	POLICIES & PROCEDURES Number: **50-40** Title: **Construction, Renovation and Design of Healthcare Facilities**
Authorization: [X] SHR Regional Infection Prevention & Control Committee	Source**: Infection Prevention & Control** Date Initiated: October, 2009 Date Reaffirmed: Date Revised: Scope: SHR Agencies & Affiliates

Introduction

Construction and renovation projects in healthcare facilities pose a threat to patients and may, occasionally, also be a health risk to staff and visitors. All healthcare facilities should be able to promote and support an environment that is safe for patients, visitors and healthcare workers.

Policies and standards have been developed to limit the transmission of infectious agents (fungal, bacterial and viral) to patients during construction, maintenance and renovation (CMR) projects in patient care areas and patient care–related areas in health care facilities because transmission of infectious agents to patients has been documented to occur during these activities.

There are Canadian Standards that address Infection Prevention and Control (IP&C) for construction, maintenance and renovation. IP&C concepts also need to be incorporated into design, to facilitate desired practices by the healthcare worker and to provide a safe environment.

Policy

1. All CMR projects will involve the SHR ICP (Infection Control Professional) in each phase of the project (from initial design through project completion).
2. All new construction, renovation and maintenance projects must be carried out in accordance with proper infection prevention and control standards and engineering procedures to reduce the risk of exposure to (airborne) contaminants.
3. The Infection Prevention and Control Checklist (Appendix I) must be completed for all CMR projects.
4. All contractors, sub-contractors, materials suppliers, vendors, employees or agents are bound by infection prevention procedures outlined for the project when working in public and patient areas and will cease operations when notified that infection prevention and control measures have been breached.

Purpose

1. To reduce the potential for healthcare acquired infections (HAI's) related to CMR.
2. To ensure patient and personnel safety needs are met through implementing and maintaining IP&C measures, including clear lines of communication.

Procedure

1. Classification of Project:
   Saskatoon Health Region (SHR) Planning will classify CMR projects according to the definitions provided in the IP&C SHR Risk Assessment Matrix (Appendix I). The project requirements that relate to the class of project will be included in contract tender documents.

2. Construction Checklist:
   The person responsible for the project (Project Manager) will complete the top portion of IP&C SHR Risk Assessment Matrix (Appendix I). A copy of the matrix will be forwarded to the site IP&C prior to the start of the work.

3. Design Phase:
   The SHR ICP will be an integral member of the project teams for CMR projects involving health care facilities within the SHR owned, operated facilities and affiliate sites.

   The SHR ICP will approve the design phase of each project as it relates to IP&C issues. These include but are not limited to:
   - Class of project
   - Traffic patterns for people and supplies
   - Ventilation systems
   - Hand washing facilities
   - Patient care areas including accommodations for patients requiring additional precautions
   - Composition of vertical and horizontal surfaces
   - Water supply and plumbing
   - Storage of equipment and supplies
   - Storage and disposal of infectious waste

4. Demolition/Construction Start-up Phase:
   Prior to the start of the work, a meeting will be held with representatives from Environmental Services, Facilities Management, IP&C, Workplace and Employee Wellness (OH&S), and the users of the area as appropriate to discuss issues related to infection prevention and control such as:
   - Ventilation systems
   - Patient location
   - Dust elimination/control
   - Traffic patterns
   - Supplies/storage
   - Transportation of demolition materials
   - Hoarding
   - Negative pressure

5. Construction Phase:
   The SHR ICP will perform spot inspections to ensure that the appropriate preventative measures are initiated and adhered to, and has the authority to stop construction if there is a significant failure to adhere to the required preventative measures.

   The project manager will respond to the deficiencies in a time line that is agreed upon with the ICP.

The health care staff (including medical and nursing staff) shall be responsible for maintaining patients' health and safety. Therefore they shall be aware of patient population at risk, potential hazards that construction activities pose to patients and the relevant preventative measures.

The ICP will follow-up on concerns related to infection from the clinical department undergoing the CMR project.

During construction checklists to document the monitoring of negative pressure, hoarding, walk off mats and filters will be used as necessary (Appendix IV). The checklists to be used will be agreed upon by the ICP and the constructor.

The ICP will also document her/his inspection using appendix III. This inspection sheet shall be made available to the constructor.

6. Commissioning/Pre-occupancy Phase:
Prior to re-opening of an area, a post-project or move coordination meeting will be held with representatives from Workplace and Employee Wellness, IP&C, Environmental Services, Facilities Management and the users of the area as appropriate to discuss IPC issues such as:
- Terminal cleaning
- Settle time (time between terminal cleaning and return to use)
- Timing of re-opening
- Walk through
- General environmental services schedules for new areas
- Ventilation system checks (i.e. air balance, pressurization, microbial contamination, air exchange rates)

7. Communication:
Communication is essential at all stages. Meetings should include the following:
- Frequent/weekly update meetings with the project manager and the ICP to discuss upcoming stages and to anticipate issues before hand
- called by the multidisciplinary team (and involve IP&C) as required.

Definitions

Construction, Maintenance and Renovation (CMR):
Includes activities by a person(s) who breach the integrity of ceilings, walls, floors and ventilation systems including activities related to installation of wiring, cables, plumbing and air handling or maintenance.

Patient Care Areas:
The in-patient and the outpatient units of a health care facility. This includes waiting rooms, clinics, emergency rooms and diagnostic areas.

Patient Care-Related Areas:
Areas proximal to patient care areas (i.e. above, below, adjacent or within). This includes areas such as supplies, equipment processing, distribution and Pharmacy.

Negative Pressure System:
Occurs when the static pressure in an enclosed work area is lower than the pressure outside the enclosed work area.

Healthcare Associated Infection (HAI):
Infections produced by microorganisms acquired during a stay at a health care facility.

Microbial Contamination:
The introduction of micro-organisms into an environment potentially causing instability, disorder, harm or discomfort.

References

1. Hospital Epidemiology and Infection Control: Guidelines for Construction/Renovation/Demolition Projects and Environmental Control of Aspergillosis and other Nosocomial Infections. (Revised 2007) UCSF Children's Hospital.

2. American Institute of Architects (AIA) 2006. Guidelines for design and construction of hospital and health care facilities.

3. APIC Text of Infection Control and Epidemiology 2005: Association for Professionals in Infection Control and Epidemiology, Inc.; 2005.

4. CHICA-CANADA POSITION STATEMENT; Healthcare Facility Design Position Statement, Dec. 2008.

5. CSA standards: (Z317.13) Infection Control during Construction or renovation of Health care Facilities

6. Health Canada, Population and Public Health Branch. (2001, July). Construction-related nosocomial infections in patients in health care facilities: decreasing the risk of *Aspergillus*, *Legionella* and other infections. Canada Communicable Disease Report, 27S2, 1-55. Available from the World Wide Web on Feb 1, 2007: http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/01pdf/27s2e.pdf

7. Calgary Health Region Regional Policy (June 2004). Infection Prevention and Control during Construction, Renovation and Maintenance.

8. The Canadian Journal of Infection Control (Spring 2008). A practical approach to address infection prevention and control issues in acute care health facilities during construction, maintenance and renovation.

9. Calgary Health Region: Infection Prevention and Control General design Guidelines/Standards for Calgary health Region Capital Projects, July 2004.

APPENDIX I
V1.1 Sept 2009
Facilities & Engineering Services

Construction, Renovation and Maintenance Infection Control Risk Assessment

Location of Construction:	**Project No.:**
Project Coordinator:	**Project Start Date:**
Work Performed by: □ **Contractor** _____ □ **Maintenance Contact Person:** _____	**Phone #:** _____ **Phone #:** _____
Supervisor: **Phone #**	**Estimated Duration:**

STEP 1 Identify the "Type of Construction Activity"	
Type A ☐	Inspection and Non-Invasive Activities. Include, but is not limited to, removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet, painting (but not sanding), wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
Type B ☐	Small scale, short duration activities which create minimal dust. Includes, but is not limited to, instillation of telephone and computer cabling, access to chase spaces, cutting of walls or ceiling where dust migration can be controlled. It also includes plumbing that requires disruption to the water supply to more than one patient care area (e.g.,>2 rooms) for less than 30 minutes.
Type C ☐	Any work, which generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies. Included, but is not limited to, sanding of walls for painting or wall covering, removal of floor coverings, ceiling tiles and casework, new wall construction, minor duct work or electrical work above ceilings, major cabling activities, and any activity which cannot be completed within a single work shift. It also includes plumbing that requires disruption to the water supply of more than one patient area (e.g., >2 rooms) for more than 30 minutes but less than one hour.
Type D ☐	Major demolition and construction projects. Includes, but is not limited to, activities which require consecutive work shifts, requires heave demolition or removal of a complete cabling system, and new construction. It also includes plumbing that results in disruption of the water supply of more than one patient care area (e.g., >2 rooms) for more than 1 hour.

STEP 2 Using the following table identify and circle the "Population Risk Groups"

Group 1 Lowest Risk	Group 2 Medium Risk	Group 3 Medium to High	Group 4 High Risk
• Office areas • Unoccupied wards • Public area • Laundry and	• Patient care areas unless listed in Group 3 or 4 • Outpatient	• Emergency room (except trauma rooms) • Diagnostic Imaging	• ICU's • Operating rooms (including prep, induction, PACU, and scrub areas • Anaesthesia storage areas

soiled linen cleaning areas • Physical plant workshops and housekeeping areas	clinics (except oncology and surgery) • Admission and discharge units • Waiting rooms • Autopsy and morgue • Occupational therapy areas remote from patient care areas • Physical therapy areas remote from patient care areas	• Labour and Delivery (LDRP) • Newborn Nurseries • Nuclear medicine • Hydrotherapy • Echocardiography • Laboratories • General medical and surgical wards • Pediatrics • Geriatrics • Long Term care • Food preparation, serving, and dining areas • Respiratory therapy • Clean linen handling and storage areas	and workrooms • Oncology units and outpatient clinics for cancer patients • Transplant units and outpatient clinics • Wards an outpatient clinics for patients with AIDS or other immunodeficiency diseases • Dialysis units • Critical care nurseries (NICU) labour and delivery operating rooms • Cardiac catheterization an angiography areas • Cardiovascular and cardiology • Endoscopy • Pharmacy admixture rooms • Sterile processing and supply • Central processing department • Burn care units • Trauma rooms • Isolation rooms • Tissue culture laboratories • Bronchoscopy, • Cystoscopy • Pacemaker insertion rooms • Dental procedure rooms

Preventative Measures Analysis

STEP 3 Match the patient Risk Level with the Construction Activity Level

	Type A	Type B	Type C	Type D
Population Risk Group				
GROUP 1	CLASS I	CLASS II	CLASS II	CLASS III – IV
GROUP 2	CLASS I	CLASS II	CLASS III	CLASS IV
GROUP 3	CLASS I	CLASS III	CLASS III – IV	CLASS IV
GROUP 4	CLASS I – III*	CLASS III - IV	CLASS III - IV	CLASS IV

STEP 4 Determine Preventative Measures Required:

* An Infection Control Permit will be required when the Construction Activity and Risk Level indicate that Class III and Class IV control procedures are necessary. Each class includes the preceding class's preventative measures. Attach this Risk Assessment to the permit for IP&C approval.

√	Class	During Construction Project	Upon Completion of Project
	I	▪ Execute work by methods to minimize raising dust from construction operations ▪ Immediately replace a ceiling tile displace for visual inspection	▪ Clean work area upon completion of task
	II	▪ Provide active means to prevent airborne dust from dispersing into atmosphere ▪ Water mist work surfaces to control dust while cutting ▪ Seal unused doors with duct tape ▪ Block off and seal air vents ▪ Place dust mat at entrance and exit of work area ▪ Remove or isolate HVAC system in areas where work is being performed	▪ Wipe work surfaces with disinfectant ▪ Contain construction waste before transport in tightly covered containers ▪ Wet mop and /or vacuum with HEPA filtered vacuum before leaving work area ▪ Remove isolation of HVAC system in areas where work is being performed
	III*	▪ Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system ▪ Complete all critical barriers (sheetrock, plywood, plastic) to seal areas from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins ▪ Maintain negative air pressure within work site utilizing HEPA equipped air filtration units ▪ Contain construction waste before transport in tightly covered containers ▪ Cover transport receptacles or carts. Tape covering unless solid lid	▪ Do not remove barriers from work area until completed project is inspected by IP&C and thoroughly cleaned by Housekeeping. ▪ Removed barrier materials carefully to minimize spreading of dirt and debris associated with construction ▪ Vacuum work area with HEPA filtered vacuums ▪ Wet mop area ▪ Removed isolation of HVAC system

	IV*	▪ Isolate HVAC system in area where work is being done to prevent contamination of duct system ▪ Complete all critical barriers (sheetrock, plywood, plastic) to seal areas from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins ▪ Maintain negative air pressure within work site utilizing HEPA equipped air filtration units ▪ Seal holes, pipes, conduits, and punctures ▪ Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear clothe or paper coveralls that are removed each time they leave the work site ▪ All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area ▪ Do not remove barriers from work area until completed project is inspected by IP&C and thoroughly cleaned by housekeeping	▪ Remove barrier material carefully to minimize spreading of dirt and debris associated with construction ▪ Contain construction waste before transport in tightly covered containers ▪ Cover transport receptacles or carts. Tape covering unless solid lid ▪ Vacuum work areas with HEPA filtered vacuums ▪ Wet mop area ▪ Removed isolation of HVAC system

Standards Council of Canada. Infection Control during construction, renovation, and maintenance of health care facilities. CSA 2007,Z317.13-07

APPENDIX J
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Construction, Renovation and Maintenance Infection Control Measures PERMIT

Location:	**Project No.:**
Project Coordinator:	**Project Start Date:**
Work Performed by: □ Contractor **OR** □ FES Contact Person **Name:**	**Phone #**
Maintenance Supervisor: **Phone #**	**Estimated Duration:**

Preventative Measures Analysis

Circle the patient Risk Level and the Construction Activity Level

	Type A	**Type B**	**Type C**	**Type D**
Population Risk Group				
GROUP 1	CLASS I	CLASS II	CLASS II	CLASS III – IV
GROUP 2	CLASS I	CLASS II	CLASS III	CLASS IV
GROUP 3	CLASS I	CLASS III	CLASS III – IV	CLASS IV
GROUP 4	CLASS I – III*	CLASS III - IV	CLASS III - IV	CLASS IV

When the population risk group is 4 and the construction activity is Type A, IP&C shall be consulted to determine the appropriate measures.

When the preventative measure is a III/IV, the Infection Control Risk Assessment and this permit is to be submitted to IP&C.

Describe work hours. Can or will the work be done during non-patient care hours?

Using the guide provided on the back of this sheet, and on the attached Risk Assessment, give a brief description of work being performed with specific plans for containment, traffic flow, debris removal.

FAX TO IP&C
RUH: 0609
SCH: 7554
SPH: 6142
PRC: 3934

☐ Attachment included

Permit Requested By:		**Supervisors Confirmation Work is as outlined:**	
Date:	**Position:**	**Name:**	**Date:**

IP&C Practitioner Consult (to include additional requirements, exceptions or deletions):

FAX TO FES
RUH: 1415
SCH: 8343
SPH: 5844
PRC: 3801

☐ Attachment included Inspected: Yes___ No___

IP&C Practitioner: **Date:**

PERMIT TO BE POSTED AT WORK SITE ENTRANCE

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Below are highlights of the CSA Z317-13-07 and <u>do not</u> include of all the requirements. Use the standard to determine the preventative measures required for this project.

Preventative Measures I and II (to be included in Preventative Measures III and IV):

☐ Establish safe route for transportation of clean or sterile supplies and equipment away from the construction area.
☐ Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
☐ Establish traffic patterns for construction workers that avoid patient care areas.
☐ Designate elevator for construction workers.
☐ Minimize exhaust output from the elevator cab in the construction area.
☐ Determine if domestic cold/hot/recirculation water lines will be affected by the construction (7.1.3.1.)
☐ Place debris in covered containers or cover it with a moistened sheet before transporting it for disposal.
☐ Place supplies and equipment in covered containers during transportation through the facility to prevent contamination in other areas.
☐ Removed the debris in the evening when patients are in their rooms and visitors have left. If not possible, removed at the end of the workday to minimize exposure.

Preventative Measures III (See 7.2.3 of the standard for details)

☐ Complete all critical barriers or implement hoarding method before construction begins.
☐ Impermeable dust barrier, from floor to underside of the deck including the areas above false ceiling, consisting of two layers of .15 (6 ml) fire-retardant polyethylene and gypsum wallboard.
☐ Use impermeable vessels constructed to contain contaminants.
☐ Vacuum mechanical and electrical systems and spaces above drop or false ceiling if necessary.
☐ Remove protective clothing before entering patient care areas.
☐ Seal holes, pipes, conduits, and punctures appropriately.
☐ Disable the ventilation system and seal duct openings in construction area.
☐ Barriers not removed from work area until project is complete.
☐ Isolate HVAC system area where work in being done to prevent contamination of duct system.
☐ Maintain negative pressure within work site (24/7) including pressure gauges and an alarm.
☐ Exhaust air shall not be discharged to areas occupied by patient risk groups 3 / 4.
☐ Permanent air handling systems should not be used for the exhausting air. Temporary duct work may be installed for such purposes however it should not be connected to the facility's HVAC system.
☐ Clean in area surrounding each construction zone with a HEPA vacuum daily.
☐ Notify housekeeping to increase the frequency of cleaning in the areas adjacent to the construction area while the project is underway.

Preventative Measures IV (See 7.2.4 of the standard for details)

☐ All access shall be from outside the occupied areas of the facility, or construct anterooms that access point to the construction area if access is from within.
☐ Walk off mat must be placed outside and inside the anterooms.

Appendix II – Construction, Renovation and Maintenance Infection Control Measures Permit

□ Constructors must leave through the anteroom so that they can be vacuumed with a HEPA vacuum before leaving or wear protective clothing that is to be removed each time they leave the construction area.

□ Repair holes in walls within 8 h or seal them temporarily.

□ Hats worn by employees within the construction area must be changed prior to putting the coveralls on.

□ Post PPE procedure in each area.

PERMIT TO BE POSTED AT WORK SITE ENTRANCE

Standards Council of Canada. Infection Control during construction, renovation, and maintenance of health care facilities.

CSA 2007,Z317.13-07

Infection Prevention & Control Construction Inspection Sheet

Date of Inspection:			
Project Location (Building, Floor, Wing and Room):			
Project Description: **Project manager/contact:**			
*	**Please note items with * need corrective measures before completed**	Yes	No
Dust Containment			
	1. Two layers of 6 mil poly if less than one day.		
	2. Rigid barrier if greater than one day.		
	3. Hoarding sealed from floor, wall and ceiling.		
	4. Is dust containment door present.		
	5. Rubber stripping on door of barrier.		
	6. Anteroom with sufficient space to remove PPE, and clean boots.		
	7. Anteroom contains: • Checklists • Construction permit • Alcohol hand sanitizer • Signage outlining entrance and exiting procedures.		
	8. Walk-off carpeting or tacky mat in anteroom and outside anteroom.		
	9. Rubber stripping on door of barrier.		
	10. Duct, electrical and plumbing holes are sealed.		
Air Quality			
	11. Negative pressure maintained at 7.5 Pa (.03wc).		
	12. HVAC intake and exhaust sealed with plastic / non-permeable material.		
	13. Ventilation system is disabled from the construction area.		
	14. Air from HEPA filter is exhausted outside.		
	15. Windows, doors, air intakes and exhaust vents sealed to adjacent construction/demolition.		
Housekeeping			
	16. It is clean in area surrounding the construction site?		
	17. Vacuum cleaner used to clean work area is HEPA – filtered.		
	18. When is the debris removal done (days and time).		
	19. Debris is removed in clean covered bins.		
	20. Route of debris removal avoids patient care areas if possible.		
	21. Materials brought into work site are covered during transport and stored in a clean dry location prior to transport.		
	22. Tools or supplies removed from work site are vacuumed with HEPA equipped vacuum or damp dusted.		
	23. Project area is swept and cleaned at the end of each day (wet mopped as needed).		

Appendix III – Infection Prevention & Control Construction Inspection Sheet

Personal Protective Equipment			
	24. Are workers traveling in areas used by patients/clients?		
	25. Is there a HEPA filter equipped vacuum for workers to vacuum boots, or supplies to damp dust boots?		
	26. Workers are wearing coveralls, and boot covers while in work area, and removing in anteroom?		
Plumbing and Water Quality			
	27. Water lines are flushed to clear before reuse of plumbing.		
	28. Water is superheated to 66°C and hyperchlorinated before being repressurized.		
	29. Dead legs are removed as close to the main line as possible.		
	30. If dead leg not removed, then water drained and capped off and tagged.		
Documentation			
	31. Is construction permit posted?		
	32. Daily negative pressure and hoarding checklist is complete?		
	33. Daily filter checklist is complete?		
Comments:			
Inspected By:			

Appendix IV – Infection Control Checks

Daily Negative Pressure & Hoarding Checks:

Date	Negative Pressure (am&pm)	Check Hoarding (am&pm)	Comments	Signature

Appendix IV – Infection Control Checks

Daily Filter Checks:

Date	Pre-Filter	HEPA	Pleated Filter	Signature

Appendix IV – Infection Control Checks

Walk-off mat check:

Date	Tacky mat (when changed)	Walk off mat (clean/vacuumed and when wet down)	Comments	Signature