Australasian Health Facility Guidelines

Part B - Health Facility Briefing and Planning

HPU 360 Intensive Care Unit

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Australasian Health Facility Guidelines

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01   INTRODUCTION

1.1   PREAMBLE

This Health Planning Unit (HPU) has been developed by the Australasian Health Infrastructure Alliance (AHIA). This revision has been informed by an extensive consultation process that was completed in 2019.

The document is intended to be used by design teams, project managers and end users to facilitate the process of planning and design.

1.2   INTRODUCTION

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

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

Other critical care services are described within the following AusHFG documents:

- HPU 260 Cardiac Care Unit; and
- HPU 390 Neonatal Care Unit.

1.3   POLICY FRAMEWORK

The following College of Intensive Care Medicine (CICM) of Australia and New Zealand publication is referenced in this HPU: College of Intensive Care Medicine of Australia and New Zealand (CICM), 2016, Minimum Standards for Intensive Care Units IC-1.

Project teams will 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 jurisdiction-specific policy information.

1.4   DESCRIPTION

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 a concentration of clinical expertise, technology and therapeutic 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.

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.

The nature and extent of intensive care services may vary greatly from hospital to hospital, and will depend on the operational policies for an individual facility. Increasingly, ICUs have extended roles including rapid response teams, outreach/liaison, retrieval services, management of central venous catheters and Total Parental Nutrition (TPN) services. These extended roles, where they exist, need to be considered during planning.

Paediatric Intensive Care Unit

A PICU is a separate and self-contained service provided by selected tertiary referral centres that is capable of providing comprehensive critical care, including complex multisystem life support, for an indefinite period to children less than 16 years of age. A PICU may be collocated with an adult ICU. Where provided as part of a children's hospital it will generally be provided as a stand-alone unit.

Levels of Service / Role Delineation

Descriptions of role delineation and levels of service for ICUs vary among jurisdictions. 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.

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

2.1   OPERATIONAL MODELS

2.1.1   Hours of Operation

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

2.1.2   Operational Service Models

Optimal facility outcomes are dependent on a clear definition of the operational model that will be used in the future ICU. The model chosen will result from a detailed analysis of unit size as well as consideration of service quality, safety and sustainability.

Combined Critical Care

The combined critical care model collocates intensive care and cardiac care beds in a single unit. This type of unit is usually located in a rural, regional or smaller metropolitan 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 ICU patient conditions. 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.

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.

Paediatric Intensive Care Services

Paediatric patients are frequently managed in adult ICUs depending on local policies and access to specialised services.

Operational models for PICUs align with those outlined for adult ICUs above, including combined general intensive care and collocated sub specialty intensive care services, typically for specialist paediatric cardiac and neurosurgery services. PICUs will manage children of all ages including neonates where access to specialised services is required.

2.2   OPERATIONAL POLICIES

2.2.1   General

Operational policies have a major impact upon the planning and design and capital and recurrent costs of health facilities. Project teams should review their design proposals with these in mind and be able to demonstrate that the capital and recurrent cost implications of proposed operational policies have been fully considered. Operational policies may have hospital-wide application or be unit-specific. A list of general operational policies that may apply can be found in Part B: Section 80 General Requirements.

2.2.2   Visitor Amenities and Access

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

- waiting areas that provide ready access to visitor toilets;

- interview rooms for meetings with family members/carers;

- facilities for family members to rest and shower; as well as access to healthy food options and drinks at all hours of the day; and

- access to health information.

A reception area may be provided depending on the size of the unit and staffing arrangements. Providing a reception point to receive and direct families can assist in managing visitors' expectations and reducing anxiety. For smaller services, consideration may be given to sharing a reception area with other services, e.g. Cardiac Care Unit (CCU) for improved efficiency and staff safety.

Where a reception is not provided, or during hours that it is not operational, a video/intercom system linking the front door to the main ICU staff station with remote door release will assist with ensuring safe entry and exit to the Unit by visitors.

Operational procedures and guidelines need to be developed regarding visiting hours, on-site accommodation and access protocols to the Unit.

2.2.3   Information, Communications and Technology

Information, Communications and Technology (ICT) are key enablers for ICUs to optimise patient care and service efficiencies. ICT systems necessary to support clinical and operational requirements should be assessed during the planning and design process to ensure an appropriate level of capability is provided that also supports future flexibility.

All units should be designed to support electronic intensive care clinical information systems. These systems provide automated monitoring and reporting with integration of patient data from multiple systems to improve patient care and safety, and support clinical decision making. The system should have automated audit, data collection and reporting capacity such as the Australia and New Zealand Intensive Care Society (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/devices or at staff stations.

Other key operational considerations include; communications systems, wireless network requirements, the emergence of telehealth, and automated medication dispensing systems. Further detail regarding ICT requirements is included in Section 3.0 Design.

2.2.4 Staffing

The staff establishment should be identified early in the planning process. This will enable the assessment of work space and amenities required to appropriately support staff to deliver services safely and efficiently. Staff may include the following, working as a multidisciplinary team, in either a permanent or visiting capacity.

- 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; physiotherapists, social workers, dieticians and speech pathologists.

- 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.

Access to work space in clinical and non-clinical areas is essential. The allocation of office and workstation areas will require reference to local jurisdictional policies.

2.2.5 Rapid Response Teams (RRT)

RRT that serve the whole hospital, are commonly located and managed by the ICU. This service may require additional staff, work space and facilities for equipment storage.

2.2.6 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.

The provision of multi-professional training and education facilities in close proximity to the ICU is essential to support accreditation for training in intensive care medicine.

2.3 PLANNING MODELS

2.3.1 Unit Size

There is no international consistency regarding the recommended size of an ICU. An optimal unit / pod size is considered to be approximately 14 beds (including isolation capacity) which allows for suitable staffing and a sufficient casemix to develop expertise, experience and training. The actual number of beds adopted should be determined through consideration of the patient casemix, clinical service planning projections and the ICU bed occupancy rate.

Larger units will likely require two or more clusters/pods 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.

2.3.2 Acuity Adaptable Patient Bed Spaces

The provision of acuity adaptable bed spaces is recommended so that each space can be flexibly used regardless of the level of care required. These may be provided as 100% enclosed single rooms or a mix of enclosed single rooms and open bed bays depending on the patient cohort and infection control considerations.

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 (Vincent et al, 2005). The provision of single rooms also supports accommodation of a range of patients such as paediatric intensive care beds within an adult ICU rather than requiring a stand-alone paediatric pod that would limit flexible bed utilisation.

Open bed bays may be considered for some patient cohorts, such as younger children within a PICU who may benefit from having a connection with other children. However enclosed single rooms will also be required to meet the requirements of older children and infection control requirements.

The bed space will be planned to provide clear zones 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.

Refer to AusHFG standard components:

- Patient Bay – Intensive Care
- 1 Bed Room – Intensive Care.

2.3.3 Staff Stations

Hamilton et al (2018) recommends the implementation of design that include both effective decentralised charting close to the patient bedside and high observation unit configurations that allow nurses to feel that they can see and hear their colleagues so backup can be provided where required and nurses feel less isolated.

One central staff station is recommended per pod to support high observation and staff support across the unit. Decentralised staff workstations collocated with patient rooms may be provided to optimise patient visibility and access.

2.3.4 Patient Visibility

Direct line of sight will be achieved from the staff station (a main or decentralised staff workstations) to each critical care bay/room, ensuring that that patient's head and torso is visible. This permits the monitoring of patient status under both routine and emergency circumstances. Glass doors at the entry to enclosed rooms and windows between adjacent rooms optimise observation of patients.

2.3.5 Outdoor Areas

Units may consider equipping an outdoor space, for example a balcony or courtyard, with a medical services panel including gases, suction and power points to support a ventilated patient. Access to an outdoor area is particularly valuable for patients experiencing prolonged ventilation, end of life care and for the provision of family centred care in paediatric units. A maximum of two patient spaces, including sufficient area for staff and family is generally considered manageable.

2.3.6 Future Expansion

Consideration should be given to future proofing the ICU to enable expansion of ICU beds if required. This may be achieved through future delivery of additional ICU pods with consideration of shared support requirements.

2.4 FUNCTIONAL AREAS

2.4.1 Functional Zones

Functional zones will include:

- entry, waiting and visitor support areas;
- patient care areas;
- support areas; and
- staff areas.

2.4.2 Entry, Waiting and Visitor Support Areas

This area provides the public entry point to the Unit and support facilities for families such as waiting areas, interview rooms, beverage bays and family rest areas.

A reception area may be provided to direct visitors and assist in managing expectations and reducing anxiety. The safety of staff working in reception requires consideration given this area can be isolated. Access to duress alarms is essential in this area and consideration may be given to sharing the reception with other units.

Other considerations relating to this area include:

- separation of visitor flows to the unit from patient transfers in and out, 'back of house' flows, e.g. transfer of waste, and staff access points;
- provision of privacy in the waiting area, e.g. having seated areas arranged so people do not have to sit and face each other;
- access to a children's play area for larger units;
- access to parenting rooms including for breast-feeding;
- provision of facilities for family members to rest, shower and access toilets; as well as access healthy food options and drinks at all hours of the day;
- consideration of multi-function rooms for use as both overflow interview rooms during the day and overnight family rooms;
- inclusion of dual egress within interview rooms and access to duress alarms;
- access to health information and health promotion advice; and
- implementation of appropriate signage for visitors.

It is recommended that consultation with consumer representatives is undertaken during the planning and design of ICUs.

2.4.3 Patient Care Areas

Patient care areas form the core area of the Unit with all other zones radiating off and supporting this clinical space.

The central staff station will provide space for charting, central cardiac monitoring, resuscitation equipment, mobile equipment and PACS viewing facilities including a number of high resolution, diagnostic monitors. Where a pneumatic tube system is proposed, to deliver pathology and/or pharmaceuticals, early planning will ensure it is located within the central staff station area.

Each pod of beds will have access to essential support facilities including staff station and a patient bathroom and/or ensuites, with access to shared support areas between pods, e.g. disposal rooms.

Paediatric patients should be accommodated in single bedrooms with access to their own bathroom facilities and separation from adult flows. Access to both baths and showers is required on PICUs to support both younger and older children.

Rooms to be used for palliative care should be located in a quieter area of the unit with provision of comfortable, less clinical furnishings and appropriate art work.

Procedures are usually undertaken at the patient bedside to minimise patient movement. A dedicated procedure room is not usually required within the ICU, however this should be confirmed to ensure alignment with local operational policies.

2.4.4 Support Areas

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. Equipment storage to support a Rapid Response Team for the hospital may also be required if based in ICU.

A range of support areas will need to be located within the patient care area to minimise staff travel time.

2.4.5 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. Staff work areas, staff amenities, meeting and reception facilities should be provided in line with local jurisdictional guidelines.

2.5 FUNCTIONAL RELATIONSHIPS

2.5.1 External

The ICU should be a separate Unit within the hospital with rapid, non-public, access to the:

- emergency unit;
- operating unit;
- interventional radiology suite (including cardiac catheter laboratories);
- medical imaging unit (CT is the priority modality within an imaging unit that requires proximal access from ICU, other modalities are frequently provided via mobile imaging units that are transported to the patient); and
- helicopter landing site.

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.

Proximal, discrete access between a PICU and neonatal intensive care services is required where they are collocated on the same site for access to subspecialty services e.g. cardiac, and neurosurgery services.

2.5.2 Internal

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

Refer to the functional relationship diagram included at Appendix 5.2.

03   DESIGN

3.1   ACCESSIBILITY

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

- 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.

3.2   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 AusHFG Part C Design for Access, Mobility, Safety and Security.

3.3   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. This will include consideration of pandemic containment requirements.

For further information refer to:

- Part C: Design for Access, Mobility, Safety and Security; and

- Part B: Section 80 General Requirements.

3.4   INFECTION CONTROL

3.4.1   General

The following aspects contribute to 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.

3.4.2   Isolation Rooms

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. All ICUs must be capable of isolating infectious patients, including the provision of respiratory isolation through negative pressure isolation rooms. The provision of positive pressure rooms is only required in specialised units, in particularly those that support major transplant services. Consideration should be given to the location of negative and positive pressure rooms to ensure optimal observation and access to these patients who are often extremely unwell.

3.4.3   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 in each bed space and at the Unit entry.

3.4.4   Other Considerations

Acuity adaptable patient care spaces reduce the need to relocate patients as their condition changes. This reduces patient movement within the ICU which in turn reduces opportunities for cross infection.

Depending on the role of the ICU, there may be a requirement for pandemic containment capability through the provision of an isolatable ICU pod.

3.5   ENVIRONMENTAL CONSIDERATIONS

3.5.1   Patient Privacy and Observation

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. In addition each patient bed space should have provision for visual privacy from casual observation by other patients and visitors.

Curtains and integral venetian blinds should be provided to screen open bed space ends and windows in dividing partitions and bedrooms, as recommended in the AusHFG intensive care standard components. As noted in the standard components integral venetians are recommended for external windows and windows between rooms for infection control reasons. Facilities may consider the installation of switchable glass that can readily change from opaque to transparent, however this will require consideration of the significant increase in capital cost in comparison to the provision of curtains and integral venetian blinds. Other considerations relating to switchable glass include the product lifespan, acoustic rating (noting it is single glazed glass in comparison to double glazing provided for integral venetians), operating regime and cleaning requirements.

Environmental graphics/films may be considered, particularly within paediatric units, to enhance clinical observation and privacy while improving the patient experience.

3.5.2 Acoustics

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.

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 decentralised staff workstations.

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. Consideration may be given to paging systems that provide alerts to staff via text message rather than audible systems.

The layout of the unit should consider the need to locate high activity/noisy areas away from patient bed rooms.

3.5.3 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.

3.5.4 Interior Décor

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.

3.5.5 Signage and Wayfinding

Refer to:
- AusHFG Part C: Design for Access, Mobility, Safety and Security; and
- Department of Health, NSW, 2009, Technical Series 2 - Wayfinding for Health Facilities.

3.6 SPACE STANDARDS AND COMPONENTS

3.6.1 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 and to enable the beds to be directly configured as patient chairs;
- pendant/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/pendant mounted hoists and weight allowances.

3.6.2 Access and Mobility

The facility must comply with the Commonwealth Disability and Discrimination Act (DDA) and the following standards where applicable:

- Disability (Access to Premises – Buildings) Standard 2010;
- National Construction Code;

- AS1428 (SET)-2010 Design for access and mobility; and

- NZS 4121: Design for access and mobility: Buildings and Associated Facilities.

3.6.3 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.

3.6.4 Bed Spacing and 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.

Beds should be arranged so that there is a minimum clearance of 1500mm to the staff side of the bed, 1200mm to the visitor side and 900mm to the head or foot. The current room layouts for the 1 Bedroom – Intensive Care and Patient Bay – Intensive Care, 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.

3.6.5 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.

Refer to AusHFG Part C: Design for Access, Mobility, Safety and Security.

3.6.6 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.

Consideration should be given to the design of external windows so that patients might have views while in bed or in a chair. Beds should be able to be rotated 90 degrees for lower acuity patients to allow them to have a view out the window. 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.

If ultrasounds are routinely being performed in the Unit, the ability to blackout a space will be needed.

3.7   SAFETY AND SECURITY

3.7.1   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.

3.7.2   Security

Facility planners and designers should enhance security by incorporating the principles of 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.

3.7.3   Risk and 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.

Work 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:

- AusHFG Part C: Design for Access, Mobility, Safety and Security; and
- AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

3.8   FINISHES

3.8.1   General

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

Refer to AusHFG Part C: Design for Access, Mobility, Safety and Security and the Standard Components for ICU specific rooms.

3.8.2   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.

3.8.3   Floor Finishes

Refer to local jurisdictional policies and to:

- AusHFG Part C;

- AusHFG Part D; and

- Department of Health, NSW, 2009, Technical Series TS7 - Floor Coverings in Healthcare Buildings.

3.8.4   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 AusHFG Part C.

3.9   FIXTURES, FITTINGS & EQUIPMENT

3.9.1   Definitions

The Room Data and Room Layout Sheets in the AusHFG define Fixtures, Fittings and Equipment. Refer to:

- Part C: Design for Access, Mobility, Safety and Security; and,

- AusHFG Standard Components for ICU specific rooms.

3.9.2   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 (2016) 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), 2016, CICM – Minimum Standards for Intensive Care Units IC-1 (2016).

3.9.3   Bedside Monitoring

Each Unit should contain an approved high acuity 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.

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. In each patient bedspace, one monitor will be located at the head of the bed.

An integrated ICU Clinical Information System should be a component of the monitoring system and will require access to patient information at each bedspace, usually via mobile technology to enable flexible positioning within the room.

3.10   BUILDING SERVICE REQUIREMENTS

3.10.1 General

Refer to local jurisdictional requirements relating to building and engineering services.

3.10.2 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.

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).

3.10.3 Electrical Services

Cardiac protection should be incorporated in all patient areas within the ICU in accordance with Standards Australia, 2018, AS/NZS 3003:2018.

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

3.10.4 Lighting

Appropriate lighting, both general and task, will be provided throughout the ICU. An examination light will be required in each patient room/bay.

Lighting levels in patient rooms should be variable and individually controlled.

3.10.5 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;

- server and communications rooms;

- e-learning and simulation; and

- e-medication management and e-storage systems such as automated dispensing systems.

3.10.6 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.

3.10.7 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 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.

3.10.8 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, Safety and Security, Space Standards and Dimensions.

3.10.9 Dialysis

Consideration should be given to access to reverse osmosis (RO) water access for dialysis in the Unit. This will be dependent on the mode and frequency of renal replacement therapy used in the Unit. The use of portable RO units are recommended given the high cost to install and maintain RO plants, however this will depend on the proximity to and size of the central RO plant.

Refer to the AusHFG intensive care standard components for room fit out requirements to support dialysis.

3.10.10 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.

Date and time should be provided in all patient bed rooms to assist with orientation.

04 COMPONENTS OF THE UNIT

4.1 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:

https://www.healthfacilityguidelines.com.au/standard-components

4.2 NON-STANDARD COMPONENTS

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

1 BED ROOM – INTENSIVE CARE (CLASS N ISOLATION)

Description and Function

Single bed room which may be used for patients requiring respiratory isolation. 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. However the location should be carefully considered to ensure appropriate observation given these patients are often extremely unwell.

Refer to AusHFG Project Resource Isolation Rooms – Engineering and Design Requirements and AusHFG Part D.

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.

05   APPENDICES

5.1   SCHEDULE OF ACCOMODATION

The application of the schedule of accommodation below will require confirmation of the total ICU capacity requirements through detailed clinical services planning and required pod size for larger units.

The schedule of accommodation provided is based on the following indicatively sized ICUs:

- 14 bed Paediatric Intensive Care Unit

- 14 bed Adult Intensive Care Unit

- 56 bed Adult Intensive Care Unit (assumed to be configured as 4 pods of 14 beds).

As noted each pod will require dedicated clinical support space to ensure that materials are close to hand and staff travel time is minimised, however a number of assumptions are noted regarding opportunities to share some support areas between pods.

The space allocated to staff and support areas will need to reflect bed numbers, the arrangement of the beds and staffing profiles.

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 / WAITING AND FAMILY SUPPORT AREAS

AusHFG Room Code	Room / Space	SC / SC-D	PICU - 14 beds		Adult ICU - 14 beds		Adult ICU - 56 beds (4 pods)		Remarks
			Qty	m2	Qty	m2	Qty	m2	
RECL-12	Reception / Clerical	Yes	1	10 (o)	1	10 (o)	1	12	Optional. Provision will depend on the size of the unit and staffing arrangements.
WAIT-10	Waiting	Yes	1	15	1	15	1	40	Nominal area. To be calculated at 1.2m2 per able- bodied person, 1.5m2 per wheelchair occupant.
PLAP-10	Play Area - Paediatric	Yes	1	10 (o)	Shared		1	10 (o)	Optional.
BVM-3	Bay - Vending Machine	Yes	1	2	1	2	1	4	Locate close to but not within waiting area given level of noise and heat generation.
BWD-1	Bay - Water Dispenser	Yes	1	1	1	1	1	1	
BBEV-OP	Bay - Beverage, Open Plan	Yes					1	4	
WCPU-3	Toilet - Public	Yes	1	3	1	3	4	3	
WCAC	Toilet- Accessible	Yes	1	6 (o)	1	6 (o)	1	6 (o)	Optional. Include if not located nearby.
PAR	Parenting Room	Yes	1	6 (o)	1	6 (o)	1	6 (o)	Optional. Include if not located nearby.
INTF	Interview Room	Yes	1	14	1	14	3	14	For interviews with relatives. Include dual egress. Consider including some interview rooms within the clinical zone.
MEET-L-20	Meeting Room	Yes	1	20 (o)	1	20 (o)	1	20	Multifunctional meeting room for family and staff meetings. Larger meeting room frequently required for end of life discussions.
OVBR	Overnight Stay - Bedroom	Yes	2	10	1	10	3	10	For families. Provision depends on local operational policies. May be designed for use during the day as overflow interview rooms
OVES	Overnight Stay - Ensuite	Yes	2	4	1	4	3	4	
PROP-2	Property Bay	Yes	1	1 (o)	1	1 (o)	1	2 (o)	Optional. For family / visitor belongings if using overnight stay rooms as multipurpose spaces.
	Discounted Circulation %			25%		25%		25%	

PATIENT AREAS

AusHFG Room Code	Room / Space	SC / SC-D	PICU - 14 beds		Adult ICU - 14 beds		Adult ICU - 56 beds (4 pods)		Remarks
			Qty	m2	Qty	m2	Qty	m2	
1BR-IC	1 Bed Room - Intensive Care	Yes	7	25	13	25	50	25	The number of enclosed vs open bays provided will depend on the patient cohort and infection control considerations. Includes provision for a palliative care space.
PBIC	Patient Bay - Intensive Care	Yes	6	24.5		24.5		24.5	
1BR-IC	1 Bed Room - Intensive Care (Class N Isolation)	Yes	1	25	1	25	4	25	No. dependent on patient cohort and local jurisdictional policies.
1BR-IC	1 Bed Room - Intensive Care (Class P Isolation)	Yes		25 (o)		25 (o)	2	25 (o)	Optional. Depends on cohort and local jurisdictional requirements.
ANRM	Anteroom	Yes	1	6	1	6	4	6	Attached to 1 Bed Rooms - Isolation Class N (neg pressure ventilation).
BATH	Bathroom	Yes	1	15	1	15	2	15	Requires gases. May be shared between 2 pods subject to design.
ENS-SP	Ensuite - Special	Yes	2	6	2	6	8	6	Ensuites dedicated to negative pressure, positive pressure and standard isolation rooms. Number dependent on isolation room requirements. PICUs should include bathrooms with baths for younger children.
ENS-SP	Ensuite - Special	Yes	3	6	3	6	12	6	Ensuites to be shared between remaining rooms (1:4 ratio). PICUs should include bathrooms with baths for younger children.
SSTN-20	Staff Station	Yes	1	25	1	25	4	25	1 central staff station per pod.
OFF-CLN	Office – Clinical Workroom	Yes	1	15	1	15	4	15	1 per pod.
	Decentralised Staff Workstation		4	2	7	2	28	2	1 between 2 enclosed rooms.
BHWS-A	Bay - Handwashing, Type A	Yes	2	1	2	1	8	1	Also included within each patient bay.
BLIN	Bay - Linen	Yes	1	2	1	2	4	2	1 per pod.
BRES	Bay - Resuscitation	Yes	1	1.5	1	1.5	4	1.5	1 per pod.
BPATH	Bay - Pathology	Yes	1	3	1	3	4	3	1 per pod. May be shared between 2 pods depending on layout.
BPTS	Bay - Pneumatic Tube	Yes	1	1	1	1	4	1	1 per pod.
BMEQ-4	Bay - Mobile Equipment	Yes	3	4	3	4	12	4	3 per pod. Locate in quiet low traffic areas.
BBW	Bay - Blanket / Fluid Warming	Yes	1	1	1	1	2	1	Shared between 2 pods if collocated, subject to design.
	Discounted Circulation %			40%		40%		40%	

SUPPORT AREAS

AusHFG Room Code	Room / Space	SC / SC-D	PICU - 14 beds		Adult ICU - 14 beds		Adult ICU - 56 beds (4 pods)		Remarks
			Qty	m2	Qty	m2	Qty	m2	
BBEV-OP	Bay - Beverage, Open Plan	Yes	1	4	1	4	2	4	Share between 2 pods where collocated.
BMT-4	Bay - Meal Trolley	Yes	1	4 (o)	1	4 (o)	2	4 (o)	Optional. Depends on local operational policy for food services. Share between 2 pods where collocated.
	Formula Room		1	9					Used for formula preparation and storage, and sterilising of expressing equipment within PICUs.
STDR-10	Medication Room	Yes	1	12	1	12	2	20	Share between 2 pods where collocated. Area to be distributed if automated dispensing units are provided centrally within central staff area.
	Store - Clean		1	30	1	30	2	60	Clean stock. Distribution between pods dependent on layout.
STEQ-20	Store - Equipment	Yes	1	28	1	28	1	112	2m2 per bed. May include specialty stores eg for retrieval equipment, renal, allied health etc.
STGN-9	Store - General	Yes	1	14	1	14	2	28	
	Respiratory / Biomedical Workroom		1	12	1	12	1	20	For set up and servicing.
DTUR-12	Dirty Utility	Yes	1	12	1	12	4	12	1 per pod.
CLUP-7	Clean-Up Room	Yes	1	7	1	7	1	24	
CLRM-5	Cleaner's Room	Yes	1	5	1	5	4	5	Number and distribution depends on layout.
DISP-10	Disposal Room	Yes	1	8	1	8	1	20	
	Simulation Room		1	25 (o)			1	25 (o)	Optional. Requirement will depend on education and training requirements / access to central simulation facilities.
	Simulation Control Room						1	10 (o)	Optional.
	Workroom - Telehealth		1	12 (o)	1	12 (o)	1	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.
WCST	Toilet - Staff	Yes	2	3	2	3	6	3	For ease of access from clinical areas.
	Discounted Circulation %			40%		40%		40%	

STAFF AREAS

AusHFG Room Code	Room / Space	SC / SC-D	PICU - 14 beds		Adult ICU - 14 beds		Adult ICU - 56 beds (4 pods)		Remarks
			Qty	m2	Qty	m2	Qty	m2	
OFF-S9	Office - Single Person, 9m2	Yes		9		9		9	Allocation will be dependent on staff profile and jurisdictional policies relating to staff work areas.
OFF-S12	Office - Single Person, 12m2	Yes		12		12		12	Allocation will be dependent on staff profile and jurisdictional policies relating to staff work areas.
	Office - Workstation, 4.4m2			4.4		4.4		4.4	Allocation will be dependent on staff profile and jurisdictional policies relating to staff work areas.
	Office - Workstation, 5.5m2			5.5		5.5		5.5	Allocation will be dependent on staff profile and jurisdictional policies relating to staff work areas.
MEET-L-15	Meeting Room	Yes	1	15	1	15	1	12	
MEET-L-20	Meeting Room	Yes	Shared		Shared		1	20	Assume shared access to 20m2 meeting room under Entry / Waiting & Family Support for smaller services.
MEET-L-55	Meeting Room	Yes					1	50	
STPS-8	Store - Photocopy / Stationery	Yes	1	5	1	5	2	8	
SRM-18	Staff Room	Yes	1	18	1	18	1	60	
CHST-10	Change - Staff (Male / Female)	Yes	1	10	1	10	1	40	Includes toilets, showers, lockers; size depends on the staffing per shift. (Female)
CHST-10	Change - Staff (Male / Female)	Yes	1	8	1	8	1	32	Includes toilets, showers, lockers; size depends on staffing per shift. (Male)
WCAC	Toilet - Accessible	Yes	Shared		Shared		1	6	
OVBR	Overnight Stay - Bedroom	Yes	1	10 (o)	1	10 (o)	1	10 (o)	Optional. Requirement depends on staffing arrangements. Close access to toilet / shower facilities required.
	Discounted Circulation %			25%		25%		25%	

5.2   FUNCTIONAL RELATIONSHIPS / DIAGRAMS

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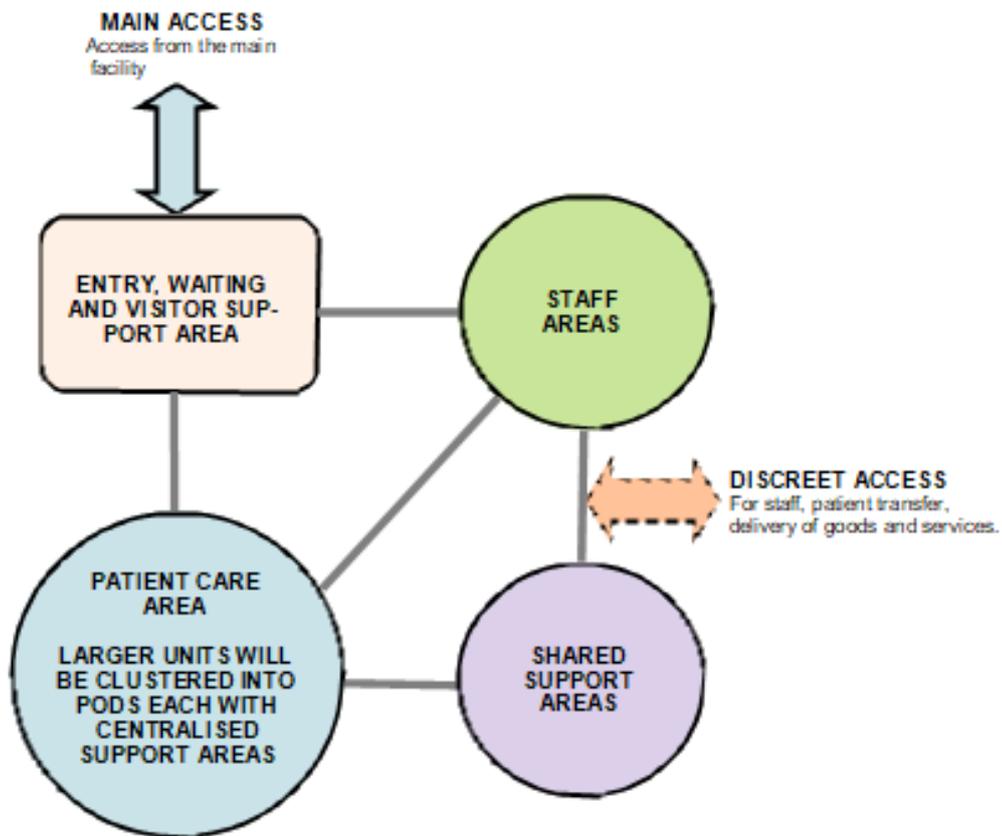
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