

1 General Requirements

1.1 Introduction

In recent decades, a greater focus on improvement for clinical practices relating to Infection Prevention & Control (IPC) and significant improvements in operational practices have led to better outcomes for patients.

Lack of risk identification or appropriate practices to control infection risks, can lead to serious issues within a healthcare facility.

There is a need to identify the “**at risk**” population, which may include patients, staff and visitors. This process is aimed to be all-inclusive to educate and bring greater awareness of infection control related issues.

The design of healthcare facilities from inception to fully detailed design must incorporate the necessary features intended to minimise the risk of infection and transfer of infection from a variety of sources to people. This may include direct transfer from person to person, transfer from surfaces to people and the spread of infection through the air.

This Part of the Guidelines covers various aspects of Infection Control and infection including hand hygiene, cleanable and inspectable surfaces and the control of the movement of air via air pressurisation regimes in facilities such as isolation rooms. Further requirements of air pressurisation are also covered within other Functional Planning Units such as the Operating Unit. For the technical requirements please refer to Part E Engineering Guidelines.

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

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, Kitchens, Laundries, Pharmacies and Laboratories. In such areas hand wash facilities may be required in certain rooms as well as the corridors leading to those rooms. Hospital staff in transit between facilities should not be required to enter a room to wash their hands.

Staff Amenities areas, such as Bathrooms, Toilets and Changing Rooms should also be equipped with hand-washing facilities. Refer to the heading 'Hand Hygiene' for further discussion and detailed requirements.

These Guidelines and the other parts such as the Functional Planning Unit make it clear that the use of antiseptic gel dispensers in most areas of the healthcare facilities is welcome but is not a complete replacement for hand washing facilities. In some areas antiseptic gel dispensers are prohibited such as in IVF facilities.

Various facets of construction and fit-out that contribute to the effectiveness of infection control are covered in many sections of these Guidelines. They include the selection of materials, separation of dirty and clean areas, adequate ventilation, floor coverings, waste management, the 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 a healthcare facility be found with pest infestation. Healthcare facilities should expect regular or random inspections requested by the relevant Authority to ensure a safe and clean environment for patients, visitors and staff.

1.3 Planning

If possible, the Team responsible for Infection Prevention and Control (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 and the intended operational policies of the facility.

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, and beyond the construction completion stage.

The design of facilities should also take into account the movement of people, equipment and materials in ways that minimises 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 Workflows

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. A few examples are provided below. For more information please refer to each individual FPU within these Guidelines.

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.

Operating Unit

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

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 uni-directional airflow 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.

Relative pressure gradients are represented diagrammatically below and in greater detail within the Operating Unit FPU:

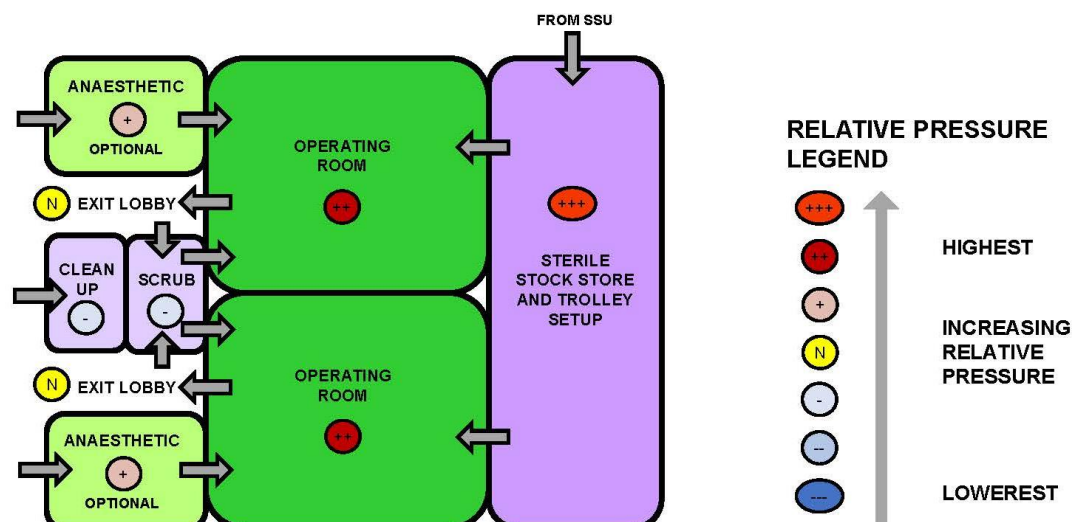


Figure 1: Pressure Gradients for Operating Rooms and surrounding support rooms under Model C in the Operating Unit FPU

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 to ensure the removal of stale air and achievement of laminar flow.

Where bronchoscopy is performed on persons who are known or suspected of having pulmonary tuberculosis or other infections, 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.

Anything that moves in or out of an OR, including the Operating Unit 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 sterilisation, or immediate-use steam sterilisation (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 sterilisation area. The provision of flash sterilisation is not mandatory in any facility and its use should be defined by the Operational Policy of the facility or the Health Authority.

Scrub facilities in operating units must not be inside the operating rooms and the air surrounding the scrub areas must not be mixed with the OR air circulation. Scrub areas must be outside the OR within a semi-enclosed area with ceiling ventilation removing moist air which is generated with potential micro-droplets of water containing undesirable particles such as dead skin or dirt.

As an exception the provision of additional scrub basins inside Endoscopy rooms is permitted due to the nature of the procedure performed.

Operating Units can be designed in a variety of planning models offered in these Guidelines. These models represent the contemporary thinking and practice in operating theatres. The prevention and control of infection in Operating Units requires a multitude of provisions including HEPA filtered operating rooms with specified air changes per hour, scrub facilities for doctors and nurses, sterile stock storage with access to the OR's either directly or via sealed carts.

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. Refer to the Operating Unit guidelines which provide 8 permutations for the relationship of the relevant rooms, which result in different practices in the movement of instruments to and from the OR's.

Nothing in these Guidelines mandates the designation of "Dirty Corridors" in Operating Units. However, there are distinct functions within the unit which are regarded as clean or dirty. Between such rooms, the control of the spread of infection is via the air pressurisation regime and the movement of items in hermetically sealed carts.

Nothing in these Guidelines prevents the partial re-circulation of the air for OR via HEPA filters. So, 100% fresh air is not a requirement of these Guidelines and in some circumstances may not even be desirable.

Day Surgery, Catheter Labs and Endoscopy may be operationally integrated with Operating Theatres provided that they comply with the relevant provisions included in the FPU's.

For greater details and the planning models refer to the Operating Unit FPU.

Instrument Processing including Sterile Supply Unit

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 the 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. The transfer should be via hermetically sealed carts. In the case of surgical instruments, they may be pre-rinsed before transportation.
Waste disposal	Non-recyclable items are disposed of appropriately. This should be via a double-bagging process. The bags should be kept in medical waste bins which are ideally lockable.
Decontamination area	All recyclable articles (including delivery trolleys) are sorted, rinsed, ultrasonically cleaned or mechanically washed and dried. Transportation trolleys used for this purpose should also be cleaned separately, held in a clean area and re-used.
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. The cooling process may generate steam which must be evacuated by the facility ventilation system to prevent the growth of mould on the adjacent ceilings.
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. This area needs to be dry and as such a moisture detector should be installed for verification.
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 (if any) on a loan basis should be provided. Dispatch may be direct via dedicated lifts or via hermetically sealed carts via the facility corridors and service lifts.
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 workspace 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.

Re-processing facilities for Endoscopy may be provided separately from the sterilising facilities for Operating Theatres as the process is different and fast turn-around time is expected. However, if preferred such facilities can also be provided back-to-back with Sterile Supply Unit (SSU) provided that the activity path is not mixed with the sterile instruments. Please refer to the Sterile Supply Unit FPU.

Both functional and decontamination areas should have:

- Adequate lighting to minimise the risk of injury and enable inspection of cleaned areas and equipment
- Good ventilation to reduce the risk of cross-infection from aerosols
- Smooth impervious work surfaces made from non-porous materials without crevices
- Slip resistant or non-slip, water-impervious 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 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 sinks or troughs 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
- Taps fitted with anti-splash devices to prevent splashing
- Filters are fitted to taps in place of anti-splash devices; filters should be cleaned regularly
- Disinfectant/ washer(s) and Sterilisers as required

Also refer to Part B – Sterile Supply Unit in these Guidelines for multiple planning models and the details of the Unit.

Staff Facilities

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

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.

Public Areas

Public areas of healthcare facilities which are completely separated from patient movements are not subject to these guidelines. However any public area where patients may also pass, for example at the time of admission or discharge or transfer within the facility are subject to these guidelines.

In such public areas such as in Lobbies, Waiting areas, Coffee Shops etc, there should be no water features, organic plants or soil. These can harbour bacteria, spores, protozoa, mould and dust. They are extremely difficult to control and keep clean. So they should be prevented. The use of sealed Aquariums is permitted subject to strict maintenance protocols.

If planting within public areas is seen as desirable, they should be kept behind a glass wall and separately ventilated.

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, 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.

For the treatment of patients with air-borne diseases such as COVID-19, SARS, MERS, tuberculosis, chicken pox and measles where there are risks 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 2 isolation room per every 30 beds) with adequately filtered air-conditioning and external exhaust systems. No recirculation of air should be permitted from such isolation rooms.

Refer to Part E of these guidelines and each of the FPU's for further reference.