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SHCC Guidelines

For Briefing, Design and Approval of Healthcare Facilities

Part D – Infection Control

Version 1, 2014

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1.0 General Requirements

1.1 General

Infection Control requirements are critical to the planning of a healthcare facility and need to be incorporated into plans and specifications.

All areas of the facility shall be designed, constructed, furnished and equipped in keeping with the principles of infection control.

Infection control involves the prevention of possible spread of infection by minimizing the transfer of microorganisms from person to person. Consider sufficient space to allow enough room for storage of Personal Protective Equipment (PPE) i.e. gowns and gloves for protective isolation.

A number of strategies contribute to the control of infection, such as handwashing, careful aseptic technique and the observance of 'standard precautions'.

By far the most important of the infection control strategies is effective handwashing.
Handwashing facilities shall be installed in all patient care areas and in all areas where careful attention to hygiene is essential, such as Kitchens, Laundries, Pharmacies and Laboratories. Staff amenities areas such as Bathrooms, Toilets and Change Rooms shall also be equipped with handwashing facilities. Refer to the section 'Handwashing Facilities' for detailed requirements of staff hand-basins.

Facets of construction and fit-out that contribute to effective infection control are covered in various sections of these Guidelines. They include ventilation, floor coverings, waste management, and provision for ease of cleaning, provision for sterilization and disinfection of equipment and instruments and provision for the isolation of infectious patients, as required.

2.0 Handwashing Facilities

2.1 General

The Guidelines refer to several categories of hand basins including Type A, B, C and troughs along with various configurations for types and placement of tap ware. These are addressed in the section and tables that follow.

2.2 Hand Basin Types

Type A hand basin refers to a clinical scrub basin. The hand basin type is a large clinical scrub type. The taps are wall-mounted, hands-free operation (elbow, foot or electronic). This basin is used in areas requiring clinical handwashing for sterile procedures, e.g. ICU Rooms, Treatment Rooms and Cardiac Catheterization areas.

Type B hand basin refers to a general staff hand basin. The hand basin type is a medium wall-mounted basin. Taps are either wall-mounted or basin-mounted with hands-free operation (elbow or wrist). This basin is used in areas requiring general staff handwashing, e.g. ward corridors.

Type C hand basin refers to a small staff hand basin. The hand basin type is a small wall-mounted basin. Taps are either wall-mounted or basin-mounted with hands-free operation (elbow or wrist). This basin is used in areas requiring general staff handwashing, e.g. staff amenities and toilets.

Scrub sink refers to a long sink that can accommodate one or more staff scrubbing for a sterile procedure at one time. Refer to the section on Ergonomics for required heights, width of space per person and type of taps.

2.3 Handwash Basins – Placement

Handwash bays should be provided in the following ratios:

- Intensive/Critical Care Units – one per enclosed room, one per two open bays
- Emergency Unit – one per four open bays
- Ambulatory Care Areas – one per four open bays
- Other patient treatment areas – generally staff should not be more than 10–12 meters from a handwash bay.

Handwash basins should be placed near the entry or egress door to a room unless otherwise required.

A handwash basin should be located in close proximity to staff stations.

2.4 Handwash Basin Types – Schedule

Schedule of basin and tap types

The following indicates recommended basin and tap combinations for particular rooms. For rooms not listed, refer to a similar area.

ROOM/SPACE	Basin Type	Wall Tap	Basin Tap	Wrist Action	Elbow Action	Infra-red	Remarks
BAY – HANDWASHING	B	Yes	Optional		Yes		In Corridors
BATHROOM	B		Yes	Yes			
BIRTHING ROOM	A	Yes			Yes	Optional	
CLEAN UTILITY	B	Yes	Optional		Yes		
CLEAN-UP ROOMS	B		Yes	Yes			
CONSULT ROOM	B	Yes	Optional	Yes	Yes		Also includes Exam Rooms
DIRTY UTILITY	B		Yes	Yes			
ENSUITES	B		Yes				
HIGH DEPENDENCY UNIT	A	Yes			Yes	Optional	
INPATIENT BEDS	B	Yes			Yes		
INTENSIVE CARE UNIT	A	Yes			Yes	Optional	
ISOLATION ROOM – AIRLOCK/ANTEROOM	B	Yes			Yes		
ISOLATION ROOM/S	B	Yes			Yes	Optional	
PANTRY	B		Yes				Includes Kitchenettes, Beverage Pantry
POST-MORTEM	A	Yes	Optional		Yes	Optional	
RECOVERY	A	Yes			Yes		
SCRUB-UP/GOWNING	A or Trough	Yes				Yes	Operating Unit, Day Procedure Unit, Procedure Rooms including Imaging
TOILET – PATIENT	B		Yes				
TOILET – PUBLIC	C		Yes				
TOILET – STAFF	C		Yes				
TREATMENT ROOM	A	Yes			Yes		

2.5 Work and Treatment Areas

Sinks should not be provided in Clean Utility areas to avoid the risk of contaminating sterile stock stored in this area. The clinical hand basin should be located externally to the room. Hand Basin Type B is recommended for this area.

3.0 Isolation Rooms

3.1 Class S – Standard Pressure

Recommended elements for Class S Isolation Rooms are as follows:

- A staff hand basin within the room
- An ensuite bathroom
- A self-closing door.

A pan sanitizer located near the room is an optional element for Class S Isolation Rooms.

3.2 Class N – Negative Pressure

Negative Pressure Rooms are for patients who require airborne droplet nuclei isolation. The aim of placing people in Negative Pressure Rooms is to reduce transmission of disease via the airborne route.

For elements and inclusions for Class N Negative Pressure Rooms, refer to Guidelines for Environmental Infection Control in Health-Care Facilities, CDC (Centre for Disease Control).

3.3 Class P – Positive Pressure

For elements and inclusions for Class P Positive Pressure Rooms, refer to Guidelines for Environmental Infection Control in Health-Care Facilities, CDC (Centre for Disease Control).

3.4 Class A – Alternating Pressure

Rooms with reversible airflow mechanisms, which enable the room to have either negative or positive pressure, shall **NOT** be used.

3.5 Number of Isolation Rooms

A minimum of 20% of the total bed complement in Inpatient Accommodation Units (across the whole facility) used for overnight stay shall be provided as Single Bedrooms (Type S).

All HPUs providing inpatient overnight accommodation shall provide at least one Class S – Standard Isolation Room.

All facilities at Level 4 and above shall provide at least one Class N – Negative Pressure Isolation room per 100 overnight beds. Additional Class N – Negative Pressure Isolation Rooms may be required to meet service profile and model of care for the HPU and the facility.

The provision of Class P – Positive Pressure Isolation Rooms is only required to meet the requirements of the service profile and the model of care for the HPU and the facility.

3.6 Operating/Procedure Rooms

When Bronchoscopy is performed on people who are known or suspected of having Pulmonary Tuberculosis, the Operating/Procedures Room shall meet the Negative Pressure Isolation Room ventilation requirements.

4.0 Physical Environment

4.1 Planning

The design of the premises is fundamental to infection control and implementation of 'Standard' and 'Additional' precautions. All new or renovated healthcare facilities should incorporate into their design and layout the physical requirements that are essential for an infection control strategy.
Design of the premises should consider the movement of people and equipment in ways that minimize the risk of transmission of infection.

4.2 Air-Conditioning

Hospital air-conditioning systems should be monitored regularly and serviced by accredited service technicians. Maintenance schedules should be documented.

Air-conditioning or ventilation systems in critical areas such as Operating Rooms, Birthing Rooms, Tuberculosis Isolation Rooms, Burns Units, Intensive Care Units, Emergency Units, as well as in special treatment or procedural areas, should provide high quality air at all times. Where the Sterile Supply/Service Unit is attached to Operating Rooms, ventilation should be provided by treated air supply and air-conditioning should comply with Part E of these Guidelines. Air-conditioning in separate Sterile Supply/Service Units should comply with the relevant Standards.

Where there is risk of airborne transmission of pathogenic microorganisms, there should be a sufficient number of single rooms (at least one per 100 Beds) with adequately filtered air-conditioning that should have external exhaust systems. No recirculation of air should be permitted. For Tuberculosis Isolation and Treatment Rooms, negative pressure ventilation should be made available, in accordance with nationally endorsed Guidelines and State and Territory Tuberculosis Guidelines. A minimum of twelve Air Changes per Hour (ACH) are advised, including at least two outside air changes per hour, plus good air circulation within the room.

Air filtration for Isolation Rooms is to be installed according to relevant standards, in particular ISO 14001.

4.3 Instrument Processing/Cleaning Areas

Separate and clearly defined operating and cleaning areas are required to maintain adequate barriers for infection control. Delineation of these areas facilitates easy identification of surfaces that should be cleaned and disinfected between patients. Both areas should have adequate lighting, good ventilation to reduce the risk of cross-infection from aerosols, bins for the disposal of hazardous waste and smooth impervious surfaces without crevices.

The cleaning area should be divided into a contaminated section and a clean section.

The contaminated section shall include:

- Adequate bench space for dismantling and working on equipment
- At least one deep sink or trough (stainless steel) for manual cleaning of instruments and other equipment
- Cleaning and disinfecting materials
- Cleaning and disinfecting equipment, including brushes
- Mechanical disinfector/washer.

Cleaning sinks must be located separately to clinical handwashing basins to avoid risk of contamination and must be used only for decontamination of equipment and instruments. Where filters are fitted to taps in place of anti-splash devices, they should be cleaned regularly. In office practices where there are no surgical or dental procedures being carried out, e.g. acupuncture clinics, a stainless steel or smooth hard plastic bowl dedicated to use in the cleaning and decontamination of instruments and devices may be used as an alternative to a sink for cleaning.

The processing area should be carefully defined and protected from all vapors, splashing or aerosols produced during operating, handwashing, equipment washing, disinfection and ultrasonic cleaning. The area should have adequate storage space and be used only for the storage of effectively covered or packaged cleaned, disinfected and/or sterilized instruments and equipment.

4.4 Work Flows

Staff eating and recreation areas must be separate from work areas and patient treatment areas.

5.0 Surfaces and Finishes

5.1 Floors

Treatment areas should not be carpeted. Flooring located under all handwash basins is to be smooth, impervious and anti-slip. The flooring should be easily cleanable and in good repair.

Floors in areas used for food preparation or food assembly shall be water resistant and greaseproof to comply with the Food Hygiene Regulations. Floor surfaces, including joints in tiles in such areas, shall be resistant to food acids (epoxy grout). In all areas subject to frequent wet cleaning methods, floor materials shall not be physically affected by germicidal cleaning solutions.

5.2 Skirtings

Wall bases in Kitchens, all clinical areas and other areas subject to frequent wet cleaning methods shall be made integral with the floor, tightly sealed against the wall and constructed without voids.

5.3 Walls

Other than special treatments included as feature face work in public or staff relaxation areas, wall finishes in clinical areas shall be scrubbable with smooth surfaces and in the immediate vicinity of plumbing fixtures, smooth and water-resistant.

5.4 Ceilings

All exposed ceilings and ceiling structures in areas occupied by patients or staff and in food preparation or food storage areas shall be finished to be readily cleanable with equipment routinely used in daily housekeeping activities.

In food preparation and other areas where dust fallout would present a potential problem, such as clinical areas, supply and storage areas and sterile stock storage, there shall be a finished ceiling that covers all conduits, piping, ductwork and open construction systems.

Ceilings in Operating and Birthing Rooms, Isolation Rooms, Nurseries, Sterile Processing Rooms, Bone Marrow Transplant Units and Oncology Units shall be monolithic from wall to wall without fissures, open joints, or crevices that may retain or permit passage of dirt particles. Light fittings shall also be recessed and flush fitting and sealed to prevent dust ingress.

Acoustic and/or lay-in ceilings shall not be used where particulate matter may interfere with infection control. This will include the following areas in addition to those noted above:

- Operating Unit 1st Stage Recovery bed areas
- Anesthetic Induction Rooms or patient preparation areas
- Intensive Care patient bed/treatment areas
- High Dependency patient bed/treatment areas
- Treatment and Procedure rooms generally.

5.5 Gaps

A gap is defined as a space where two materials do not meet, leaving a space or opening that can harbor dust, germs, mold or vermin.

In the construction of healthcare facilities, gaps between surfaces are not permitted and must be properly sealed. In particular, gaps in the following area are not allowed:

- Between skirting and floor
- Between utility benches and walls
- Between cupboards and floor or walls
- Between fixtures attached to floors and walls.

Floor and wall construction, finishes and trims in dietary and food preparation areas shall be free of spaces that can harbor rodents and insects. Details to comply with the relevant Public Health regulations.

Floor and wall penetrations by pipes, ducts and conduits shall be tightly sealed to minimize entry by rodents and insects; joints of structural elements shall be similarly sealed.

5.6 Surface Materials

Regular routine cleaning of the healthcare facility premises can be carried out much more efficiently if the design of the building is adapted to its function. Unnecessary horizontal, textured, moisture-retaining surfaces or inaccessible areas where moisture or soil will accumulate should be avoided, if possible.

All fixtures and fittings should be designed to allow easy cleaning and to discourage the accumulation of dust. Blinds are preferable to curtains for this reason.

Where there is likely to be direct contact with patients or with blood or body fluids, floors and walls should be surfaced with smooth, impermeable seamless materials, such as vinyl. In equipment processing areas, work surfaces should be non-porous, smooth and easily cleaned.

All surfaces in high-risk clinical areas, including the Operating Unit, Intensive Care Unit, Obstetrics Unit and Neonatal Special Care Nurseries, should be smooth and impervious.

6.0 Construction and Renovation

6.1 Planning

Infection control precautions during construction should be integrated into the design and documented from the beginning of the design stage. It is important that the dust and infection control principles developed during the pre-design stage be integrated at the initial stages of the design development. It is important that the pre-design team comprehensively brief the design team and submit the findings of the survey and risk profile.

6.2 Risk Management

A formal approach to risk management must be part of all building and renovation activities. Risk management should include specific assessment of infection control risks. The design stages of a project shall include an infection control risk assessment.

A more detailed review of risk is beyond the scope of this document but adherence to risk management principles will provide the framework to assemble a relevant risk management strategy.

Airborne sampling may be part of a risk management program. Cumulative data is used to establish indoor and outdoor background levels of filamentous fungi for a particular site. This will enable establishment of risk profiles for particular locations in and around the hospital.

The risk profile should as a minimum:

- Identify the location of high-risk patients in relation to the site
- Identify ventilation system types and potential impact
- Determine air monitoring requirements, methodology and frequency
- Take air quality samples to establish a baseline
- Identify possible contaminants and their locations (contaminants may be present in ceiling dust, service shafts, sprayed on fire retardants and bird droppings).

6.3 Infection Control

Current construction practices can affect patient well-being by the dissemination of bacteria and fungi that can cause healthcare associated infections.

Building, renovation and maintenance activities within a healthcare facility impose risks upon the incumbent population unlike any other building site. Building practices therefore require a range of precautions appropriate to the risk. Identification of the at risk population, a knowledge of the transmission route of a likely pathogen and location of the at risk population in relation to the construction, all need to be taken into account in the planning stages.

Infection control measures to consider during construction are:

- Infection control site induction of building workers should be carried out as a major component of the OSH induction. This induction process should be documented and signed off by each person inducted
- Worker compliance with procedures should be monitored and the results of this monitoring should be fed back to the workers routinely through the builder. A system must be in place to manage major breaches
- Ensure that adequate inspections by the nominated representatives take place during the construction of the barriers. These inspections should be monitored and reported on.

6.4 Air Sampling

Negative pressurization of the construction zone is recommended to maintain correct airflow direction. The exhaust/extraction systems specified in the contract documentation must be constantly monitored and maintained to ensure no failures occur. These inspections should be documented and reported on.

If HEPA filtration is required, a person must be nominated as responsible for that duty. The filters should have differential pressure monitoring with alarms. Spare filter elements must be kept on hand. These inspections should be documented and reported on.

Routine inspections of barriers should be conducted by the hospital's nominated representative from the contractor. These inspections should be documented and reported on.

Routine air sampling should be employed by the hospital to monitor the effectiveness of the barriers, pressurization and housekeeping procedures. The routine air sampling should be documented and reported on.

A high level of site cleanliness is essential. It is recommended that tools with efficient dust extraction systems connected to HEPA filters be used. Tasks such as sanding plasterboard present a high level of potential risk; therefore it is recommended that mechanical sanding should be used.

Demolition and jack hammering of concrete should be undertaken with a filter unit in close proximity.

HEPA vacuuming, not sweeping, should be used to clean up. Conventional vacuum cleaners disseminate huge quantities of dust and fungal spores and should not be used.

Movement in and out of the site shall be controlled by restricting access to only those who have undergone site induction. This will assist greatly in reducing the spread of contaminants.

All inspections should be documented including a non-conformance system for defaults complete with a corrective and preventative action loop.

6.5 Air Sampling Methodology

There are two distinct sampling methodologies for the detection of viable airborne fungal spores. These are high air volume sampling and low air volume sampling. Sampling for viable fungal spores almost universally is via low air volume sampling. Low volume sampling is used to measure high spore concentrations. High volume sampling is used to measure low spore concentrations.

Along with airborne sampling, routine surface sampling should be used. A combination of settle plates and surface swabbing can be employed to augment airborne sampling. Airborne sampling has limitations due to the burst nature of fungi and the transience of bacilli.

It is important to have a clear idea of what outcomes are required of the sampling. Equally important is to have an approximate idea of the expected number of fungi that will be obtained. This will determine the appropriate sampling system. Refer to ISO 14001 for additional information related to air sampling.

7.0 Verification

7.1 General

All infection control measures described in this section are required to be capable of verification by inspection. There must be no barriers in place to prevent the checking and validating the measures described.

8.0 Further Reading

Readers may find the following articles and Guidelines useful for further reference:

- CDC (Centre for Disease Control), 'Guidelines for Environmental Infection Control in Health-Care Facilities', 2003, US; Retrieved from website: http://www.cdc.gov/hicpac/pubs.html 2014
- CDC (Center for Disease Control), *'Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings'*, 2007, US; Retrieved from website: http://www.cdc.gov/hicpac/pubs.html 2014
- National Institute for Health and Care Excellence (NICE), *'Prevention and control of healthcare-associated infections (PH36)'*, 2011, UK; Retrieved from website: http://www.nice.org.uk/guidance/PH36 2014
- Standards Australia, 'Cleaning, disinfecting and sterilizing reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities', AS/NZS 4187, 2003, AUS; Retrieved from website: http://www.saiglobal.com/PDFTemp/Previews/OSH/as/as4000/4100/4187.pdf 2014
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- Victorian Advisory Committee on Infection Control, 'Guidelines for the classification and design of isolation rooms in health care facilities', 2007, AUS; Retrieved from website:
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