1. General Principles

1.1 Risk Management

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, patient escorts, 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 formalised risk management methodology that includes sound infection control procedures should result in an improved overall outcome, with minimised risks to patients and health facility staff.

1.2 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.

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.

1.3 Work Flows

1.3.1 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.

1.3.2 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:

Department or Functional Planning Unit (FPU)	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	Sterile Stock is 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	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.

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

1.3.4 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 supplies to be transported in sealed trolleys.

If the single corridor design model is adopted, then the sterile instruments and supply should be transported to the OR via sealed carts. Similarly, the removal of waste and used instruments should be via separate sealed carts to clean-up rooms, SSU and disposal rooms.

1.4 Air-Conditioning

Health facility 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 for all areas of the building. Critical areas as identified under **Part E – Engineering Services** of these Guidelines should be provided with backup cooling and power.

Air conditioning in Sterile Supply Units should comply with **Part E – Engineering Services** of these Guidelines.

Where there is a risk of airborne transmission of pathogens, there should be a sufficient number of single rooms (minimum of 2 isolation rooms in every 60 beds) with adequately filtered air-conditioning and external exhaust systems. No recirculation of air should be permitted. Clinical planning to determine these requirements.

Negative pressure ventilation should be made available in accordance with these Guidelines for patients infected with tuberculosis (TB), chicken pox, measles, SARS and MERS.

Refer to **Part E – Engineering Services** of these guidelines for further information.

1.5 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 or similar infection, 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 – Engineering Services** for Bronchoscopy room design.

All standard Operating Rooms (ORs) or Procedure Rooms are required to be positive pressure rooms, relative to any adjacent area except the attached Sterile Stock/ Set-up Rooms. The pressure gradient must provide an airflow direction from the OR to the surrounding areas.

Relative pressure gradients are represented diagrammatically below:

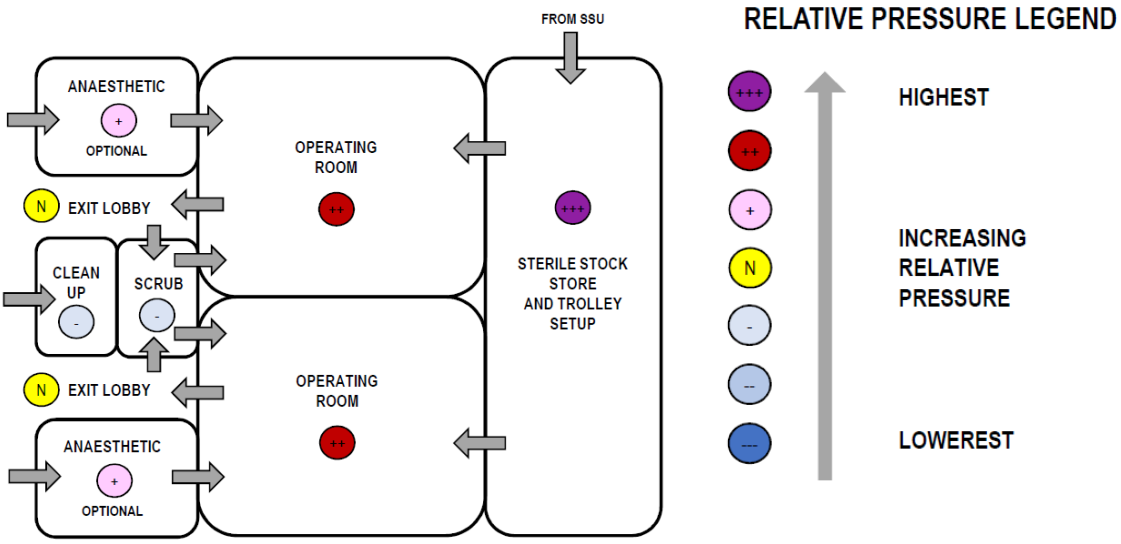

Figure 1: Pressure Gradients for Operating Rooms and surrounding support rooms

In all cases, terminal filters at the point of entry to the OR should be HEPA filters, with provision for testing filter integrity from the room side. HEPA filters should be housed in special housing 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, 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.

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 circumstances and its usage should be restricted to minimal.

1.6 Separation of Decontamination Areas

Separate and clearly defined decontamination areas from other functional 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.

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.

Functional areas can be categorised as extreme, high, medium and low risk. The classification of the spaces 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 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-imperious flooring with sealed joints
- Correct bins for the disposal of hazardous waste

Decontamination areas should be divided into separate functional zones for the progressive decrease of contamination towards a relatively clean but not sterile condition. 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 requirements of these Guidelines 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 non-refillable 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 mechanical disinfector/ washer as required
- a first-aid kit to be provided in the decontamination room

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