Australasian Health Facility Guidelines

Part B - Health Facility Briefing and Planning
0360 - Intensive Care - General

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Australasian Health Facility Guidelines

Address: PO Box 1060, North Sydney NSW 2059
Website: http://www.healthfacilityguidelines.com.au
Email: webmaster@healthfacilityguidelines.com.au

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01 INTRODUCTION

01.01 Preamble

PURPOSE OF GUIDELINE
This Health Planning Unit (HPU) has been developed for use by the design team, project managers and end users to facilitate the process of planning and design.

The Intensive Care Unit HPU was originally developed for NSW Health and issued for Australasian use in 2006. This revision has been informed by an extensive consultation process that was completed in 2013.

01.02 Introduction

GENERAL
This HPU outlines the specific requirements for the planning and design of an Intensive Care Unit (ICU), including a Paediatric Intensive Care Unit (PICU).
This document should be read in conjunction with AusHFG generic requirements described in:

- Part A: Introduction and Instructions for Use;
- Part B: Section 80 - General Requirement and Section 90 - Standard Components, Room Data and Room Layout Sheets;
- Part C: Design for Access, Mobility, OHS and Security;
- Part D: Infection Prevention and Control; and
- Part E: Building Services and Environmental Design.

The College of Intensive Care Medicine (CICM) of Australia and New Zealand has published Minimum Standards for Intensive Care Units (revised 2011). These standards are extensively referenced in this HPU. Refer to College of Intensive Care Medicine of Australia and New Zealand (CICM), 2011, CICM - Minimum Standards for Intensive Care Units IC-1 (2011).

Intensive Care Units provide critical care to patients with life threatening illness or injury. These Units provide a concentration of clinical expertise, technological and therapeutic resources which are coordinated to care for the critically ill patient.
The clinical infrastructure and staff profiles reflect the complex nature of the monitoring and therapeutic interventions undertaken to provide the necessary physiological and psychosocial support required.
Demand for intensive care services continues to increase and the capacity for ‘growth’ and ‘future expansion’ of a service should be considered when planning and designing a new or expanded Unit.

ICUs are part of a broader range of critical care services which include Coronary Care Units (CCU), Neonatal Intensive Care Units (NICU) and High Dependency Units (HDU). With the exception of HDUs, these other services are not described in this document as they are detailed within other HPUs. Refer to:

- Part B: HPU 260 Coronary Care Unit; and
- Part B: HPU 390 Intensive Care - Neonatal/ Special Care Nursery.

The nature and extent of intensive care services may vary greatly from hospital to hospital, and will also rely upon the operational policies for an individual facility. Increasingly, ICUs have extended roles including rapid response teams, outreach/liaison, retrieval services, and central venous catheter and TPN services. These extended roles, where they exist, need to be considered during planning.
Smaller hospitals may provide higher levels of critical care in the form of high dependency beds, within or attached to general inpatient units.
Where paediatric intensive care services are collocated within an adult ICU, these beds are ideally separated within the Unit. The provision of PICU as part of a children’s hospital will generally be provided as a stand-alone unit.

01.03 Policy Framework

SPECIFIC POLICIES/GUIDELINES
Project teams will also need to consider local jurisdictional policies as these requirements may vary or differ from the information contained in this HPU. The Further Reading section of this HPU provides some guidance towards this jurisdiction-specific policy information.
The following publications are also relevant:

- College of Intensive Care Medicine of Australia and New Zealand (CICM), 2011, CICM - Minimum Standards for Intensive Care Units IC-1 (2011); and
- College of Intensive Care Medicine of Australia and New Zealand (CICM), 2010, Recommendations on Standards for High Dependency Units for Training in Intensive Care Medicine IC-13.

01.04 Description

DESCRIPTION OF ICU HEALTH PLANNING UNIT (HPU)
Intensive Care Unit
An ICU is a specially staffed and equipped, separate and self-contained area within a hospital for the management of patients with life-threatening or potentially life-threatening, and reversible or potentially reversible organ failure. The ICU provides resources for the support of patients and their families, and utilises the specialised skills of medical, nursing and other staff experienced in the management of critically ill patients.
These skills and resources, necessary to care for the critically ill, are most efficiently concentrated in one area of the hospital.

High Dependency Unit
An HDU is a specially staffed and equipped unit or area of an ICU that provides a level of intermediate care between intensive care and general inpatient care. In practice, beds are usually integrated within an ICU rather than provided as a separate unit so that specialty skills are maintained and patient transfers are reduced.

Paediatric Intensive Care Unit
A PICU is a separate and self-contained service provided by selected tertiary referral centres that may be collocated with an adult ICU and capable of providing comprehensive critical care including complex multi-system life support for an indefinite period to children less than 16 years of age. Refer to College of Intensive Care Medicine of Australia and New Zealand (CICM), 2011, CICM - Minimum Standards for Intensive Care Units IC-1 (2011).

LEVELS OF SERVICE/ROLE DELINEATION
Descriptions of role delineation and levels of service for ICUs vary among jurisdictions. This HPU references CICM levels.
The level of intensive care services available should support the delineated role of the health service.
The role of the ICU will vary, depending on staffing expertise, facilities and support services as well as the severity of illness and activity data of patients being admitted. The level of service is determined by the type and immediacy of clinical presence and hospital resources together with teaching and research activities; not the standard of care.
The three levels of ICU, along with additional information relating to PICU and HDU, are described in the Appendices.

PATIENT CHARACTERISTICS
General patient characteristics are outlined in the descriptions of service levels. Specific characteristics will vary between individual facilities but may include ventilated and non-ventilated patients; multiple invasive technologies; major surgery such as cardiac, vascular, thoracic, neurology, trauma; organ failure; drug overdose; organ transplantation and other emergency conditions.
Super specialty services may be provided for specialties such as acute spinal injuries, severe burns and cardiac transplantation. Bariatric patients requiring intensive care intervention constitute another group requiring special consideration when admitted to an ICU.

02 PLANNING

02.01 Operational Models

HOURS OF OPERATION
Intensive Care Units provide a 24 hour, seven day per week service.

OPERATIONAL SERVICE MODELS
Optimal facility outcomes are dependent on a clear definition of the operational model that will be used in the future ICU. This model will identify innovations and trends that will need to be accommodated within a new facility.
Four broad approaches to ICU planning are described in this HPU. The model chosen will result from a detailed analysis of unit size and issues of quality, safety and sustainability.

Combined Critical Care
The combined critical care model collocates intensive care, high dependency and coronary care beds in a single unit.
This type of unit is usually located in a rural or regional hospital where flexibility of bed utilisation is important.
The acuity of patients managed in this type of unit is generally lower and is reflected in nurse to patient ratios.

Combined General Intensive Care
Larger hospitals and some tertiary hospitals may combine all patients within a dedicated ICU that will cater for patients with a range of conditions including trauma, neurosurgery, thoracic or cardiothoracic surgery and general medical.
This model offers the advantage that in hospitals where the sub-specialty case load is limited staff are exposed to a general range of intensive care problems. Cross fertilisation of education and protocols allows efficient service provision when caseloads within sub-specialty units are low.

Collocated Sub-Specialty Intensive Care
This model collocates sub-specialty ICUs under a single operational and management structure. The sub-specialties usually encompass cardiothoracic, trauma, neurosurgical and general intensive care. High dependency care may be integrated into each sub-specialty area or provided as a separate pod within the Unit.
This model has the principal advantage of collocating services and avoiding duplication. The single management structure allows for a more efficient medical and nursing cover. This model assumes Unit-wide policies and procedures with support services. Most equipment would be standardised.

Separate Intensive Care Units
This model encompasses a range of differentiated ICUs within a hospital such as a separate general ICU, a separate HDU, a separate Cardiothoracic ICU and a separate Neurosurgical ICU etc.
The model encourages the development of sub-specialty medical and nursing skills but can result in duplication of management structures, policies and procedures. Physical isolation can, at times, make it difficult to adequately resource and relieve staff in the Unit.

GENERAL COMMENTS ON MODELS
Despite the model selected, consideration should be given to future proofing to enable expansion of ICU beds if required. Collocation of a HDU with beds equipped to the same standard as an ICU is one means of achieving this. The service may be an expansion within the ICU or be a unit that can be separated and integrated relevant to activity requirements. By identically equipping HDU beds the future expansion demands of intensive care services can be easily met.

02.02 Operational Policies

GENERAL
The development of operational policies is integral to defining how the unit will operate within a healthcare facility or health service, as well as in relation to adjoining health services from where patients may be referred. They impact on the capital and recurrent costs of a facility and will vary from unit to unit depending on a wide range of factors such as the clinical characteristics of the patients and the defined role of the unit. The cost implications of proposed policies should be fully evaluated to ensure the most cost-effective and efficient design solutions are developed in providing therapeutic and high quality physical environments. Operational policies should be developed for every service as part of the project planning process. For further information refer to AHIA, 2010, AusHFG Part B: Section 80 General Requirements.

ADMISSIONS AND DISCHARGE
Admissions policies will be determined by the level of service and the availability of support services.
Each Unit should have defined policies/guidelines for admission, discharge and referral of patients. Refer to College of Intensive Care Medicine of Australia and New Zealand (CICM), 2011, CICM - Minimum Standards for Intensive Care Units IC-1 (2011).

PATIENT CLINICAL MANAGEMENT
Policies and procedures should be developed to clarify the range of patient management regimes, treatments and procedures performed in the Unit. These will include the management of infectious and dying patients.

VISITOR AMENITIES AND ACCESS
A range of visitor amenities will be provided to support the needs of families and friends including:

- access to interview rooms;
- waiting areas that provide ready access to visitor toilets; and
- access to health information.

In larger Units, general waiting space will be separated from family space.
Patient bed spaces are sized to accommodate visiting family and friends.
Operational procedures and guidelines need to be developed regarding visiting hours, on-site accommodation and access protocols to the Unit.

CLINICAL INFORMATION SYSTEMS
Unit design and operational policies should allow for the introduction of clinical information systems including electronic health records that integrate patient monitoring outputs and medical imaging technology (PACS). The system should have automated audit, data collection and reporting capacity such as ANZICS data base submissions.
Consideration needs to be given as to the method and location of entering and retrieving patient information. This may occur at the bedside, decentralised workstations, mobile units or at staff work stations.

STAFFING
Identify the staff establishment early in the planning process. This will enable the assessment of the work space and amenities required to support staff to deliver services safely and efficiently. These staff may include:

- medical staff such as staff specialists, VMO’s, advanced trainees and junior medical staff;
- nurses such as nursing managers, registered nurses, educators and clinical nurse specialists and consultants;
- equipment manager;
- clinical information system manager;
- allied health staff including, physiotherapist, social workers, and pharmacists;
- administrative staff;
- project officers (e.g. organ and tissue donation coordinators);
- rapid response /liaison team members, and other ICU based services (e.g. central venous access service);
- wards persons/porters;
- research and data management staff;
- environmental services staff; and

- chaplain/ pastoral care providers.

Staff may include the following working as a multidisciplinary team, in either a permanent or visiting capacity. Access to work space in clinical and non-clinical areas is essential.

RAPID RESPONSE TEAMS (RRTs)
An emerging trend is for RRTs that serve the whole hospital, to be located and managed by the ICU. This service may require additional staff, work space and facilities for equipment storage.

EDUCATION, TRAINING AND RESEARCH
Requirements for education, training (including access to advanced clinical simulation) and research will depend on the overall policies of the health service, the level of service and the need to obtain professional accreditation.

02.03 Planning Models

GENERAL PRINCIPLES
The operational model chosen for the HPU will greatly influence the planning model adopted.

UNIT SIZE
There is no international consistency regarding the recommended size of an ICU. An optimal unit size is considered to be between 10 to 16 beds which allows for suitable staffing and a sufficient casemix to develop expertise, experience and training. These beds will include isolation capacity.
Larger units will likely require two or more clusters of beds. Each pod will require access to a range of support spaces that minimises staff travel, supports infection prevention and reduces the potential for cross-infection.

ACUITY ADAPTABLE BED SPACES
An alternative to providing differing bay/ room sizes for intensive and high dependency care is to standardise the space allocation so that it is capable of being used to provide a range of care.
The provision of single rooms provides increasing flexibility to accommodate a range of patients such as the provision of paediatric intensive care beds in an adult ICU rather than a stand-alone pod should bed requirements be low. The literature indicates that single rooms can reduce patient stress and the need for multiple patient transfers. Provision of single rooms will also reduce the risk of infection. As the mortality rate arising from infections within the ICU is much higher than other clinical environments, the use of single rooms is ideal (The Prevalence of Nosocomial Infection in Intensive Care Units in Europe: Results of EPIC Study).
The bed space will be planned to provide clear zone for the patient, staff and visitors. This will ensure that staff can deliver care unimpeded while providing a good level of amenity for family and friends.
For further reading see Vincent JL, Bihari DJ, Suter PM, Bruining HA, White J, Nicolas-Chanoin MH, Wolff M, Spencer RC, Hemmer M., 1995, The Prevalence of Nosocomial Infection in Intensive Care Units in Europe. Results of the European Prevalence of Infection in Intensive Care (EPIC) Study.

PATIENT BED SPACES
Patients may be accommodated in open bed bays with walls and a curtain or enclosed single bed rooms. Adequate area is required for equipment and for unobstructed work area to provide the required clinical care and management. Consideration needs to be made of changing therapeutic and diagnostic practice.
Units expected to provide prolonged ventilation may consider equipping an outdoor space, for example a balcony or courtyard, with piped gases, suction and power points to support a ventilated patient.

PATIENT VISIBILITY
Direct line of sight will be achieved from the staff station (a main or sub-station) to each critical care bay/ room. The upper one third of the patient's bed will be visible. Indirect means such as video monitoring may be used as a supplement. This permits the monitoring of patient status under both routine and emergency circumstances. Non cavity sliding glass doors and partitions facilitate observation and increase access to the room in emergency situations.

02.04 Functional Areas

FUNCTIONAL ZONES
Functional zones may include:

- entrance / reception area;
- patient areas;
- staff areas; and
- clinical and non-clinical support areas.

ENTRANCE/ RECEPTION
This area provides the public entry point to the Unit. The area will provide support facilities for families such as beverage areas, waiting and interview rooms.
The inclusion of a video intercom at the front door linked to the main staff station within the ICU with remote door release should assist with ensuring safe entry and exit to the unit by visitors, particularly after hours when administration staff may not be available.

PATIENT CARE AREA
Patient care areas form the core area of the Unit with all other zones radiating and supporting this clinical space.
The staff station will provide space for charting and central cardiac monitoring, resuscitation equipment, mobile equipment and PACS viewing facilities.
Where a pneumatic tube system is proposed, to deliver pathology and/or pharmaceuticals, early planning will ensure it is located within the staff station area.
Each cluster of beds will have access to the minimum support facilities including staff station and a patient bathroom and/or ensuites. Support facilities may be shared between clusters of beds (e.g. pathology bay, disposal rooms etc.).

STAFF AREAS
The staff areas will be located within close proximity to the patient care areas, while still providing staff with privacy from patient and public areas. Office space, staff amenities, meeting and reception facilities should be provided in line with staffing and jurisdiction office space guidelines.

SUPPORT AREAS – CLINICAL AND NON-CLINICAL
The ICU should provide adequate storage space for the equipment and services required to support patients with increased acuity, complex conditions and the increasing clinical diagnostic and therapeutic interventions that occur simultaneously at the point of care.
This area includes clean and dirty utilities, linen bays, medical imaging viewing areas, point of care pathology, equipment storage areas including rooms and bays. The clean utility and some mobile equipment bays may be located within the patient care areas for easy access.

02.05 Functional Relationships

EXTERNAL
The ICU should be a separate Unit within the hospital with close access to the Emergency Unit, Operating Unit, Medical Imaging Unit and helipad. Discrete transport routes to and from the Operating Unit would be required if the ICU provides recovery facilities for complex surgery e.g. cardiac, neurosurgery etc.
Ready access 24 hours per day is also required between the ICU and other inpatient units as well as ancillary services including pathology, pharmacy and allied health.

INTERNAL
Planning of the ICU is complex and requires the correct relationships to be achieved between the functional zones described previously.

03 DESIGN

03.01 Accessibility

EXTERNAL
Rapid and urgent access is required from Emergency Unit and the Operating Unit to the ICU.

INTERNAL
The following movement of patient, staff, visitors into and out of the Unit should be considered including:

- the ICU is a discrete stand-alone unit that will not be used as a through-traffic area;
- circulation routes for the transfer of critically ill patients in and out of the Unit should be separate from public circulation routes for visitors; and
- alternate travel routes will ideally be provided for patient transfers, staff and the movement of goods and waste.

03.02 Parking

There are no specific parking requirements for ICUs.
Parking arrangements for on-call staff need to be considered to ensure that delays do not occur.
For additional information relating to staff parking, refer to Part C: Section 790, Safety and Security Precautions.

03.03 Disaster Planning

The planning team will consider the role of the Unit in any local, regional or statewide disaster management plans.
Each Unit will have operational plans and policies in place detailing the response to a range of internal and external emergency situations.
For further information refer to:

- Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions; and
- Part B: Section 80 General Requirements.

03.04 Infection Control

GENERAL
The following aspects contribute to the effective infection prevention and control, and are relevant within the context of this service:

- hand hygiene facilities;
- provision for the isolation of infectious patients;
- separation of clean and dirty work flows;
- storage;
- waste management; and
- surface finishes.

An infection control risk assessment should be undertaken prior to concept design planning.
Refer to individual jurisdiction policies and guidelines, and to Part D: Infection Prevention and Control.

ISOLATION ROOMS
An ICU must be capable of the isolation of infectious or immunosuppressed patients. (CICM 2011). Planning teams should consider the need for negative and positive pressure rooms, as well as HEPA filtration to air handling systems.

Requirements for isolation rooms will need to be confirmed through a risk assessment process which will include consideration of the role delineation of the health service and patient profile.
Owing to high mortality rates experienced by ICU patients with infections, single bed rooms are preferred.

HAND HYGIENE
Clinical hand washing facilities should be provided convenient to the staff station and patient bed areas. One clinical hand-washing bay should be provided at every patient bed space and in corridors.
Alcohol based hand rub dispensers should also be provided generally throughout the Unit to supplement hand basins. In particular, these should be located at the Unit entry.

OTHER CONSIDERATIONS
Acuity adaptable patient care spaces reduces the need to relocate patients as their condition changes (e.g. from intensive to high dependency care). This reduces patient movement within the ICU which in turn reduces opportunities for cross infection.

03.05 Environmental Considerations

ACOUSTICS (PATIENT-OCCUPIED AREAS ONLY)
Noise is a constant source of complaint from patients and may compromise patient comfort and recovery. In particular, noise at night may have a negative impact on the ability of patients to sleep.
Confidentiality of patient information should also be protected.
While the use of single bed rooms can significantly reduce the impact of noise, when the doors are closed, staff may not be able to hear the patients when outside the room. This may be overcome by the placement of speakers in the room that are linked to sub-staff stations.
Signals from patient call systems, alarms from monitoring equipment, and telephones should be modulated to a level that will alert staff members, yet be rendered less intrusive.
For further information refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

NATURAL LIGHT
Natural light contributes to a sense of wellbeing for all building occupants including patients, staff and other users. A limited number of research studies suggest a link between greater levels of natural light and improved clinical outcomes.
For these reasons, the use of natural light should be maximised throughout the Unit.
In Units where long-term ventilation is provided, consideration may be given to providing some collocated outdoor space so that patients can send some time outdoors. This space would need to be supported by a medical services panel.

PRIVACY
A major conflict in the design of inpatient accommodation often arises due to the need to ensure that patients and staff can see each other, while also ensuring patient privacy.
Bedrooms and other areas occupied by patients should be designed and configured to give staff the greatest ability to observe patients, particularly unstable or vulnerable patients.

BED SCREENS
Each patient bed space should have provision for visual privacy from casual observation by other patients and visitors. Blinds or curtains should be provided to screen open bed space ends and windows in dividing partitions and bedrooms.

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

SIGNAGE AND WAYFINDING
Consideration needs to be given to the system used in the numbering of patient rooms. The numbering system will facilitate way finding for visitors and staff.
Refer to:

- Part C: Section 750, Signage; and

- Department of Health, NSW, 2009, Technical Series 2 - Wayfinding for Health Facilities.

03.06 Space Standards and Components

HUMAN ENGINEERING
Human engineering covers those aspects of design that permit effective, appropriate, safe and dignified use by all people, including those with disabilities.
Refer to:

- Part C: Section 730, Human Engineering; and
- Part C: Section 790, Safety and Security Precautions.

ERGONOMICS
Patients in ICUs are nursed in beds and require significant, if not total assistance with all activities of daily living. Some strategies that can be used including:

- electric beds so that staff minimise bending and poor posture. Newer beds can be reconfigured electronically to become patient chairs;
- ceiling mounted hoists; and
- provision of mobile equipment bays to accommodate lifting equipment where ceiling mounted hoists are not provided.

Equipment will also be required for the management of bariatric patients. Examples include beds, patient chairs and hoists. Refer to jurisdictional policies regarding issues relating to ceiling mounted hoists and weight allowances.
For more details refer to Part C: Section 730, Human Engineering.

ACCESS AND MOBILITY
The design will comply with AS 1428 -2010 - Design for Access and Mobility (Standards Australia). This would apply to bathrooms, public toilets and ensuites designed for independent wheelchair users including staff. For detailed information refer to:

- Part C: Section 730, Human Engineering; and
- Standards Australia, 2010, AS 1428 (Set) 2010 Design for access and mobility Set (SAI Global).

BUILDING ELEMENTS
Building elements include walls, floors, ceilings, doors, windows and corridors.
For further details refer to Part C: Section 710, Space Standards and Dimensions.

DOORS AND DOORWAYS
Ensure doorways are sufficiently wide and high to permit the manoeuvring of beds, wheelchairs, trolleys and equipment without risk of damage or manual handling injury, particularly in rooms designed for bariatric patients.
All entry points, doors or openings, should be a minimum of 1200mm wide, unobstructed. Larger openings may be required for special equipment, as determined by the operational policy.

BED SPACING / CLEARANCES
There must be adequate clear distance between the bed and any fixed obstruction including bed screens or wall to facilitate resuscitation procedures without restricting movement of staff, beds, and equipment, Generally this requires a minimum cubicle or room width of 4000 mm clear. Beds should be arranged so that there is a minimum clearance of 1200mm to each side and 900mm to the head or foot. The current room layouts for the Patient Bay – Critical, both 20m2 and 25m2, exceed these minimum dimensions.
When an open plan arrangement is provided, a circulation space or aisle of 2200mm minimum clear width should be provided beyond dedicated cubicle space.

CORRIDORS
The size of the basic ICU bed is often enlarged by the addition of monitors, drips and several staff, making movements more difficult than in other areas of the hospital.
Adequate circulation space will be provided for the safe and efficient movement of these trolleys and beds which are large and carry valuable and sensitive equipment, and patients who are severely ill.

These Guidelines provide information on the required corridor widths etc. for health care facilities, see AHIA, 2010, AusHFG Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

WINDOWS

The environment provided should minimise stress to patients and staff. Therefore, natural light and views should be available from the Unit.

Windows are an important aspect of sensory orientation, and as many rooms as possible should have windows to reinforce day / night orientation. If ultrasounds are routinely being performed in the Unit, the ability to blackout a space with curtaining will be needed.

Window treatments should be durable and easy to clean. If drapes or shades are not a viable option, consider the use of tinted glass, reflective glass, exterior overhangs or louvres to control the level of lighting.

Consideration should be given to the design of external windows so that patients might have views while in bed or in a chair. If windows cannot be provided in each room, an alternate option is to allow a remote view of an outside window.

If single rooms are provided, glazing between rooms can allow staff to oversight patients in the next room. These viewing panels will need to ensure that patient privacy can also be achieved.

03.07 Safety and Security

SAFETY

The design and construction of the facility and selection of furniture, fittings and equipment should ensure that users are not exposed to avoidable risks of injury.

SECURITY

Facility planners and designers should enhance security by incorporating the principles Crime Prevention Through Environmental Design (CEPTED) such as territorial reinforcement, passive surveillance, space management and access control into the design.

Access to an ICU should be controlled with the ability to lock-down the Unit if required. However, this should not unnecessarily prevent access by family members.

Staff only areas will be planned so they are not accessed by unauthorised individuals.

Rooms containing high-cost equipment, medications and clinical supplies will be locked or under the direct supervision of staff to prevent theft and/or tampering.

RISK / HAZARD MANAGEMENT

The physical environment has a significant impact on the health and safety of end users. A risk management approach ensures risks are managed systematically utilising a process that supports the anticipation, identification and avoidance of risks that may have an impact on users and services.

Broad consultation with all stakeholders and other identified processes may be utilised to identify risks according to the availability of expertise to ensure security, health and safety risks are proactively managed.

Individual jurisdictions should refer to their local legislation for further requirements for plant and buildings.

Occupational health and safety legislation requires designers to identify, assess and control risks in order to provide an optimal ergonomic design and to do this in consultation with stakeholders.

By adopting a risk management approach, many safety and security related hazards can be eliminated or minimised at the planning stage before work even begins, reducing the likelihood of adverse incidents occurring.

Refer to:

- Part C: Section 790, Safety and Security Precautions; and
- Standards Australia, 2004, AS/NZS 4360:2004 Risk Management (SAI Global).

03.08 Finishes

GENERAL

Finishes in this context refer to walls, floors, windows and ceilings.

Refer to Part C: Section 710, Space Standards and Dimensions.

WALL FINISHES
Adequate wall protection should be provided to areas that will regularly be subjected to damage. Particular attention should be given to areas where bed or trolley movement occurs such as corridors, bed head walls, treatment areas, equipment and linen trolley bays.

FLOOR FINISHES
Refer to local jurisdictional policies and to:

- Part C: Section 710, Space Standards and Dimensions; and
- Department of Health, NSW, 2009, Technical Series TS7 - Floor Coverings in Healthcare Buildings.

CEILING FINISHES
Ceiling finishes should be selected with regard to appearance, cleaning, infection prevention and control, acoustics and access to services.
For more information refer to Part C: Section 710, Space Standards and Dimensions.

03.09 Fixtures, Fittings & Equipment

DEFINITIONS
Room Data Sheets (RDS) and Room Layout Sheets (RLS) in the AusHFGs contain most standard rooms as described in this HPU.
Refer to the RDS and RLS for detailed information, and to:

- Part C: Section 710, Space Standards and Dimensions; and
- Part F: Section 680 Furniture Fittings and Equipment.

EQUIPMENT
The type and quantity of equipment will vary with the type, size and function of the unit and should be appropriate to the workload of the Unit.
The Minimum Standards for Intensive Care Units (2010) specifies minimum equipment to be included in an ICU. This equipment is identified on Room Data Sheets.
Refer to College of Intensive Care Medicine of Australia and New Zealand (CICM), 2011, CICM - Minimum Standards for Intensive Care Units IC-1 (2011).

BEDSIDE MONITORING
Each Unit should contain an approved patient monitoring system, with visual display for each patient at a central monitoring point, generally the staff station. In large Units, a central monitor will be provided in each pod. Monitors with high / low alarm and the capability to provide hard copies of displays are recommended. In each patient bedspace, one monitor will be located at the head of the bed. Future capacity may be provided for an additional monitor at the foot of the bed. An integrated ICU Clinical Information System should be a component of the monitoring system and will require a PC in each bedspace. Should a staff work base be located outside of each room, or between two rooms, an additional PC is usually needed. In future, this system will aggregate clinical information and store information on the electronic health record. Bedside monitoring equipment should be located in a position that makes it easy for staff to access and view the equipment, but does not interfere with their ability to see or access the patient.
As monitoring equipment may increase over time, future capacity in terms of space and electrical facilities should be planned.

03.10 Building Service Requirements

GENERAL
Refer to Part E: Building Services and Environmental Design.

AIR HANDLING SYSTEMS
Provision of natural ventilation to patient care areas is not usually suitable within an ICU as the management of airflows and the creation of a stable environment are essential to the control of the spread of infection and an air conditioning system should be provided.

Consideration should be given to the provision of HEPA filtration, especially to isolation rooms.
Refer to:

- Part D: Infection Prevention and Control; and
- Standards Australia, 2003, AS HB 260-2003: Hospital acquired infections - Engineering down the risk (SAI Global).

It is essential that services such as emergency lighting, telephones, duress alarm systems, including the central computer and electronic locks are connected to the emergency power supply.
Body/cardiac protection should be incorporated in all patient areas in accordance with:

- Part E: Section 3, Electrical; and
- Standards Australia, 2011, AS/NZS 3003:2011 Electrical installations - Patient areas (SAI Global).

LIGHTING
Appropriate lighting, both general and task, will be provided throughout the ICU. Procedure lights may also be required in single and procedure rooms.
Lighting levels in patient rooms should be variable and individually controlled.

INFORMATION TECHNOLOGY AND COMMUNICATIONS
A range of information technology and communications issues, and the associated infrastructure requirements, will need to be assessed during planning and design to ensure long term flexibility including:

- wireless technology;
- radiofrequency identification (RFID) for access control, locks etc.;
- duress alarm systems;
- voice / data (telephone and computers);
- videoconferencing capacity / telemedicine;
- electronic health records;
- clinical point of care systems such as CIS;
- Picture Archiving Communication System (PACS);
- Patient Administration Systems (PAS);
- Radiology Information Systems (RIS);
- paging and personal telephones replacing most aspects of call systems;
- patient multimedia devices including bedside monitors that function as televisions, computer screens for internet access, etc.;
- bar coding for supplies and x-rays / records;
- server and communications rooms;
- e-learning and simulation; and
- e-medication management and e-storage systems such as automated dispensing systems.

TELEHEALTH
Facilities for video conferencing and consultations are required for staff education, patient consultations with specialist clinicians and to enable clinicians in remote locations to discuss cases.

NURSE / STAFF CALL SYSTEM
The emergency call system should alert to a central module situated adjacent to the staff station, as well as to the staff and meeting rooms.
Call systems should be designed and installed to comply with Standards Australia, 1998, AS 3811 - Hard wired Patient Alarm Systems.

COMMUNICATIONS
All ICUs should have an intercommunication system that provides voice linkage between the staff station, patient care areas, staff overnight rooms, meeting rooms and the staff room.
Some types of communication, such as personnel tracking and non-emergency calls, may best be accomplished using visual displays, such as numeric or colour-coded lights, which eliminate unnecessary noise.
There should be a mechanism for emergency internal and external communications when normal systems fail.

DURESS ALARMS
Duress alarms - mobile or fixed - should be provided in accordance with jurisdiction policies. In the ICU context, fixed duress is likely to be provided at reception, in interview rooms and staff stations.
For further information refer to Part C: Design for Access, Mobility, OHS and Security, Space Standards and Dimensions.

HYDRAULIC SERVICES
Warm water systems will be required.

DIALYSIS POINTS
Consideration should be given to installation of reverse osmosis water access for dialysis in the Unit. This will be dependent on the mode and frequency of renal replacement therapy used in the Unit.

MEDICAL GASES
Each bed will require oxygen, suction and medical air in quantities specified in RDS.
Refer to Standard Components for patient bedrooms.

CLOCKS
The accurate tracking of time within the ICU is critical. The utilisation of synchronised digital wall clocks will be visible in all clinical areas and waiting areas.

04 COMPONENTS OF THE UNIT

04.01 Standard Components

Rooms / spaces are defined as:

- *standard components* (SC) which refer to rooms / spaces for which room data sheets, room layout sheets (drawings) and textual description have been developed;
- *standard components – derived rooms* are rooms, based on a SC but they vary in size. In these instances, the standard component will form the broad room 'brief' and room size and contents will be scaled to meet the service requirement;
- *non-standard components* which are unique rooms that are usually service-specific and not common.

The standard component types are listed in the attached Schedule of Accommodation.

The current Standard Components can be found at: www.healthfacilityguidelines.com.au/standard-components

04.02 Non-Standard Components

Non-Standard Components are unit-specific and are described below.

PATIENT BAY - CRITICAL - ISOLATION CLASS N
Description and Function
Single bed room which may be used to isolate patients with known infectious conditions. The room will have an adjoining anteroom that will be used by staff. Patients will enter the enclosed room via the main doorway. An internal communication system (for example intercom) should be provided between rooms.

Location and Relationships
Isolation Rooms should be clustered and located away from the Unit entrance.
Refer to Part D: Infection Prevention and Control.

BAY - PATHOLOGY
Description and Function
All ICUs should have access to 24 hour Pathology Unit. When this service cannot be provided by the Pathology Unit, a satellite laboratory within or immediately adjacent to the ICU should serve this function including arterial blood gas analysis.

Location and Relationships
Accessible from all areas of the Unit.

RESPIRATORY / BIOMEDICAL WORKROOM
Description and Function
A respiratory / biomedical workroom is an area for the repair maintenance and calibration of both respiratory and Biomedical equipment, and as a work base for anaesthetic and biomedical technicians when visiting the Unit. This area will typically be occupied intermittently by one or two persons. Piped oxygen and air should be provided to this area.

Location and Relationships
A respiratory / biomedical workroom should be accessible from all areas of the Unit.

AX APPENDICES

AX.01 Schedule of Accommodation

The Schedule of Accommodation lists generic spaces for this HPU. Quantities and sizes of spaces will need to be determined in response to the service needs of each unit on a case by case basis. A Level III service may range in size from less than 20 beds to one exceeding 50 beds.

The space allocated to staff areas, clinical support and to non-clinical support space will need to reflect bed numbers, the arrangement of the beds and staffing profiles. In practice, an ICU with 50 beds may be organised in four clusters with most clinical support space provided on a per cluster basis to ensure that materials are close to hand and staff travel time is minimised. This is likely to increase the overall space allocation.

The levels reflect the CICM descriptions as outlined in Appendix AX.03 Levels of Care.

The 'Room/ Space' column describes each room or space within the Unit. Some rooms are identified as 'Standard Components' (SC) or as having a corresponding room which can be derived from a SC. These rooms are described as 'Standard Components –Derived' (SC-D). The 'SD/SD-C' column identifies these rooms and relevant room codes and names are provided.

All other rooms are non-standard and will need to be briefed using relevant functional and operational information provided in this HPU.

In some cases, Room/ Spaces are described as 'Optional' or 'o'. Inclusion of this Room/ Space will be dependent on a range of factors such as operational policies or clinical services planning.

ENTRY / RECEPTION

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2 Level 1	Qty x m2 Level 2	Qty x m2 Level 3	Remarks
INTF	Interview Room	Yes	1 x 12	-	1 x 12	For interviews with relatives
MEET-12	Meeting Room	Yes	-	1 x 15	1 x 15	For interviews with relatives.
WCPU-3	Toilet - Public, 3m2	Yes	1 x 3	1 x 3	1 x 3	
WAIT-10	Waiting, 10m2	Yes	1 x 10	1 x 15	1 x 20	Nominal area. To be calculated at 1.2m2 per able-bodied person, 1.5m2 per wheelchair occupant.
	Discounted Circulation %		25%	25%	25%	

PATIENT AREAS

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2 Level 1	Qty x m2 Level 2	Qty x m2 Level 3	Remarks
PBC-24	Patient Bay - Critical, 24m2	Yes	24	24	24	No. dependent on services planning; group of not more than 12, within easy observation of staff station.
PBC-20	Patient Bay - Critical, 20m2	Yes	20	20	20	No. dependent on services planning; group of not more than 12, within easy observation of staff station.
PBCE-25	Patient Bay - Critical (Enclosed), 20m2	Yes	25	25	25	No. dependent on services planning; group of not more than 12, within easy observation of staff station.
	Patient Bay - Critical Enclosed (Class N Isolation)		25	25	25	No. dependent on services planning ; clustered, located away from Unit entrance.
ANRM	Anteroom	Yes	6	6	6	Attached to 1 Bed Rooms - Isolation Class N (neg pressure ventilation)
BATH	Bathroom	Yes	1 x 15	1 x 15	1 x 15	Inclusion depends on operational policy of unit
BLIN	Bay - Linen	Yes	1 x 2	2 x 2	2 x 2	
BRES	Bay - Resuscitation	Yes	1 x 1.5	2 x 1.5	2 x 1.5	
BBEV-OP	Bay - Beverage, Open Plan, 4m2	Yes	1 x 4	1 x 5	1 x 5	
ENS-SP	Ensuite - Special, 6m2	Yes	1 x 6	1 x 6	1 x 6	FPU; sizes for 'full assistance' i.e. 2 staff plus medical equipment.
	Discounted Circulation %		40%	40%	40%	

STAFF AREAS

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2 Level 1	Qty x m2 Level 2	Qty x m2 Level 3	Remarks
MEET-L-20	Meeting Room, 20m2	Yes	Shared	1 x 20	1 x 20	Education / resource / teleheath - may include library, 24 hour access required via perimeter of unit.
MEET-L-30	Meeting Room, 30m2	Yes	1 x 15	1 x 30	1 x 35	Seminar / Training Room - alternative location for Library 24 hour access required; perimeter of unit.
OFF-CLW	Office – Clinical Workroom	Yes		1 x 15	1 x 15	Inclusion depends on operational policy of unit. Close to staff station
OFF-S9	Office - Single Person, 9m2	Yes		9	9	Senior Nurse Manager, NUM, staff specialists
OFF-S12	Office - Single Person, 12m2	Yes		1 x 12	1 x 12	Medical Director
	Office - Workstation, 4.4m2		4.4	4.4	4.4	Registrars - workstation/s, open plan or enclosed. Number determined by staffing.
	Office - Workstation, 5.5m2		5.5	5.5	5.5	CNC/Educator-workstation/s, open plan or in shared office. Number determined by staffing.
	Office - Workstation, 5.5m2			5.5	5.5	Research - workstation/s, open plan or in shared office. Number determined by staffing.
	Office - Workstation, 5.5m2		5.5	5.5	5.5	Secretarial - workstation/s, open plan or in shared office. Number determined by staffing.
	Office - Workstation, 5.5m2		5.5	5.5	5.5	General - workstation/s open plan or in shared office. Number determined by staffing.
OVBR	Overnight Stay - Bedroom	Yes		1 x 10	1 x 10	Registrar, needs access to bathroom facilities e.g. Staff Change Rooms
SHST	Shower - Staff, 3m2	Yes	Shared	1 x 3	1 x 3	
SRM-15	Staff Room, 15m2	Yes	1 x 15	1 x 30	1 x 35	
SSTN	Staff Station, 20m2	Yes	1 x 18	1 x 25	2 x 25	
CHST-10	Change - Staff (Male / Female), 10m2	Yes	1 x 8	1 x 20	1 x 30	Includes toilets, showers, lockers; size depends on the staffing per shift. (Female)
CHST-10	Change - Staff (Male / Female), 10m2	Yes	1 x 8	1 x 20	1 x 25	Includes toilets, showers, lockers; size depends on staffing per shift. (Male)
STFS-10	Store- Files, 10m2	Yes		1 x 10	1 x 10	
STPS-8	Store - Photocopy / Stationery, 8m2	Yes	1 x 5	1 x 8	1 x 12	
	Discounted Circulation %		25%	25%	25%	

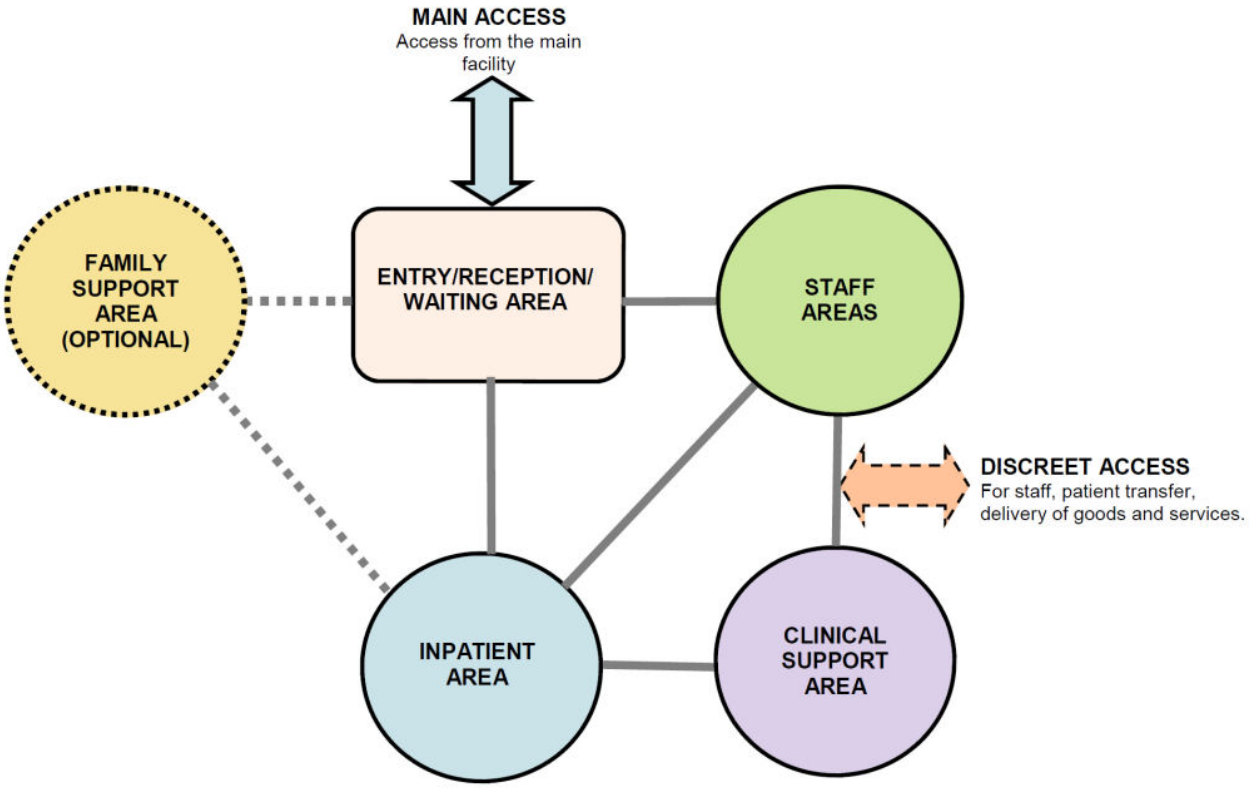
Examples are only for offices. Individual jurisdictions to reference relevant policy documents.

SUPPORT AREAS - CLINICAL AND NON CLINICAL

AusHFG Room Code	Room / Space	SC / SC-D	Qty x m2 Level 1	Qty x m2 Level 2	Qty x m2 Level 3	Remarks
BBW	Bay - Blanket / Fluid Warming	Yes		1 x 1	1 x 1	Inclusion depends on operational policy of unit.
BHWS-A	Bay - Handwashing, Type A	Yes	1	1	1	Refer to Part D for numbers and locations
BMEQ-4	Bay - Mobile Equipment, 4m2	Yes	2 x 4	3 x 4	3 x 4	Locate in quiet low traffic areas.
BBEV-OP	Bay - Beverage, Open Plan, 4m2	Yes		1 x 4	1 x 4	
BPATH	Bay - Pathology			1 x 3	1 x 5	Inclusion depends on operational policy of unit
BPTS	Bay - Pneumatic Tube		1 x 1	1 x 1	1 x 1	
CLRM-5	Cleaner's Room, 5m2	Yes	1 x 5	1 x 5	1 x 5	
CLUR-12	Clean Utility, 12m2	Yes	1 x 12	2 x 12	2 x 12	
DTUR-10	Dirty Utility, 10m2	Yes	1 x 10	1 x 10	1 x 10	
DISP-8	Disposal Room, 8m2	Yes	1 x 8	1 x 8	2 x 8	Inclusion depends on bed numbers and waste management guidelines. Preference for only 1 larger room.
CLUP-7	Clean-Up Room, 7m2	Yes	1 x 7	1 x 18	1 x 18	
	Respiratory / Biomedical Workroom			1 x 20	1 x 20	Inclusion depends on operational guidelines of unit.
STDR-10	Medication Room, 10m2	Yes	1 x 10	1 x 10	1 x 10	May be included with clean utility
STEQ-14	Store - Equipment, 14m2	Yes	1 x 14	1 x 14	1 x 20	General equipment
STEQ-20	Store - Equipment, 20m2	Yes			1 x 20	Inclusion depends on operational guidelines of unit. Required for storage of respiratory associated equipment and consumables.
STSS-30	Store - Sterile Stock, 30m2	Yes	1 x 15	1 x 30	2 x 30	
	Workroom - Telehealth			1 x 12	1 x 12	Optional: Inclusion depends on operational guideline of unit. Can be used for viewing medical images and discussions, and for telehealth activities for liaison regarding transfers, virtual rounds etc.
	Discounted Circulation %		25%	25%	25%	

AX.02 Functional Relationships / Diagrams

The following diagram sets out the functional relationships between zones in an ICU.



AX.03 Levels of Care

LEVELS OF INTENSIVE CARE UNIT
The follow information describes service levels for ICUs as described in the CICM Minimum Standards for Intensive Care Units.
LEVEL I ICU
A Level I ICU should be capable of:

- providing immediate resuscitation and short term cardio-respiratory support for critically ill patients;
- monitoring and prevention of complications in “at risk” medical and surgical patients;
- providing mechanical ventilation and simple invasive cardiovascular monitoring for a period of at least several hours. Provision of such care for more than 24 hours is permitted for patients with single system failure but only within the context of ongoing discussion with a Level II or Level III unit with which the host unit has an established referral relationship. Such a relationship should include telehealth facilities for clinical consultation and advice, mutual transfer and back transfer policies and an established, joint review process.

The patients most likely to benefit from Level I care for example include:

- patients with uncomplicated myocardial ischaemia;
- post-surgical patients requiring special observations and care;
- unstable medical patients requiring special observations and care beyond the scope of a conventional ward, and
- patients requiring short term mechanical ventilation.

The number of ICU beds and number of patients' admissions should be sufficient to maintain clinical skills by both medical and nursing staff.

LEVEL II ICU
A Level II ICU should be capable of:

- providing a high standard of general intensive care, including complex multi-system life support, which supports the hospital's delineated responsibilities; and
- providing mechanical ventilation, renal replacement therapy and invasive cardiovascular monitoring for a period of at least several days. All patients admitted to the unit will be referred for management to the attending intensive care specialist.

At least six staffed and equipped beds should be provided to adequately discharge clinical and teaching functions. There should be sufficient clinical workload for maintaining clinical expertise and to provide adequate clinical exposure and education of intensive care staff and trainees. This should normally provide capacity for more than 200 mechanically ventilated patients per annum.

LEVEL III ICU
A Level III ICU is a tertiary referral unit for intensive care patients and should be capable of providing comprehensive critical care including complex multi-system life support for an indefinite period. Level III units should have a demonstrated commitment to academic education and research. All patients admitted to the unit will be referred for management to the attending intensive care specialist.
At least eight staffed and equipped beds should be provided to adequately provide for clinical, teaching and research commitments consistent with the functioning of an ICU in a tertiary referral centre. There should be sufficient clinical workload and case-mix of patients to maintain a high level of clinical expertise and to provide adequate clinical exposure and education of staff and trainees. This should normally provide capacity for more than 400 mechanically ventilated patients per annum.

PAEDIATRIC INTENSIVE CARE UNIT (PICU)
A PICU is a tertiary referral centre capable of providing mechanical ventilation, extracorporeal renal support services and invasive cardiovascular monitoring for an indefinite period. Extensive back up laboratory and clinical service facilities are required. These units should have a commitment to academic education and research. All patients admitted to the unit will be referred for management to the attending intensive care specialist. This equates to a Level III ICU in terms of planning.
A minimum of eight staffed and equipped beds is usually considered necessary to provide for its clinical and teaching functions. There should be sufficient clinical workload to maintain clinical expertise. This is usually a minimum of 300 patient admissions per annum.

HIGH DEPENDENCY UNIT (HDU)
Patients in HDU will typically have single organ failure and are at a high risk of developing complications. A HDU should have resources for immediate resuscitation and management of the critically ill. Equipment should be available to manage short term emergencies e.g. the need for mechanical ventilation. In stable patients routine monitoring and support may include ECG, oximetry, invasive measurement of blood pressure, low level inotropic or pressor support and non-invasive ventilation.

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AX.06 Checklists

Refer to the Planning Checklists at the ends of Parts A, B, C and D.