

1 General Requirements

1.1 Introduction

In recent years, a greater focus on improved clinical practices relating to infection prevention and control (IPC) and significant advances in technologies has led to better outcomes for patients.

On-going construction practices however, in new build, renovation, or the maintenance of health care facilities can impact on the well-being of patients. Any risks associated with all forms of construction therefore need to be managed in a recognised and formal manner.

Lack of risk identification or not having appropriate practices in place to control risks, can lead to serious environmental issues within a health care facility.

There is a need to identify the “at risk” population, which may include patients, staff and visitors; the geographical location of the potential risk, and the possible transmission source/s at an early stage of planning and development. This process is aimed to be all-inclusive so as to educate and bring greater awareness of infection control related issues.

A formalized risk management methodology that includes sound infection control procedures should result in an improved overall outcome, with minimized risks to patients and health facility staff.

1.2 General

Infection control involves the prevention of the possible spread of infection by minimising the transfer of micro-organisms from person to person.

A number of strategies contribute to the control of infection, such as hand washing, careful aseptic technique and the observance of 'standard precautions' as determined by the operational policy of the particular healthcare facility.

By far the most important of the infection control strategies is effective hand hygiene. Hand hygiene facilities should be installed in all Patient Care Areas, and also 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 should also be equipped with hand-washing facilities. Refer to the heading 'Hand Hygiene' for further discussion and detailed requirements.

Facets of construction and fit-out that contribute to effective infection control are covered in various sections of these Guidelines. They include selection of materials, separation of dirty and clean areas, adequate ventilation; floor coverings; waste management; provision for ease of cleaning; provision for sterilisation and disinfection of equipment and instruments; provision for the isolation of infectious patients, and provision for required facility cleaning regimes.

Under no circumstances, should an healthcare facility be found with pest infestation. Hospitals should expect any regular or random inspections requested by the relevant Authority to ensure a safe and clean environment for patients, visitors and staff.

1.3 Planning

The Team responsible for IPC strategies should be consulted throughout each stage of a project. Their considerations should be taken into account to ensure the design and physical layout of a facility meets required infection control measures.

It is imperative that IPC measures are “built in” or incorporated at the very outset of the planning and design of health care facilities – and that IPC inputs continue up to, into and beyond the construction completion stage.

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The design of facilities should also take into account the movement of people, equipment and materials in ways that minimise the risk of infection transmission.

To facilitate IPC measures, the team should:

- Determine a suitable and appropriate assessment of the IPC risks
- Identify the necessary steps to reduce or control infection risks
- Take records of findings based on the assessment and the necessary steps taken
- Implement the steps that have been identified
- Monitor and determine if further steps are needed to reduce or control infection risk

The objective of these control measures is to ensure the IPC advice is provided at the correct time to prevent delays or costly mistakes.

1.4 Work Flows

General

While the cleanliness of people, tools and supplies within the facility is vital to infection prevention and control, the spaces they enter and how they move between spaces is also critical. This means that spaces must be designed with certain activities separated from others to avoid the risk of infection and cross contamination. A carefully planned workflow is essential to minimising risk of contamination.

Instrument Processing

The planning and design of a facility should provide separate clean and dirty working areas with a defined unidirectional workflow to prevent cross contamination. The flow of instruments, equipment and materials must be linear - from dirty to clean, to sterile, to store, to dispatch. To allow these processes to occur, planning functions should be broken up into the following zones:

Zone	Description
Receiving area	Soiled items are received from units throughout the facility and separated into recyclable and non-recyclable items.
Waste disposal	Non-recyclable items are disposed of appropriately.
Decontamination area	All recyclable articles (including delivery trolleys) are sorted, rinsed, ultrasonically cleaned or mechanically washed and dried
Packing area	Instruments and equipment are sorted, counted and packaged for sterilising
Sterilising / cooling areas	Sterilisers are loaded, operated, and unloaded Sterilised items are allowed to cool while still loaded on steriliser trolleys
Sterile Stock	A sterile storage area for instruments and packs being off loaded from the Sterilising/cooling areas. Items will be kept here before dispatch to other units of the facility
Dispatch area	Sterile stock and distribution trolleys are held prior to dispatch to units of the facility. A separate entrance for sterile stock being received from external suppliers should be provided
User areas	Sterile stock is distributed to the units of the facility as required and disposed of or returned to the receiving area after use.

Table 1: Zones for Instrument Processing

Activities carried out within this process must be performed in designated zones to maintain the workflow pattern and thus prevent contamination. Each zone should have sufficient work space to permit the required activity to be performed without the need for any “back tracking”. Clean items should not re-enter contaminated areas. Refer to ‘Functional and Decontamination Areas’ in this section for further discussion and information.

Staff Facilities

Eating and recreation areas for staff must be separate from work areas and patient treatment areas.

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Utensils must not be washed in hand basins and hand washing should not occur in sinks for washing equipment.

Refrigerators for staff food storage must be separate from refrigerators for clinical specimen, medical products such as drugs, vaccines and blood, and other treatment materials.

Operating Rooms (ORs)

Shared use of the corridor for staff and patient access in the OR is acceptable such as in single corridor designs. However the delivery of sterile supplies and removal of waste to provide sufficient separation needs to be carefully considered in this model. It is recommended that sterile supplies/ equipment have a separate, dedicated access way into the OR without this conflicting with staff or patient traffic.

Sterile instruments and supply are to be transported to the OR via sealed carts if the single corridor design model is adopted. Soiled instruments and waste should also be transported via sealed carts (separate from the clean carts) to the SSU, clean-up rooms and disposal rooms,

1.5 Air-Conditioning

Hospital air-conditioning and ventilation systems should be monitored regularly and serviced by accredited service technicians. Maintenance schedules should always be documented and appropriate access given to permit ongoing maintenance.

Air-conditioning or ventilation systems are required in all parts of the facility where extra attention should be given to critical areas such as Operating Rooms, Birthing Rooms, Tuberculosis Isolation Rooms, Burns Units, Intensive Care Units, Emergency Units, and special treatment or procedural areas. Regular maintenance should ensure that the system is providing high quality air meeting local standard and requirements at all times.

Air conditioning in Sterile Supply Units should comply with the relevant local standards and with Part E of these Guidelines.

For treating patients with air-borne diseases such as COVID-19, SARS, MERS, tuberculosis, chicken pox and measles where there is a risk of airborne transmission of pathogens, isolation and treatment rooms must be installed with negative pressure ventilation in accordance with these Guidelines. There should be a sufficient number of single rooms (minimum of 1 isolation room per every 30 beds) with adequately filtered air-conditioning and external exhaust systems. No recirculation of air should be permitted.

Refer to Part E of these guidelines for further reference.

1.6 Operating/ Procedure Rooms

Due to the invasive procedures undertaken in an operating /procedure room, infection control is a key consideration in the design and planning process.

Where bronchoscopy is performed on persons who are known or suspected of having pulmonary tuberculosis, the Operating/Procedures Room should meet the negative pressure Isolation Room ventilation requirements. Air to a bronchoscopy suite/room should not be re-circulated, unless this is done via a well-maintained HEPA filtration system. The air should exhaust externally and any external vents should not be in proximity to other patient areas, or air intake locations. Refer to Part E in these Guidelines for Bronchoscopy room design.

All standard Operating Rooms (ORs) or Procedure Rooms are required to be positive pressure rooms, relative to any adjacent area. The pressure gradient must provide an airflow direction from the OR to the surrounding areas. Active control of pressure differentials is not necessary provided supply air fans are selected so that constant airflow volume is maintained for the life of the filters. Provision of increased filter resistance should be made in filter loading calculations.

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Relative pressure gradients are represented diagrammatically below:

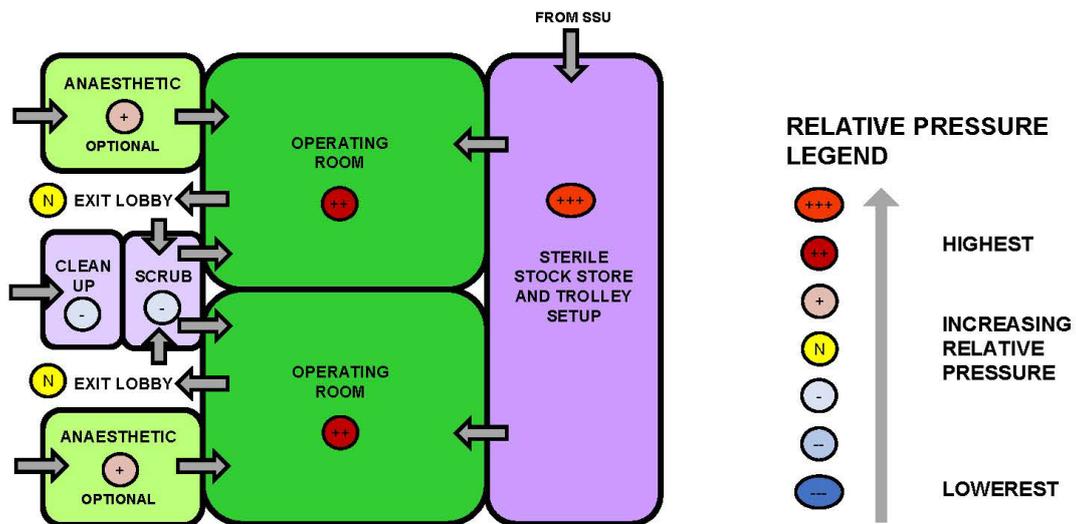


Figure 1: Pressure Gradients for Operating Rooms and surrounding support rooms

In all cases, terminal filters at the point of entry to the OR should be HEPA filters, with provision for testing filter integrity. HEPA filters should be installed in special housing complete with sealing and tested air diffusion screens.

A minimum of four exhaust or return air intake grilles should be located in the corners of the OR, approximately 200mm above floor level.

Anything that moves in or out of an OR, including the surgical suite as a whole, should be subject to stringent control. Any moisture in this environment must be rigorously and aggressively controlled by limiting the location and quantum of sources.

Accordingly, flash sterilization, or immediate-use steam sterilization (IUSS) where possible, should be avoided as ideal infection control measures are not assured. It also introduces sources of moisture into a sterile environment and may create cross-contamination where ORs/ Procedure Rooms share the same flash sterilization area. The provision of flash sterilization is not mandatory in any facilities and its use should be defined by the Operational Policy of the facility.

1.7 Separation of Decontamination Areas

A functional area is a zone or group of rooms within a healthcare facility that provides a specific service. For example, functional areas within an Inpatient Unit include patient areas, support areas and staff areas.

Separate and clearly defined functional and decontamination areas are required to maintain effective barriers for infection control. Delineation of these areas facilitates easy identification of surfaces that should be cleaned and disinfected between patients.

Functional areas can be categorized as extreme, high, medium and low risk. The classification of the space reflects the frequency and intensity of cleaning required to meet infection control standards; and will influence the design and material specification of the specific area.

Both functional and decontamination areas should have:

- Adequate lighting to minimize the risk of injury and enable inspection of cleaned areas and equipment
- Good ventilation to reduce the risk of cross-infection from aerosols

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- Smooth impervious work surfaces made from non-porous materials without crevices
- Slip resistant or non-slip, water-imperious flooring with sealed joints
- Correct bins for the disposal of hazardous waste.

Decontamination areas should be divided into separate functional zones where the degree of contamination decreases progressively towards a relatively clean but non-sterile environment. The clean-up/ processing area should be carefully defined and protected from all vapours, splashing or aerosols that may be produced during operating, hand washing, equipment washing, disinfection and ultrasonic cleaning that occurs in the decontamination area.

The area should comply with relevant local authority standards and include:

- adequate bench space for dismantling, cleaning and working on equipment
- adequate bench space for drying, processing and packaging cleaned equipment
- sufficient storage for materials and equipment used for cleaning and disinfecting; keeping the work benches free from clutter
- handwash basin with soap and paper towel fittings
- at least two deep stainless steel sink or trough for manual cleaning of instruments and other equipment. For smaller facilities where no surgical or dental procedures take place, (e.g.: acupuncture clinics), a small dedicated basin or stainless steel bowl may be used as an alternative. Cleaning sinks must be used only for the decontamination of equipment and instruments and must be located separately to clinical hand washing basins to avoid cross-contamination
- a first-aid kit to be provided in the decontamination room
- a mechanical disinfectant/ washer as required.

A sterilizing area, cooling area for sterile items awaiting storage and sufficient storage for effectively covered or packaged cleaned, disinfected and/or sterilized instruments and equipment will be required, ideally in a separate and collocated zone adjacent to the decontamination area. Also refer to Part B – Sterile Supply Unit in these Guidelines.