

Part B – Health Facility Briefing & Design
130 Intensive Care Unit - General



iHFG

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1 Executive Summary

This Functional Planning Unit (FPU) covers the requirements of the Intensive Care Unit (ICU). ICU is part of a broader category of facilities referred to as “Critical Care”. Other Critical Care types are covered by separate FPU’s within these Guidelines, such as High Dependency Unit (HDU), Coronary Care Unit (CCU) and Neonatal Intensive Care Unit (NICU). This FPU also covers the requirements of Paediatric Intensive Care Unit (PICU) which may be merged or back-to-back with the adult ICU.

Intensive Care is a dedicated Critical Care unit for the support, monitoring and treatment of critically ill patients who require invasive life support, high levels of medical and nursing care and complex treatment. Patients in the general ICU include adults of all ages, acuity, frailty and all levels of disability. ICU is also increasingly dealing with patients with co-morbidities such as obesity, diabetes and renal dysfunctions. In smaller hospitals with a lower Role Delineation Levels ICU is typically combined with other critical care units such as High Dependency Unit (HDU), Paediatric Intensive Care Unit (PICU) or Coronary Care Unit (CCU) to save on space whilst sharing staff and support facilities.

A step-down ICU is referred to as HDU and is physically identical to ICU, however with different levels of nursing (1:1 for ICU vs 2:1 for HDU). Units at RDL 3 are likely to be HDU. At higher RDLs ICU and HDU may be provided back-to-back in the same area whilst providing the appropriate level of nursing. ICU and HDU are provided in a hospital setting and rely on the availability of other hospital resources.

The Burns Unit is a special type of ICU with all positive pressure isolation rooms and different support rooms. A Bone Marrow Transplant Unit also has some similarities with ICU. Both of these Units have been provided as separate FPU’s within these Guidelines.

General ICU may be further sub-specialised for Medical, Surgical or Cardiac Surgery. These are then referred to as MICU, SICU or CSICU. The facility requirements remain the same as those of this FPU. However the staff may be further specialised in the relevant field.

The Functional Relationship Diagrams provided indicate the ideal external relationships with other key departments and hospital services. This includes relationships with Emergency Unit, Operating Unit, Inpatient Units, Diagnostic units (such as Medical Imaging and Laboratory) and clinical support units such as Pharmacy and Biomedical Engineering. Optimum internal relationships are demonstrated in the Functional Relations Diagram according to the functional zones whilst indicating the important paths of travel and requirement for observation.

An ICU room within these Guidelines is a fully enclosed room with a glazed front for good observation. The older style ICU with privacy curtain separation is now regarded as HDU. However, HDU can also be designed in identical manner to ICU. In such a case the HDU will only require the upgrading of the nursing ratio to be regarded as a full ICU.

Design Considerations address a range of important issues including visibility, finishes, clearances and building services requirements. The Schedules of Accommodation are provided using references to Standard Components (typical room templates) and quantities for typical units at Role Delineation Levels (RDL) 3 to 6 with 4, 8, 12 and 24 bed examples. The actual number depend on each facility’s service plan.

Further reading material is suggested at the end of this FPU but none are mandatory.

2 Introduction

Intensive Care is a dedicated unit for critically ill patients who require invasive life support, high levels of medical and nursing care and complex treatment. The intensive care unit provides a concentration of clinical expertise, technological and therapeutic resources which are coordinated to care for the critically ill patient.

3 Functional and Planning Considerations

Operational Models

The level of Intensive Care available should support the delineated role of the particular hospital. The role of a particular ICU will vary, depending on staffing, facilities and support services as well as the type and number of patients it has to manage.

There are a number of operational models applicable to intensive care units. These and some special requirements are covered below.

Combined Critical Care

Intensive Care is part of a broader category of FPU's referred to as Critical Care. The Combined Critical Care may include an Intensive Care Unit (ICU), High Dependency Unit (HDU), Paediatric Intensive Care Unit (PICU) and/ or Coronary Care Unit (CCU), often located in a variety of hospital settings where flexibility of bed and staff utilisation is important. This will allow patients to be managed in a flexible environment based on the fluctuation of demand and patient types encountered. In larger and busier facilities, the different categories of Critical Care are separated, forming individual, dedicated FPU's.

Combined General Intensive Care

In this model the Intensive Care consists of all patient specialties such as cardiothoracic surgery, orthopaedics, neurosurgery, and general medical patients. These Units will usually have a combination of Intensive Care (ICU) and High Dependency (HDU) beds.

This model may be adopted where there are limited numbers of sub-specialty critical patients. The disadvantage of this model is that if the general intensive care is fully occupied, critical sub-specialty cases may need to remain in standard inpatient units for treatment.

In larger and busier facilities, the different categories of ICU may be further sub-divided into discrete units such as Medical ICU (MICU), Surgical ICU (SICU) and Cardiac Surgery ICU (SCICU).

Hot Floor

A comprehensive 'Hot Floor' model may include the back-to-back collocation of ICU with Operating Unit, Emergency, CCU and all or a satellite of Medical Imaging. The Hot Floor model has the principal advantage of collocating services, avoiding duplication, reducing travel distances and potential for a single management structure.

Advantages of the Hot Floor model include:

- Enables standardisation of equipment across the Hot Floor avoiding duplication and minimises service costs
- Assists practitioners particularly medical and nursing to develop expertise in the specialties
- Prevents access blockage to general ICU beds optimising patient throughput
- Allows for a more efficient medical and nursing overview

The disadvantages of a Hot Floor involve:

- The management of a large group of nurses and doctors
- Infection control risks including cross infection of patients in co-located units.

Separate Intensive Care Units

This model covers a range of specialty Intensive Care Units provided as disconnected units in separate locations, with an independent management structure for each unit. Convenient access to the relevant hospital FPU's shown in the Functional Relations Diagrams is required. However, this

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does not imply that the separate ICU must be on a particular level of a hospital, such as the surgical floor.

Advantages of this model include:

- Encourages the development of sub-specialty medical and nursing skills
- Greater control of the operations of the single unit by the staff within the Unit
- Possibly avoiding operational errors

Disadvantages include:

- Duplication of management, policies and procedures
- Physical isolation of units that may make staffing more difficult
- Harder to share any un-used beds with adjoining units

ICU Bed Number Ratios

The overall ICU bed numbers may vary depending on the service plan of the facility. However, as a minimum, ICU beds should be provided at a ratio of 1 ICU bed to 1 Operating Room or 5% of total beds for facilities at RDLs 4, 5 and 6, whichever is greater. At RDL 3, only HDU is required at the same ratios. At RDL 3, the Operating Unit Stage 1 Recovery Beds may count as part of the total HDU numbers required.

In summary, provide the ICU or HDU numbers equal or greater than the following:

- 1 ICU bed for each operating theatres or,
- 5% of total inpatient bed numbers (of all types)

The exceptions to the above requirements are as follows:

- Dedicated Rehabilitation Hospitals or Rehabilitation facilities within hospitals with no surgical services
- Dedicated Mental Health Hospitals or Mental Health facilities within hospitals
- Other specialty hospital types which may not provide any surgical or medical services

Beds should ideally be arranged in groups (or pods) of no more than 12 beds (plus/minus 2), in order to optimize and balance efficiency with size, monitoring and close, patient-focused care. If more than 14 beds are required by the Service Plan, then additional pods or groups should be added, each with a staff station and the required support rooms.

If the service plan requires an ICU with fewer beds than 12, for example 6 beds, the unit will still require all the support rooms mentioned in this FPU.

Isolation Room Requirements

For each ICU pod (12 beds plus/minus 2), at least two negative pressure isolation ICU rooms with ante room should be provided. These isolation rooms will be regarded as part of the total bed count in the pod. For each ICU pod up to 6 beds a single negative pressure ICU room with ante room should be provided. Positive pressure Isolation rooms provision will be subject to the clinical services plan of the hospital and the management policy of the facility. However, the specialty intensive care types covered in other FPU's such as Burns Unit or BMT will have mandatory requirements for Positive Pressure ICU rooms.

Planning Models

The ICU should be in a location that eliminates or minimises:

- Disturbing sounds (ambulances, traffic, sirens)
- Disturbing sights (morgue, cemeteries etc.)
- Problems associated with prevailing weather conditions (excessive wind, sun exposure etc.)

The location and design should ideally consider expansion if additional beds are required in the future.

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A double corridor (racetrack model for the design of ICU is ideal). ICU can be designed within a building width that is appropriate for both ICU and Inpatient Units). So, ICU and IPU can be vertically stacked successfully. For this stacking to work, usually the building width of no less than 3 grids (8400mm per grid) or 25,200 (without façade thickness) is recommended.

In the ideal configuration of an ICU, all beds should be visible from the Staff Station. In larger units where this cannot be achieved, decentralised staff / workstations (also referred to as reporting stations) with computer support should be provided at a minimum ratio of one per two adjoining rooms with direct view.

If ICU can be designed to provide natural light to the bedrooms, it will be ideal. However, the minimum required provision is for 50% of the rooms to have access to natural light.

Functional Areas

The Intensive Care Unit will consist of the following Functional Areas:

- Entry/ Reception/ Waiting Areas
- Gown-up/ Gown-down areas for visitors
- Patient/ Treatment Areas including Patient Rooms and Ensuites
- Support Areas including Staff Station, Clean and Dirty Utility Rooms, medication room, Cleaner's Room, Disposal Room, Store Rooms, Stat Lab, Linen bays, Overnight Stay accommodation, write-up, pantry, handover areas and Biomedical workshop
- Administrative / Office Areas, with Offices, Workstations for a range of clinical staff, Meeting and Interview rooms
- Staff Amenities areas, including Staff Room, Toilets, Shower and Lockers.
- Some of the Functional Areas are specific to each unit and some may be shared with adjoining or collocated Units.

Some of the above zones are briefly described in greater detail below.

Entry/ Reception/ Waiting Areas

As determined by the size of the ICU and hospital operating policy, a Reception and visitor's / relatives' Waiting Areas shall be provided immediately outside the entry to the ICU, but away from patient and staff traffic areas. It is desirable that this area has provision for drinks dispenser, television and comfortable seating. An Interview Room and a separate area for distressed relatives should be available nearby.

The Entry/ Reception Area may be shared between up to 3 closely located ICU Pods or Units depending on the design. Visitors access to the interior of each ICU from the waiting area should be via visitor Gown-up/ Gown-down rooms.

Patient Areas

A number of patient Bedrooms, Isolation rooms and Ensuites will be provided according to the Service Plan. All patient areas are to comply with Standard Components within these Guidelines.

The provision of attached ensuite bathrooms for ICU is permitted and will depend on the operational policies of the individual facilities. Such ensuite bathrooms should be lockable from outside by the staff, so that they can decide whether to permit the patient to use them or not based on safety considerations.

However, the provision of at least one toilet/shower room per 6 ICU beds is required and can be accessed via the corridor from all rooms.

The ICU room size should be sufficient to accommodate the patient, necessary personnel, monitoring facilities, life support equipment and support services with safety considerations. Work surfaces and storage areas must be adequate to maintain all necessary supplies and permit the performance of all desired procedures without the need for staff to leave the room frequently.

ICU bedrooms must be fully enclosed with the corridor side glazed for visibility. Doors within the corridor side glazed wall should also be glazed and may be either swing or sliding type.

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Any bed designated as a dedicated HDU may be provided within semi-open bays, separated by curtains. A hybrid arrangement with solid side walls and curtain on the corridor side is more desirable.

In a combined ICU/HDU, up to 50% of the beds can be provided as HDU with this type of semi-open bay. Isolation rooms must always be fully enclosed and incorporate an anteroom, even in a dedicated HDU.

Consideration should be given to ease of access for patients transported from areas outside the ICU. Therefore, a separate path towards service lifts will be ideal. There should be a strict separation of service lifts (including bed lifts) and public lifts including the lift lobby and connecting corridors.

A separate Procedure Room may be included if required by the Operational Policy of the Unit, located within or immediately adjacent to the Unit. One special Procedure Room may serve several ICUs in close proximity. The Procedure Room requires access for a bed and mobile X-Ray.

In RDL 3 hospitals, ICU beds are automatically regarded as HDU or CCU beds regardless of the enclosed vs semi-open bay arrangement used.

All Patient areas are to comply with Standard Components included in these Guidelines.

Biomedical Workshop

Dependent upon the size and intended use of the ICU, a dedicated electronic and pneumatic equipment maintenance service may have to be accommodated within the hospital or a 24 hour on-call emergency service made available. This same service would cover the Operating, Emergency and Medical Imaging Units.

If a dedicated workshop is provided, its location should be in an area that is equally accessible to all of the above-mentioned departments. The facility should have a degree of sound-proofing and be accessible from a non-sterile area.

Based on the facility's operational policy, the facility a dedicated biomedical workshop may be provided exclusively for the ICU or several nearby ICU pods.

Laboratory Facilities

The ICU must have available 24-hour clinical laboratory services. When this service cannot be provided by the central hospital Laboratory, a satellite laboratory within or immediately adjacent to the ICU must serve this function. The Satellite facilities must be able to provide minimum chemistry and haematology testing, including arterial blood gas analysis.

Overnight Accommodation

On-call rooms shall be provided for the medical staff. On-call rooms may be within the Unit or within a close proximity outside the Unit. Depending upon the availability of nearby commercial accommodation, consideration should be given to the provision of overnight accommodation for relatives and staff. This will be dependent upon the size and intended function of the ICU. A motel type bed-sitter level of provision is recommended.

Storage Areas

Mobile equipment such as cardiopulmonary resuscitation trolleys and mobile X-ray, that are used and located within the ICU, should have storage areas that are out of traffic paths but conveniently located for easy access by staff. Consideration should be given to the ever-increasing amount of equipment used in a typical ICU.

Staff Facilities

Offices / workstations are required for senior staff in full time administrative roles according to the approved positions in the Unit. Offices / workstations for medical staff and some nursing staff (manager/ specialists/ registrars/ educators) may be located as part of the Intensive Care Unit where required for clinical functions or adjacent in an administrative area, to facilitate unit co-ordination, educational and research activities.

A Staff Lounge shall be provided within the unit for staff to relax and prepare beverages. Inclusion of a window to the outside is desirable. A Library/ Reference area with an appropriate range of bench manuals, textbooks and journals for rapid access should be available within the Intensive Care Unit. This resource may also be fully electronic.

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Staff will need close access to the following:

- Toilets and Shower
- Lockers
- Meeting room/s

Functional Relationships

A Functional Relationship can be defined as the correlation between various areas of activity which work together closely to promote the delivery of services that are efficient in terms of management, cost and human resources. Correct Functional Relationships are identified below.

External

It is desirable that the Intensive Care Unit has ready access to:

- Emergency Unit, for urgent admissions
- Operating Unit, for urgent patient transfers
- Coronary Care Unit/ High Dependency Unit
- Inpatient Units for patient transfers
- Medical Imaging, particularly for chest x-rays and CT scanning
- Laboratory Services (also possible via pneumatic tube)
- Inpatient Pharmacy
- Biomedical Engineering, to ensure availability and functioning of monitoring and life support equipment
- Mortuary
- Helipad (if provided)

Important and desirable External functional relationships outlined in the diagram include:

- Entry for visitor directly from dedicated lifts and public corridor
- Visitor access to the unit only via gown-up and gown-down rooms
- Bed access to/ from key clinical units associated with patient arrivals and transfers via service corridor
- Entry for staff via public or service corridor
- Separate service access for biomedical engineering, materials, catering and housekeeping.

Internal

Optimal internal relationships to be achieved include those between:

- Visitor waiting areas and access to the unit via Gown-up / Gown-down rooms
- Patient occupied areas, forming the core of the unit, which require direct access and observation by staff
- Staff station(s) and associated areas that need direct access and observation of patient areas and ready access to administration areas
- Alternatively, a series of de-centralised Reporting Stations located off the corridor between each pair of ICU rooms for the immediate observation of two bedrooms
- Clinical Support Areas such as Utility and storage areas that need to be readily accessible to both patient and staff work areas
- Shared support areas that should be easily accessible from the units served.

Important and desirable Internal relationships outlined in the diagram include:

- Bed Room(s) on the perimeter arranged in a double corridor racetrack model (although other models are also possible)

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- Staff Station(s) located in such a way as to observe the entry of visitors as well as the surrounding corridors
- Clinical support areas located centrally for ease of staff access
- Administrative areas located at the Unit entry and in staff accessible corridors

4 Design Considerations

Patient Areas

Patients must be situated so that healthcare providers have direct visualisation, with a variety of monitoring, at all times. This approach permits the monitoring of patient status under both routine and emergency circumstances. The preferred design is to allow a direct line of vision between the Staff Station and the patient's head through a glazed corridor wall or doors.

Sliding glass doors facilitate this arrangement and increase access to the room in emergency situations. Swing doors are also possible, but care should be taken so that the door opening does not clash with any element inside the room. Swing doors should also be glazed for visibility.

If sliding doors are provided, they can be manually or electrically operated. Sliding doors should not have a floor track but only overhead track and a mechanism for the door panels to slide against one another with a reasonable seal between the panels.

Where the geometry and the size of the unit does not permit direct observation from the central staff station, then de-centralised reporting stations should be provided between the rooms with direct view of the head of the patient through glass panels. Such reporting stations should be accessed from the corridor rather than inside the room.

Visual privacy is required even as the corridor side of the room is glazed for observation. This may be provided by a privacy curtain behind the glass or through electronic systems commonly referred to as iGlass or Intelligent Glass, where the glass can switch from transparent to opaque.

The patient bed should be floating in the approximate centre of the room, not against a wall.

All services such as electrical, data and medical gases should be provided via ceiling mounted pendants, in a way that both sides of the bed (left and right) can be covered adequately. Wall mounted or column mounted services are not preferred.

The angle of the patient bed is variable as long as the patient's head and face is visible from the staff station or reporting station. It is possible to angle the bed in such a way that the patient has a view to the outside whilst the staff can still observe the patient directly.

For maximum clarity, the use of cameras for patient monitoring as an alternative to direct observation is not acceptable.

Renal Dialysis Facilities

Dialysis machines, including provision for reverse osmosis water and drainage, should be provided to patient bedrooms according to the Unit's Operational Policy. As a minimum, dialysis facilities should be provided in each ICU Isolation Room, plus one per pod outside the isolation room. Ideally the remaining rooms, should have water outlets provided. RO water may be provided via portable dialysis units. Refer to Part E - Engineering Services for details on RO water.

Environmental Considerations

Acoustics

The Intensive Care Unit should be designed to minimize the ambient noise level within the unit and transmission of sound between patient areas, staff areas and public areas. Consideration should be given to the location of noisy areas or activity, preferably placing them away from quiet areas including patient bedrooms and bed bays.

Signals from staff call systems, alarms from monitoring equipment, and telephones add to the sensory overload in critical care units. Without reducing their importance or sense of urgency.

For these reasons, floor coverings that absorb sound such as cushioned vinyl should be considered while keeping infection control, maintenance, and equipment movement needs under consideration.

Notwithstanding the consideration of acoustic design issues, the requirements of infection control and permitted finishes supersede all acoustic considerations. In an Intensive Care room and in the corridors adjoining the rooms, porous surface mounted materials such as typical acoustic drop-in tiles are not permitted. All surfaces must be monolithic with finishes which can be vigorously scrubbed and cleaned.

Any sound isolation between the rooms and through the ceilings should be provided via insulation materials within hollow walls or above the ceilings.

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Acoustic treatment is required to the following:

- Patient Bedrooms and Ensuites
- Interview and meeting rooms
- Procedure rooms (if any)
- Staff rooms
- Change Rooms, toilets and showers.

Natural Light

Natural light and views should be available from the Unit for the benefit of staff and patients. Windows are an important aspect of sensory orientation, and as many rooms as possible should have windows to reinforce day/ night orientation.

As a minimum 50% of ICU/HDU rooms should have direct access to a window. The balance of the rooms/ bays may have accessed to borrowed light via the corridor outside the room. Skylights, light tubes or high-level windows are also acceptable.

Privacy

The design of the Intensive Care Unit needs to consider the contradictory requirement for staff visibility of patients while maintaining patient privacy. Unit design and location of staff stations offer varying degrees of visibility and privacy.

Each bedroom shall be provided with privacy bed screens or iGlass to ensure privacy of patients undergoing treatment in the room. Refer to the Standard Components for examples.

Other factors for consideration include:

- Use of windows in internal walls and/or doors, provision of privacy blinds
- Location of external areas, courtyards or atriums facing bedroom windows to prevent others from viewing into ICU bed and treatment spaces

Interior Décor

Interior decor includes furnishings, style, colour, textures and ambience, influenced by perception and culture. This can help prevent an institutional atmosphere. However, cleaning, infection control, fire safety, patient care and the patients' perceptions of a professional environment should always be considered.

Some colours, particularly the bold primaries and green should be avoided in areas where clinical observation occurs such as bedrooms, treatment areas and corridors. Such colours may prevent the accurate assessment of skin tones e.g. yellow / jaundice, blue / cyanosis, red / flushing.

Space Standards and Components

Accessibility

Ideally there should be a separate and discrete entry or entries for staff, goods and supplies with swipe card or similar electronic access to authorised personnel. Discrete entry for patients on beds or trolleys may also be considered and this should provide:

- Ready access from Emergency Unit, and Operating Unit that may involve transfers via lifts
- Ready access to and from Diagnostic Imaging areas

There should be only one point of public entry overseen by a ward clerk / receptionist during extended daytime hours to:

- Monitor and / or prevent access by visitors depending on the patients' condition
- Advise visitors if patients have been moved or are out of the unit for any reason
- Monitor visiting staff and direct them to the appropriate staff member or patient
- Monitor patient movements in and out of the unit

Door openings to ICU Bedrooms shall have a minimum of 1400mm clear opening to allow for easy movement of beds and equipment.

Bed Spacing/ Clearances

Bed dimensions become a critical consideration in ascertaining final room sizes. The dimensions noted in these Guidelines are intended as minimums and do not prohibit the use of larger rooms where required. It should be noted that ICU beds are wider than normal beds.

Refer to the section under Patient Areas above for the configuration of the patient bed within the ICU room.

In ICU, unlike the configuration of Inpatient Unit bedrooms, the bed is to float in the approximate centre of the room with all services accessible via ceiling mounted pendant(s). Staff must be able to freely circulate around the bed without any interference from cables, tubes and similar obstructions. Therefore, in ICU, the beds should not be placed against the wall.

In ICU rooms a minimum of 1200 mm clearance around both sides and the foot of the bed is recommended.

Safety and Security

The Intensive Care Unit shall provide a safe and secure environment for patients, staff and visitors, while remaining a non-threatening and supportive atmosphere conducive to recovery.

The facility, furniture, fittings and equipment must be designed and constructed in such a way that the users of the facility are not exposed to avoidable risks of injury.

Security issues are important due to the increasing prevalence of violence and theft in health care facilities.

The arrangement of spaces and zones shall offer a high standard of security through the grouping of like functions and the provision of optimum observation for staff. The level of observation and visibility has security implications.

Entrance doors need to be secured to prevent unauthorised access. A video intercom with speech should be provided from entrance and exit door (or the visitor lounge) to main staff reception or staff station, complete with door release button for access control. Security surveillance of the Unit may include CCTV cameras and monitors.

Drug Storage

Drugs prescribed at the hospital should not be stored in the patient bedrooms or bed bays. All drugs should be managed by the responsible nurses via a Medication Room.

Medications may be manually stored and managed, or alternatively automated Medication Management systems may be utilized.

Controlled, semi-controlled or narcotic drugs as per the Country's Laws must be kept in a secure cabinet within the Medication Room with alarm. The room requires controlled staff only access and may include CCTV surveillance.

A refrigerator is required to store restricted substances and must be lockable or housed within a lockable storage area. All drug refrigerators must be alarmed and the signal should be sent to a staff station which is manned at all times.

The Medication Room must have space for parking a medication trolley.

Finishes

The following factors should be considered in the selection of finishes:

- Durability
- Ease of cleaning
- Infection control
- Fire safety
- Acoustic properties
- Movement of equipment; floor finishes should be resistant to marring and shearing by wheeled equipment

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In all areas where patient observation is critical, colours shall be chosen that do not alter the observer's perception of skin colour.

Wall protection should be provided where bed or trolley movement occurs such as corridors, patients' bedrooms, equipment stores, linen storage and treatment areas.

Fixtures, Fittings and Equipment

Bedside monitoring equipment should be located to permit easy access and viewing, and should not interfere with the visualisation of, or access to the patient. The bedside nurse and/or monitor technician must be able to observe the monitored status of each patient at a glance. This goal can be achieved either by a central monitoring station, or by bedside monitors that permit the observation of more than one patient simultaneously. Neither of these methods are intended to replace direct bedside observation.

Weight-bearing surfaces that support the monitoring equipment should be sturdy enough to withstand high levels of strain over time. It should be assumed that monitoring equipment will increase in volume over time. Therefore, space and electrical facilities should be designed accordingly.

Clocks

An analogue clock/s with a second sweep hand shall be provided and conveniently located for easy reference from all bed positions and the Staff Station.

Window Treatments

Window treatments should be durable and easy to clean. Within ICU, window curtain or blinds with horizontal blades may not be utilised. Vertical blinds, hollands blinds and venetian blinds (within double glazing) may be utilised.

Building Service Requirements

Mechanical Services (HVAC)

The unit shall have appropriate air conditioning that allows control of temperature, humidity and air change.

Refer to Part E of these Guidelines for the specific requirements for Mechanical and Electrical provision.

Electrical Services

Provide the required electrical services and outlets by quantity and type as shown in the Standard Components for the required rooms within the ICU. These constitute the briefing requirements for the electrical services required for ICU.

The number and type of electrical sockets may at first appear excessive. However, operational practice has shown that they are required and cannot be compromised.

Refer to Part E of these Guidelines for the specific requirements of Electrical Services including backup generators, distribution etc.

Public Health Services (Hydraulic and Plumbing)

Provide the necessary public health services within ICU, which include hot, cold and warm water and drainage to various sanitary fixtures and equipment within the unit.

Refer to Part E of these Guidelines for the specific requirements of Public Health Services.

Medical Gases

Provide the Medical Gas outlets required by quantity and type as shown in the Standard Components for the patient rooms and optional procedure rooms. These constitute the briefing requirements for the Medical Gas services required for ICU.

Information Technology (IT) and Communications

It is vital to provide reliable and effective IT/ Communications service for efficient operation of the Unit. The following items relating to IT/ Communication shall be addressed in the design of the Unit:

- Electronic patient records – Patient information systems

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- Electronic forms and requests (e.g. scripts and investigative requests)
- Picture archiving communications systems (PACS)
- Telephones including cordless and mobile phone/ DECT
- Computers and hand-held computers
- Paging for staff and emergencies
- Duress systems
- Bar coding for supplies, x-rays and records
- Wireless network requirements
- Videoconferencing requirements
- Communications rooms and server requirements.

Nurse/ Emergency Call/ Staff Call

Nurse and Emergency Call facilities shall be provided in all patient and treatment areas in order for patients and staff to request for urgent assistance.

The individual call buttons shall alert to an annunciator system. Annunciator panels should be located in strategic points within the circulation area, particularly Staff Stations, Staff Rooms, and Meeting Rooms and should be of the “non-scrolling” type, allowing all calls to be displayed at the same time. The audible signal of these call systems should be controllable to ensure minimal disturbance to patients at night. The alert to staff members shall be done in a discreet manner at all times.

Pneumatic Tube Systems

It is highly desirable, although not mandatory to provide a Pneumatic Tube System (PTS) within the ICU.

Typically, the PTS will be located close to the Staff Station, within an alcove. PTS can be used for the transfer of samples to the Laboratory, various forms of paper or drugs from the Inpatient Pharmacy, to name a few.

Infection Control

Handbasins

Clinical Hand-washing Facilities shall be provided convenient to the Staff Station and patient bed areas. The ratio of provision shall be one clinical hand-washing facility for every two patient beds in open-plan HDU areas and one in each patient Bedroom in ICU.

Hand wash basins should also be provided in the corridors for use by doctors, nurses, cleaning, housekeeping and transport staff. At least one of the hand wash basins must be at or near the staff station. The total ratio of hand wash basins in the corridors should be no less than one per 4 beds.

The hand wash basins in the corridors should be type A or B. The hand wash basins in the patient rooms or bays or procedure rooms should be type A.

Antiseptic Hand Rubs

Antiseptic hand rubs should be located so they are readily available for use at points of care, at the end of patient beds and in high traffic areas.

The placement of antiseptic hand rubs should be consistent and reliable throughout facilities. Antiseptic hand rubs are to comply with part D – Infection Control, in these guidelines.

Antiseptic Hand Rubs, although very useful and welcome, cannot fully replace Hand Wash Bays. Both are required.

Isolation Rooms

Refer to the section under Functional Planning Considerations above for the minimum number of negative pressure isolation rooms.

Entry to each Isolation room shall be through an airlock (or anteroom). Clinical hand-washing, gown and mask storage, and waste disposal shall be provided within the airlock.

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The pressurisation of the isolation ICU room and the airlock must be monitored and displayed on a device on the corridor side. The monitor must have audible and visible alarm.

The pressure regime for the negative pressure isolation ICU room and airlock should be based on the following:

Corridor	(N) Neutral
Airlock	(-) Negative
ICU room	(--) Negative
Ensuite	(---) Negative

An Ensuite - Special, directly accessible from the Isolation Room, shall be provided for every isolation room, negative or positive.

Positive Pressure isolation ICU rooms will depend on the operational policy of the facility and the clinical assessment of the patient types expected.

The pressure regime for the positive pressure isolation ICU room and airlock should be based on the following:

Corridor	(N) Neutral
Airlock	(+) Positive
ICU room	(++) Positive
Ensuite	(N) Neutral (Negative against the ICU room)

Also refer to Parts E and D of these Guidelines.

5 Components of the Unit

Standard Components

The Intensive Care Unit will consist of Standard Components to comply with details described in these Guidelines.

Standard Components are typical rooms within a health facility, each represented by a Room Data Sheet (RDS) and a Room Layout Sheet (RLS).

The Room Data Sheets are written descriptions representing the minimum briefing requirements of each room type, described under various categories:

- Room Primary Information; includes Briefed Area, Occupancy, Room Description and relationships, and special room requirements).
- Building Fabric and Finishes; identifies the fabric and finish required for the room ceiling, floor, walls, doors, and glazing requirements.
- Furniture and Fittings; lists all the fittings and furniture typically located in the room; Furniture and Fittings are identified with a group number indicating who is responsible for providing the item according to a widely accepted description as follows:

Group	Description
1	Provided and installed by the Builder/ Contractor
2	Provided by the Client and installed by the Builder/Contractor
3	Provided and installed by the Client

- Fixtures and Equipment; includes all the serviced equipment typically located in the room along with the services required such as power, data and hydraulics; Fixtures and Equipment are also identified with a group number as above indicating who is responsible for provision.
- Building Services indicates the requirement for communications, power, Heating, Ventilation and Air conditioning (HVAC), medical gases, nurse/ emergency call and lighting along with quantities and types where appropriate. Provision of all services items listed is mandatory.

The Room Layout Sheets (RLS's) are indicative plan layouts and elevations illustrating an example of good design. The RLS indicated are deemed to satisfy these Guidelines. Alternative layouts and innovative planning shall be deemed to comply with these Guidelines provided that the following criteria are met:

- Compliance with the text of these Guidelines.
- Minimum floor areas as shown in the schedule of accommodation.
- Clearances and accessibility around various objects shown or implied.
- Inclusion of all mandatory items identified in the RDS.
- The Intensive Care Unit consists of Standard Components to comply with details described in these Guidelines. Refer also to Standard Components Room Data Sheets (RDS) and Room Layout Sheets (RLS) separately provided.

Standard Components have considered the required design parameters described in these Guidelines. Each FPU should be designed with compliance to Standard Components - Room Data Sheets and Room Layout Sheets, nominated in the Schedules of Accommodation (SOA) of this FPU.

Non-Standard Components

Non-standard rooms are rooms are those which have not yet been standardised within these Guidelines. As such there are very few Non-standard Rooms. These are identified in the Schedules of Accommodation as NS.

Bay - Pneumatic Tube

The Bay - Pneumatic Tube should be located at the Staff Station/s under the direct supervision of staff for urgent arrivals. The location should not be accessible by external staff or visitors. Requirements include:

- The bay should not impede access within staff station areas

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- Racks should be provided for pneumatic tube canisters
- Wall protection should be installed to prevent wall damage from canisters

6 Schedule of Equipment (SOE)

This Schedule of Equipment (SOE) below lists the major equipment required for the key rooms in this FPU.

Room Name		
Patient Bay - Intensive Care, Room Code (pbc-24-i), Patient Bay - Critical (Enclosed); Class N Isolation, Room Code (1br-icu-25-i similar)		
Air flowmeter	Infusion pump: single channel	Sequential compression unit (may be shared)
Bed: ICU, electric	Infusion pump: syringe	Suction adapter
Chair: recliner, electric	Light: procedure (may be part of supply unit/ pendant)	Supply unit: ceiling
Haemodialysis unit: CRRT (optional or haemodialysis unit)	Monitor: physiologic, critical care	Ventilator: adult/ paediatric
Infusion pump: enteral feeding	Oxygen flowmeter	
Patient Bay - High Dependency, Room Code (pb-hdu-24-i)		
Air flowmeter	Infusion pump: single channel	Sequential compression unit (may be shared)
Bed: ICU, electric	Infusion pump: syringe	Suction adapter
Chair: recliner, electric	Light: procedure (may be part of supply unit/ pendant)	Supply unit: ceiling
Haemodialysis unit: CRRT (optional or haemodialysis unit)	Monitor: physiologic, critical care	Ventilator: adult/ paediatric
Infusion pump: enteral feeding	Oxygen flowmeter	

7 Schedule of Accommodation

The Schedule of Accommodation (SOA) identifies the rooms required in the Unit along with the quantity and the recommended room area. The sum of these room areas is the Sub Total and Total Departmental areas with a recommended circulation percentage. The circulation percentage represents the area required for internal corridors and is a target for efficient planning. SOAs and room sizes are developed for typical units and are organized into the functional zones applicable to the Unit. Not all rooms identified are mandatory requirements and optional rooms are indicated. Quantities of rooms may need to be proportionally adjusted to suit the desired unit size and service needs.

The Schedules of Accommodation are developed for particular levels of service known as Role Delineation Level (RDL) and numbered from 1 to 6 (including in-between numbers such as 4-5). Level 1 represents uncomplicated health facilities, ascending to level 6 representing complex specialist services and hospitals. Refer to the full Role Delineation Framework in these guidelines for a full description of the RDL's identified. RDL Levels not listed are not applicable for this service.

The Schedule of Accommodation for typical ICUs at RDL Levels 4 to 6 with 8, 12 and 24 beds is as follows. RDL 3 facilities are likely to include a High Dependency Unit (HDU) that may be collocated with another unit. The Schedule of Accommodation lists generic spaces that form an Intensive Care Unit. Quantities and sizes of some spaces need to be determined in response to the service needs of each unit on a case by case basis.

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Intensive Care Unit – General at Role Delineation Levels 3 to 6

Room/ Space	Standard Component Room Codes	RDL 3 Qty x m ² 4 Bed HDU			RDL 4 Qty x m ² 8 Beds			RDL 5 Qty x m ² 12 Beds			RDL 5/6 Qty x m ² 24 Beds			Remarks
Entry / Reception														
Reception/ Clerical	recl-10-i recl-12-i				1	x	10	1	x	12	1	x	12	
Waiting	wait-15-i wait-20-i wait-30-i	1	x	15	1	x	20	1	x	20	1	x	30	1.2 m ² per person; 1.5 m ² per wheelchair
Waiting - Family	wait-20-i wait-25-i wait-50-i	1	x	20	1	x	20	1	x	25	1	x	50	
Meeting Room	meet-12-i meet-l-15-i				1	x	12	1	x	15	1	x	15	
Toilet - Public	wcpu-3-i	2	x	3	2	x	3	2	x	3	2	x	3	May share public amenities if located close
Gown Up/ Gown Down facility	gw-up-i similar gw-dn-l similar	2	x	6	2	x	8	2	x	10	2	x	10	Mandatory for parents and visitors
Patient Areas														
Patient Bay – High Dependency	pb-hdu-24-i	3	x	24	3	x	24	5	x	24	10	x	24	This is the open bay with curtain separation used for HDU
1 Bedroom – Intensive Care	1br-icu-25-i				3	x	25	5	x	25	10	x	25	This is the standard ICU room
Patient Bay - Critical (Enclosed); Class N Isolation	1br-icu-25-i similar	1	x	25	2	x	25	2	x	25	4	x	25	Negative pressure isolation room. locate away from Unit entrance
Anteroom	anrm-i	1	x	6	2	x	6	2	x	6	4	x	6	For negative pressure isolation rooms
Ensuite - Super	ens-sp-i	2	x	6	3	x	6	4	x	6	9	x	6	One ensuite for each isolation room. The balance shared by all other bedrooms at the ratio of one per 6 beds
Support Areas														
Bathroom	bath-i	1	x	16	1	x	16	1	x	16	1	x	16	Inclusion depends on operational policy of unit
Bay - Beverage	bbev-op-i bbev-enc-i	1	x	5	1	x	5	1	x	5	1	x	5	
Bay - Blanket Warmer	bbw-i	1	x	1	1	x	1	1	x	1	1	x	1	Optional
Bay - Handwashing, Type A	bhws-a-i	1	x	1	2	x	1	3	x	1	4	x	1	At entry to the Unit and in Corridors
Bay - Linen	blin-i	1	x	2	1	x	2	2	x	2	2	x	2	
Bay - Mobile Equipment	bmeq-4-i	1	x	4	1	x	4	2	x	4	2	x	4	
Bay - Pathology	bpath-i similar	1	x	1	1	x	2	1	x	4	1	x	4	

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Room/ Space	Standard Component Room Codes	RDL 3 Qty x m ² 4 Bed HDU			RDL 4 Qty x m ² 8 Beds			RDL 5 Qty x m ² 12 Beds			RDL 5/6 Qty x m ² 24 Beds			Remarks
Bay - PPE	bppe-i	1	x	1.5	1	x	1.5	1	x	1.5	4	x	1.5	As required, may be combined with Bay-Handwashing
Bay - Resuscitation Trolley	bres-i	1	x	1.5	1	x	1.5	1	x	1.5	1	x	1.5	
Cleaners Room	clrm-6-i	1	x	6	1	x	6	1	x	6	1	x	6	Smaller units may share with a collocated unit
Clean Utility/ Medication	clur-12-i clum-14-i	1	x	12	1	x	12	1	x	14	2	x	14	Medication room may be separate
Dirty Utility	dtur-10-i dtur-12-i dtur-14-i	1	x	10	1	x	12	1	x	14	2	x	14	
Disposal Room	disp-8-i disp-10-i	1	x	8	1	x	8	1	x	10	1	x	10	Inclusion depends on unit size & waste operational policies
Equipment Clean-up	ecl-8-i	1	x	8	1	x	8	1	x	8	1	x	8	Room size according to service requirements
Office - Clinical Workroom	off-clw-i similar	1	x	10	1	x	15	1	x	15	1	x	20	Locate near staff station
Pantry	ptry-k				1	x	8	1	x	8	1	x	8	Optional
Reporting Station	rpst-2-i	2	x	2	4	x	2	6	x	1	12	x	2	De-centralised reporting stations between bedrooms or bays. Provide one per two bedrooms or bed bays if there is no direct observation from the Staff Station to the bed.
Respiratory/ Biomedical Workroom	rewm-i similar							1	x	20	1	x	20	Inclusion depends on operational policy of unit
Staff Station	sstn-12-i sstn-18-i sstn-20-i	1	x	12	1	x	18	1	x	20	2	x	20	
Store - Drugs	stdr-5-i stdr-10-i	1	x	5	1	x	10	1	x	10	1	x	10	Optional
Store - Equipment	steq-10-i steq-15-i steq-30-i	1	x	10	1	x	15	1	x	15	1	x	30	May be subdivided
Store - General	stgn-12-i stgn-16-i stgn-30-i	1	x	12	1	x	16	1	x	16	1	x	30	
Store - Respiratory	steq-20-i										1	x	20	Inclusion depends on operational policy of unit
Store - Sterile Stock	stss-12-i similar stss-24-i	1	x	6	1	x	12	1	x	24	2	x	24	
Staff Areas														
Bay - Beverage	bbev-op-i bbev-enc-i				1	x	5	1	x	5	1	x	5	Optional, near Meeting Room/s
Change - Staff (Male/Female)	chst-10-i chst-20-i chst-25-i	2	x	10	2	x	14	2	x	20	2	x	25	Toilets, Shower and Lockers; size dependent on staffing numbers
Meeting Room	meet-l-15-i meet-l-25-i	shared			1	x	15	1	x	25	2	x	25	Quantity and size dependent on Service Plan

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Room/ Space	Standard Component Room Codes	RDL 3 Qty x m ² 4 Bed HDU			RDL 4 Qty x m ² 8 Beds			RDL 5 Qty x m ² 12 Beds			RDL 5/6 Qty x m ² 24 Beds			Remarks
Office - Single Person, 12 m ²	off-s12-i							1	x	12	1	x	12	Note 1; Director/ Service Manager
Office - Single Person, 9 m ²	off-s9-i	1	x	9	1	x	9	1	x	9	2	x	9	Note 1; Unit Manager
Office - Single Person, 9 m ²	off-s9-i	1	x	9	1	x	9							Note 1; Staff Specialists
Office - 2 Person, Shared	off-2p-i							1	x	12	1	x	12	Note 1; Nurse Educators, Staff Specialists, Clinicians
Office - Workstation/s	off-ws-i	1	x	5.5	2	x	5.5	4	x	5.5	8	x	5.5	Note 1; Registrars, Nursing, Secretarial
Overnight Stay - Bedroom	ovbr-i							1	x	10	2	x	10	Optional
Overnight Stay - Ensuite	oves-i							1	x	4	2	x	4	Optional
Staff Room	srm-15-i srm-20-i srm-35-i	1	x	15	1	x	15	1	x	20	1	x	35	May be shared
Store - Files	sfts-10-i										1	x	10	Optional, depends on record storage operational policy
Store - Photocopy/ Stationery	stps-8-i stps-10-i	1	x	8	1	x	8	1	x	10	1	x	10	
Sub Total		364.5			570			790			1392.5			
Circulation %		40			40			40			40			
Area Total		510			798			1106			1950			

Note 1: Offices to be provided according to the number of approved full time positions within the Unit

Please note the following:

- Areas noted in Schedules of Accommodation take precedence over all other areas noted in the FPU.
- Rooms indicated in the schedule reflect the typical arrangement according to the Role Delineation.
- Exact requirements for room quantities and sizes will reflect Key Planning Units identified in the Service Plan and the Operational Policies of the Unit.
- Room sizes indicated should be viewed as a minimum requirement; variations are acceptable to reflect the needs of individual Unit.
- Staff and support rooms may be shared between ICU Pods dependant on location and accessibility to each unit and may provide scope to reduce duplication of facilities.
- Units at RDL 3 will be regarded as HDU by default. Higher RDL's may have a mix of ICU and HDU.

8 Further Reading

In addition to iHFG Sections referenced in this FPU, i.e. Part C- Access, Mobility, OH&S and Part D - Infection Control, readers may find the following helpful:

- AHIA, Australasian Health Facility Guidelines, Part B Health Facility Briefing and Planning, Intensive Care - General, Rev 6, 2016; refer to website: <https://healthfacilityguidelines.com.au/health-planning-units>
- Guidelines for Design and Construction of Hospitals and Outpatient Facilities; The Facility Guidelines Institute, 2014, refer to website www.fgiguide.com
- DH (Department of Health) (UK) Health Building Note 57: Facilities for critical care, 2003, refer to www.estatesknowledge.dh.gov.uk