:
  - of the project
  - barriers that should be in place
  - who to tell for unsafe situations

**Checking the air flow**

- Barrier, vents, which way is the air flowing
- Close windows and doors




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**What to Do if You Find a Problem?**

- Containment
- Alert others: Report ANY water leaks or disruptions right away
- Get help
- Dry within 48 hours
- Don't let anyone make it worse
- Close windows and doors




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**If You Find Mould ...  
Stop work !!**




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## Questions?



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## Resources for IPAC in Construction and Renovation



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### References

- Canadian Standards Association (CSA)
- CAN/CSA Z317.13-07:  
Infection Control During Construction or Renovation of Health Care Facilities  
Revision released December 2007
- ***An excellent resource to have throughout all aspects of the construction project***



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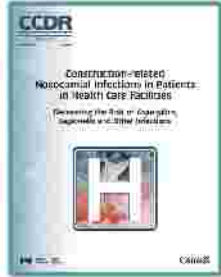
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**Health Canada**

Health Canada. July 2001.  
 Construction-related  
 Nosocomial Infections in  
 Patients in Health Care Facilities.  
 Decreasing the Risk of Aspergillus,  
 Legionella and Other Infections.  
 CDR. Vol. 27s2. ISSN 1188-4169



<http://www.phac-aspc.gc.ca/publicat/ccdr-mtc/01pdf/27s2e.pdf>

 The Ontario Health Services  
 PUBLIC HEALTH ONTARIO




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**Guidelines for Design  
 and Construction of  
 Health Care Facilities  
 (formerly AIA Guidelines)**

- Facility Guidelines Institute  
 2010 Edition
- A ***"must have"*** reference  
*during the design phase of  
 construction.*



 The Ontario Health Services  
 PUBLIC HEALTH ONTARIO




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**Mould Guidelines**

Mould Guidelines for the  
 Canadian Construction  
 Industry provides guidance on  
 methods and techniques with  
 respect to the presence of  
 mould including:

- Insurance Considerations;
- Minimizing of Moisture Intrusion;
- Proper Building Maintenance and Operation;
- Mould Assessment;
- Mould Remediation Protocols;
- Proper Disposal of Mouldy Materials; and
- Guidelines for Selecting Mould Remediation  
 Contractors



[www.cca-acc.com](http://www.cca-acc.com)

 The Ontario Health Services  
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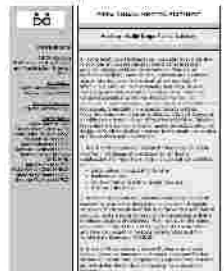
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### CHICA – Position Statement

Healthcare Facility Design Position Statement Developed by the Special Interest Group Healthcare Facility Design and Construction Interest Group



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### Mould Remediation

- Manitoba Protocol
- Outlines Assessment
- Remediation Procedures



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### CHICA Audit Toolkit ( [www.chica.org](http://www.chica.org) ):

- Facility Construction and Renovation Project Report to Infection Prevention and Control
- ANNEX F: Construction Risk Assessment Matrix
- INFECTION PREVENTION AND CONTROL AUDITS for Class I, Class II, Class III and Class IV Construction/Renovation and Maintenance Projects in Health Care

[www.webbertraining.com](http://www.webbertraining.com) Teleclasses presented by Andrew Streifel. Air & Water Sanitation for Infection Control & Prevention. 20 Nov., 2008. Maintenance for Infection Prevention. 23 Oct., 2008. Hospital Construction and Infection Control Best Practices. 2 Feb., 2007.

Arache, Camille. (2009). Minimize patient exposure and possible litigation. Building Strategies. Spring(1)14-15.



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**GOS (Generic Output Specifications)**

Includes recommendations for; hand hygiene stations, airborne precaution rooms, HVAC (air quality systems), spacing and storage, clean and soiled storage areas and waste management.



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**APIC Text**

The *APIC Text* contains 121 chapters covering every aspect of infection prevention and control. It is the most comprehensive guide to infection control guidelines and clinical standards.



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**APIC Toolkit**

This tool kit provides sample policies, procedures, essential forms, fact sheets, checklists, and ICRA forms and resource information in one book.

Gathered from the APIC Text and 2006 AIA Guidelines, AIA ventilation tables and recommendations along with extensive literature references and updated equipment resources.



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**HVAC Design Manual for Hospitals and Clinics ASHRAE 2003**

This manual provides those involved in the design, installation, and commissioning of HVAC systems for hospitals with a comprehensive reference source.

The text covers environmental comfort, infection control, energy conservation, life safety, and operation and maintenance, providing design strategies for applicable standards and guidelines.



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- Centre for Disease Control and Prevention, Guidelines Environmental Infection Control in Healthcare Facilities - 2003 <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm>
- New York City Guidelines Department of Health & Mental Hygiene; Bureau of Environmental & Occupational Disease Epidemiology. *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, 2003. <http://www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html>
- Ministry of Health and Long-Term Care, Long-Term Care Facility Design Manual, May 1999. [http://www.health.gov.on.ca/english/providers/program/lc\\_redev/pdf/design\\_manual.pdf](http://www.health.gov.on.ca/english/providers/program/lc_redev/pdf/design_manual.pdf).
- Burrill, Gordon. (2008). Building with care at healthcare facilities. *Healthcare Facilities*. Winter(4)31-32. [http://www.bsismagazine.ca/CSAStandardInfectionControlinHospital\\_s.aspx](http://www.bsismagazine.ca/CSAStandardInfectionControlinHospital_s.aspx)



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