Australasian Health Facility Guidelines

Part B - Health Facility Briefing and Planning

0520 – Operating Suite

Update April 2025:
Section 3.10.5 has been updated with revised information relating to the provision of reticulated nitrous oxide.

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Australasian Health Facility Guidelines

Website: http://www.healthfacilityguidelines.com.au
Email: HI-AusHFGteam@health.nsw.gov.au

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CULTURAL ACKNOWLEDGEMENT AND TERMINOLOGY

The Australasian Health Facility Guidelines (AusHFG) are developed in collaboration with stakeholders across Australia and Aotearoa, New Zealand.

Acknowledgement of Country

We acknowledge the Aboriginal people as traditional owners and continuing custodians of the land throughout Australia and the Torres Strait Islander people as the traditional owners and continuing custodians of the land throughout the Torres Strait Islands. We acknowledge their connection to land, sea and community and pay respects to Elders past, present and emerging.

Acknowledgement of Te Tiriti o Waitangi

We acknowledge Māori as tangata whenua in Aotearoa New Zealand; Te Tiriti o Waitangi obligations have been considered in developing these resources.

Terminology and Language in the AusHFG

Throughout the AusHFG resources, the term ‘Indigenous Peoples’ is used to refer to both the Aboriginal and Torres Strait Islander Peoples of Australia and Māori of Aotearoa, New Zealand. Where references to specific cultural requirements or examples are described, the terms ‘Aboriginal and Torres Strait Islander Peoples’ and ‘Māori’ are used specifically. The AusHFG respect the right of Indigenous Peoples to describe their own cultural identities which may include these or other terms, including particular sovereign peoples or traditional place names.

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Acronyms

ACORN	Australian College of Perioperative Nurses [Standards]
ACSQHC	Australian Commission on Safety and Quality in Health Care
AGP	Aerosol Generating Procedure
ANZCA	Australian and New Zealand College of Anaesthetists
APAS	Australian Paint Approval Scheme
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASHRAE	American Society of Heating, Refrigerating and Airconditioning Engineers
AS/NZS	Australian / New Zealand Standards
AR	Augmented Reality
AV	Audio Visual
CCU	Cardiac Care Unit
CT	Computed Tomography
DOSA	Day of Surgery Admission
ECMO	Extracorporeal Membrane Oxygenation
ED	Emergency Department
EDO	Extended Day Only Unit
eMR	Electronic Medical Records
EPA	Environmental Protection Authority
GPO	General Power Outlet
HEPA	High Efficiency Particulate Air [Filter]
HPU	Health Planning Unit
HVAC	Heating, Ventilation and Airconditioning
ICT	Information Communications and Technology
ICU	Intensive Care Unit
IPU	Inpatient Unit
MRI	Magnetic Resonance Imaging
N_2O	Nitrous Oxide
OR	Operating Room
PACS	Picture Archiving and Communication System
PACU	Post Anaesthetic Care Unit (Stage 1 Recovery)
PC	Personal Computer
PPE	Personal Protective Equipment
PTS	Pneumatic Tube System
RANZCOG	Royal and New Zealand College of Obstetricians
RDS	Room Data Sheet

RFID	Radio Frequency Identification Device
RLS	Room Layout Sheet
RTLS	Real-Time Locating Systems
RMD	Reusable Medical Device
SC	Standard Component (AusHFG)
SC-D	Standard Component - Derived
SOA	Schedule of Accommodation
SSU	Sterilizing Services Unit
TGA	Therapeutic Goods Administration
VOC	Volatile Organic Compounds
WES	Workplace Exposure Standards
WHS	Work Health & Safety
WOW	Workstation on Wheels

01 INTRODUCTION

1.1 PREAMBLE

The Australasian Health Facility Guidelines (AusHFG) (www.healthfacilityguidelines.com.au) are freely available resources for health services and project teams across Australia and New Zealand to support better planning, design, procurement and management of health facilities.

The AusHFG are an initiative of the Australasian Health Infrastructure Alliance (AHIA), a cross-jurisdictional collaboration of all health authorities across Australia and New Zealand (NZ). Part A of the AusHFG provides further information relating to the purpose, structure and use of these resources. It is acknowledged that the application of the AusHFG varies between jurisdictions across Australia and New Zealand.

This AusHFG Health Planning Unit (HPU) has been developed by AHIA following an extensive consultation process completed in 2023.

1.2 INTRODUCTION

This HPU outlines the specific requirements for the planning and design of an Operating Suite.

The scope of services covered in this HPU includes the preoperative, intraoperative and postoperative management of patients. This includes the second stage recovery and discharge facilities for day only patients, however planning for surgical inpatient units is covered within HPU 340 Adult Acute Inpatient Unit.

In response to the increasing convergence of complex interventional and surgical procedures this revised version includes planning and design guidance relating to hybrid operating rooms (OR), which combine a traditional OR with the technologies of interventional imaging.

This document should be read in conjunction with the Australasian Health Facility Guidelines (AusHFG) generic requirements described in:

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

Additional AusHFG resources that complement this HPU include:

- HPU 270 Day Surgery/Procedure Unit (applicable to dedicated day only surgical services)
- HPU 190 Sterilizing Services and Endoscope Reprocessing Unit
- HPU 340 Adult Acute Inpatient Unit which can be used to plan surgical inpatient units
- HPU 510 Maternity Unit
- HPU 440 Medical Imaging Unit
- HPU 430 Front of House Unit which can be used to plan an admissions unit, and
- HPU 155 Ambulatory Care and Community Health which can be used to plan preadmission clinics.

Project teams should refer to local jurisdictional policies and guidelines relating to engineering and building services requirements. A summary of key references is included at AusHFG 'External Resources' tab.

1.3 POLICY FRAMEWORK

Before undertaking a project, planners and project staff are encouraged to familiarise themselves with jurisdictional plans, policies and guidelines relating to surgical services. Key reference materials include:

- Australian College of Perioperative Nurses (ACORN) Standards for Perioperative Nursing in Australia
- Australian and New Zealand College of Anaesthetists (ANZCA) Professional Standards including PS4 Recommendations for the Post-Anaesthesia Recovery Room)
- Australian Commission on Safety and Quality in Health Care (ACSQHC), Australian Guidelines for the Prevention and Control of Infection in Healthcare
- AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities (Standards Australia), and
- Infection Prevention and Control in Endoscopy, Gastroenterological Society of Australia and Gastroenterological Nurses Society of Australia).

Regulatory requirements relating to radiation protection vary between States and Territories and in NZ. Confirmation of requirements should be sought from the jurisdiction's relevant regulatory authority (refer to Section 5.4). Different jurisdictions may refer to information and standards published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and other bodies.

The storage of medications within an operating suite must be in line with the Poisons and Therapeutic Goods Act 1966, Poisons and Therapeutic Goods Regulation 2008, and relevant jurisdictional policies.

Information relating to jurisdictional policies and guidelines are listed in the Appendices.

1.4 DESCRIPTION

The Operating Suite is a self-contained, physically distinct and environmentally controlled area. The Unit will accommodate perioperative care including the:

- preoperative phase which includes patient management prior to the surgery or procedure to the point of transfer to the OR
- intraoperative phase which includes surgery or procedures, and
- post-operative phase which begins with first stage recovery until a patient is transferred to an inpatient unit or discharged.

Activity undertaken within an Operating Suite will include elective and emergency surgery. A large percentage of surgery will be elective, with most patients being admitted on the day of procedure with many being day only admissions.

Operating Suites will vary depending on the size, scale and role delineation of the health service. These Units may range from a single OR, used a few days a week, through to large services with over 20 ORs. The number of rooms will affect the operational and design solution. It is increasingly likely that tertiary and quaternary services will continue to implement new technology, equipment and procedures that will influence space requirements. Examples include digital environments, hybrid ORs, robotics and major medical equipment such as CT (fixed and mobile).

The surgical environment is planned and designed to reduce the risk of infection for patients and staff. Considerations include air-handling systems, the use of materials that are easy to clean and maintain, the flow of people (staff and patients), materials (clean and dirty) and access control.

The Operating Suite should be sufficiently flexible to accommodate the day-to-day fluctuations in surgical and procedural caseload and enable the adoption of these emerging technologies. The range of patients being managed within the Operating Suite will include children, adults and those with specific needs, e.g. obstetric procedures, bariatric and those with cognitive impairments. In addition, these environments are used for clinical training of a range of students and clinical staff.

1.4.1 Terminology

C-arm

A C-arm, sometimes referred to as an image intensifier (II) for mobile units, is a fluoroscopic system that connects an x-ray source on one end and the detector on the other (in a C shape) and is rotated around the patient at different angles to provide real time imaging. These are commonly used to support a range of image guided procedures and may be provided through fixed or mobile units.

Day of Surgery Admissions (DOSA)

A service model whereby patients are admitted to hospital and have surgery on the same day. This model is promoted for the majority of elective surgery patients. Some facilities refer to a DOSA unit which is the location for patients to present to for admission and preparation prior to surgery.

Digital Operating Room

These rooms provide the visual and digital information integration to support minimally invasive and image guided surgery.

Video integration (in-theatre) is the transfer of video from instrumentation, i.e. endoscope or camera (in-light camera) to the display screens (either ceiling or wall mounted display screens). Video integration can also occur outside of the OR with the transfer of streamed video from instrumentation or cameras to an external location such as a training room or device.

Digital integration can be used for a range of functions including generation of worklists from the eMR, retrieving PACS images for review during a procedure, customisation of the OR, room lighting and music.

Extended Day Only (EDO)

This is also referred to as a ‘23 hour model’ and is a variant of day surgery whereby care is delivered within 23 hours. Some units may implement EDO models where care is provided over a longer length of stay. Patients are identified through a pre-admission screening process and managed by clinical protocols that promote improved patient outcomes and patient experience, and more efficient use of hospital resources.

Hybrid Operating Room

An advanced procedural space that combines a traditional OR with an image guided interventional suite. A hybrid OR includes fixed digital medical imaging systems that provide the capability to perform image-guided procedures combined with minimally invasive and open surgical procedures.

O-arm

An ‘O-arm’ is a mobile CT imaging structure developed for intraoperative 3D fluoroscopic imaging and is typically associated with spinal procedures.

Post Anaesthetic Care Unit (PACU)

The PACU, also known as Stage 1 recovery, provides accommodation for unconscious, post-procedure patients who require constant observation and monitoring.

Reusable Medical Device (RMD)

A medical device (often referred to as surgical instruments) that is designated or intended by its manufacturer as suitable for reprocessing and reuse.

Robotics

Robotics used in surgery support minimally invasive techniques by providing the surgeon with enhanced visualisation through magnification, articulation of surgical tools and the use of dyes and lights to identify key structures to guide surgery. Robotics may offer greater precision and control than is possible with conventional techniques through videoscopic and stereotactic techniques.

The use of robotics in surgery is anticipated to continue growing. Two broad types of systems are used including:

- large robotic units, e.g. daVinci Surgical System that can be difficult to manoeuvre are often sited within a nominated OR, and
- haptic robot arms, tactile feel technology systems, which are more mobile.

02 PLANNING

2.1 OPERATIONAL MODELS

2.1.1 Hours of Operation

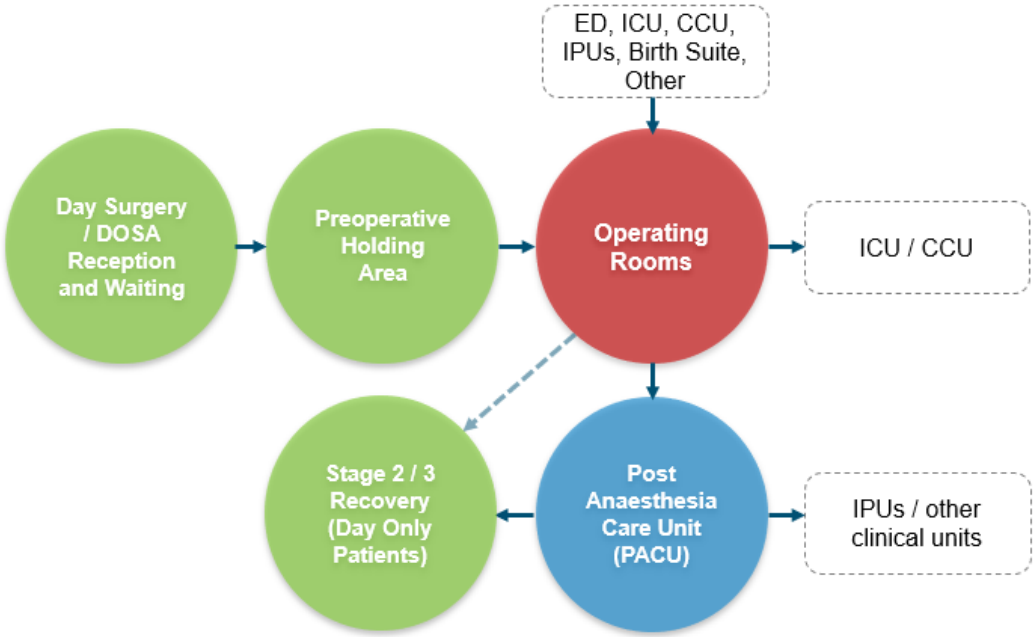
The hours of operation of an Operating Suite will vary according to the level of service, model of care and operational policies.

Large tertiary units will provide services 24/7 subject to planned closures and arrangements for emergency surgery during those periods. Smaller units may provide an on-call service after hours and at weekends.

Consideration will need to be given to the safety of staff working out of normal business hours and the optimal arrangements for patients and staff relating to services operating extended hours. Planning should consider the impact of closing down some zones after hours so that the core services can continue to operate safely with minimal travel distances.

2.1.2 Patient Flow

An overview of typical patient flows from the preoperative phase through to postoperative phase is provided in the figure below.



Patient Preparation and Pre-operative Holding

Contemporary models of care promote day of surgery admission (DOSA) models, however, with the exception of Operating Suites exclusively focussed on day surgery, patients will be transferred to the Operating Suite from a range of clinical departments and may include elective and emergency cases.

Following presentation to the unit, day only and DOSA patients will wait in a waiting room prior to being prepared for the procedure. This will involve checking information, taking a set of observations, and the patient changing into a hospital gown and waiting in the 'pre-operative holding' area. Patients may also require assessment by the treating clinician. The environment should actively support the emotional wellbeing of the waiting patient at this stage. The arts can be used to positively support the clinical experience. Refer to Section 3.5.4 for further guidance on arts integration.

Where possible, patients from other clinical units will be transferred directly to the OR. The provision of additional pre-operative holding areas for these patients will depend on travel distances and operational practices. Where provided pre-operative holding areas should be centralised to promote staffing efficiencies.

Some services may provide an anaesthetic preparation room attached to each OR to facilitate patient flow and to support patient preparation (e.g. insertion of preoperative intravenous lines, invasive monitoring devices and regional anaesthesia).

Patient Recovery

Following their procedure, most patients will be transferred to a PACU, also known as Stage 1 recovery, which provides accommodation for unconscious, post-procedure patients who require constant observation and monitoring. Patients are transferred out of PACU once they have regained control of their airway, have stable observations, and are awake and able to communicate purposefully. Some patients will require transfer to an Intensive Care Unit/Cardiac Care Unit where a higher level of care is needed.

Although not standard practice at the time of writing version 7.0 of this HPU, some facilities may implement advanced recovery models where it is an endorsed model of care for that unit. The aim of this model is to extend the level of monitoring and support into the immediate postoperative period for medium risk patients to reduce complications following surgery. Patients will remain in PACU for an extended period of time, typically 4-6 hours or overnight, prior to being transferred to the inpatient unit. Where provided, a small proportion of PACU bays may be designated to support the model.

Patients requiring admission are transferred to the relevant Inpatient Unit following anaesthetic recovery in PACU, with day only patients directed to Stage 2 recovery prior to discharge. Day only patients who have had little or no sedation may bypass PACU and be directed straight to Stage 2 recovery following their procedure. Most patients will be nursed in a recliner in Stage 2 recovery although some access to trolleys may be needed. Patients will receive a light meal, post-discharge instructions and be supplied with discharge medications or a script.

Stage 3 recovery is a discharge lounge that is typically provided in larger units only to optimise patient flow.

Some facilities may provide an Extended Day Only (EDO) Unit, whereby care is typically delivered within an episode of care up to 24 hours or a longer period on some units. The length of stay for the unit must be identified given this will impact facility requirements.

2.1.3 Models of Service Delivery

The model and range of services to be provided will determine the component parts and configuration of the Operating Suite and the functional relationships required with other clinical services. Some examples are described below, acknowledging that a range of models may be implemented within the same facility.

Integrated Unit

A fully integrated unit provides all the facilities for preoperative, intraoperative and post-operative management of all patients including DOSA patients. It may or may not have access to an EDO Unit.

Perioperative Model

Facilities for preoperative management of DOSA patients and post-operative care of day patients may be undertaken in a separate unit that could additionally operate as an EDO Unit. Patients undergoing planned surgery as day-only or day-of-surgery admissions are admitted to a dedicated facility prior to surgery. Surgery and first stage postoperative recovery are undertaken in the Operating Suite. DOSA patients are transferred to an inpatient unit. Day-only cases are transferred to the Perioperative / Day Surgery Unit for pre-discharge care.

Regardless of whether the units are operationally integrated or separate, planning should focus on minimising the travel distances for patients and staff between units.

Collocated Operating Suite and related procedural services

This is a model whereby operating rooms and a range of other specialty procedure rooms, e.g. interventional angiography, endoscopy and cardiac catheterisation rooms, are collocated, allowing easy access to anaesthetic support and shared use of perioperative facilities thus reducing unnecessary duplication.

Optimising patient pathways and the efficient provision of anaesthetic support and recovery areas are priority considerations relating to this model. Large units that are challenging to accommodate on a single level may consider separation of some interventional services or the endoscopy suite where it will promote improved patient flows and the size of the unit is sufficient to support a critical mass of anaesthetic support and recovery areas.

2.1.4 Hybrid Operating Rooms

There is an increasing provision of hybrid ORs across Australia and New Zealand, combining the requirements of an OR with the technologies of interventional and fixed imaging. Hybrid ORs support a broad range of procedures that are less invasive than traditional surgery and offer faster recovery times for patients. However, they are costly to build and operate given the additional space, equipment, and workforce requirements, so early planning must include a detailed analysis of service need that considers:

- clinical specialties and sub-specialties that are proposed to utilise the hybrid ORs
- projected casemix and activity volumes for relevant procedures
- imaging technology required
- engineering services provisions
- service capability
- workforce requirements, and
- capital and recurrent cost implications.

It is essential that early planning processes confirm the types of procedures to be undertaken in the hybrid ORs and the need for flexible use by other surgical specialties as this will impact planning and design.

The main specialties using hybrid ORs include vascular surgery, neurosurgery, cardiac and cardiothoracic surgery, orthopaedics and trauma, other minimally invasive surgeries, interventional radiology (IR) and interventional neuroradiology (INR).

Types of Hybrid ORs

Hybrid ORs are typically characterised by the type of imaging equipment installed in the room and the clinical services offered.

Imaging equipment commonly installed in a hybrid OR includes single-plane or biplane angiography systems, computed tomography (CT) scanners, and magnetic resonance imaging (MRI) scanners with adjacent use of portable ultrasound.

The **single plane system** is the most commonly installed imaging equipment in a hybrid OR. These systems are often referred to as a single ‘C-arm’ unit, reflecting the C-shaped arm that connects the x-ray source on one end and the detector on the other and is rotated around the patient at different angles to provide real time imaging. These are typically used for a range of vascular, cardiac, urology, general surgery and orthopaedic procedures. The **biplane** system has two C-arms that can acquire images from two reference points at the same time and are used most often for small vessel angiography including paediatrics, neurosurgery, INR and complex cardiac interventions.

These two systems can be configured to work with a standard interventional imaging table or a surgical operating table.

The further addition of CT and/or MRI to the single and bi-plane angiography configuration is available. The complexity of this design should not be underestimated. Single or multiple room workflows should be evaluated to ensure best clinical use.

There are two approaches to the use of intra-operative CT and MRI. Either the imaging modality is moved via tracks to the patient in the operating room or the patient is moved to the imaging room. In both cases, the option of accessing the imaging room at other times is desirable, e.g. for use by intensive care patients, so the location within the complex may need to consider this requirement.

The procurement of major medical equipment, including imaging systems, operating tables, pendants and AV integration must be informed by the types of procedures to be undertaken and the requirement for flexible use by other specialties. This also applies to the design and integration of adjacent medical equipment and accessories. The dual requirements of the 'operating room' and the 'medical imaging' equipment will need to be clearly defined to best support a fully integrated approach.

Workforce Considerations

Realising the benefits from a hybrid OR requires highly specialised clinicians working in teams, including surgeons, interventional cardiologists or radiologists, radiographers, nurses, anaesthetists, perfusionists and biomedical engineers. A sustainable workforce model will be essential, and all team members should be involved in the planning for these facilities so there is a shared understanding of the proposed scope of requirements.

Long term post commissioning, multi-speciality training and technical support and clinical workflows must also be considered in the workforce model.

Further design guidance relating to hybrid ORs is provided in Section 4.2.5 Non-Standard Components and 5.1 Schedule of Accommodation.

2.1.5 Environmental Sustainability Initiatives

Operating Suites have a significant environmental impact due to their energy-intensive processes, consumption of resources, use of volatile anaesthetic agents and production of waste. They are estimated to be three to six times more energy intensive than inpatient units (Royal College of Surgeons England, 2022) and account for up to 33% of total hospital waste (Wyssusek et al. 2018).

There has been a growing trend in recent years to implement a range of sustainability initiatives within Operating Suites, however there is variability of implementation across Australia and New Zealand. Sustainability initiatives need to consider 'whole of hospital' approaches to sustainability and the full logistics process, for example waste management processes relating to collection and recycling providers.

A number of key sustainability strategies for operating suite planning, design and operation are outlined below. For further information refer to:

- ASHRAE Standard 189.-2021 Design, Construction and Operation of Sustainable High-Performance Health Care Facilities
- ANZCA PS64 (G) Position Statement on environmental sustainability in anaesthesia and pain medicine practice, 2019
- Climate Risk and Net Zero, NSW Health - Surgery Resources
- Intercollegiate Green Theatre Checklist:. Evidence-based recommendations from 3 UK medical colleges for environmentally sustainable practice in operating theatres, recently endorsed by Council of the Royal Australasian College of Surgeons
- Jurisdictional waste management policies / regulations and relevant Environmental Protection Authority (EPA)

- Royal College of Surgeons England, Sustainability in the Operating Theatre, May 2022
- Victorian Health Building Authority Guidelines for Sustainability in Heath Care Capital Works
- Wyssusek et al. 2018, Operating room greening initiatives - the old, the new, and the way forward: A narrative review.

Waste

Operating theatres produce significant amounts of operational waste including single use plastics, medical waste, and general waste. A waste minimisation approach should be adopted by reducing waste where possible, efficient and appropriate use of consumables and medical equipment, improved waste segregation, and recycling.

Key planning and design implications relating to waste management are included in Section 2.2.8 Waste Management.

Anaesthetic gases

Operating Suites use a range of anaesthetic gases. Nitrous Oxide (N_2O) has a high Global Warming Potential (GWP) and therefore contributes to greenhouse gas emissions. There is a current trend towards reducing clinical N_2O use, however where required, deconstruction scavenger systems may be implemented to reduce environmental impact. Where reticulated N_2O is used, there should be a focus on minimising operational leakage through rigorous maintenance and diligent operational processes.

Key planning and design implications relating to nitrous oxide are included in Section 3.10.5 Medical Gases.

Energy

As noted above, Operating Suites are major energy consumers. This is primarily due to their requirement for continuous high volumes of humidity-controlled air to maintain required conditions and optimise infection prevention and control.

Designing air handling system with reduced fan power and operating in setback mode outside operating suite usage hours can reduce energy consumption significantly. If set back operation is implemented, it is essential that full humidity control within the limits of local jurisdiction requirements is maintained.

Energy efficient lighting and other equipment should be provided.

Electrification of all equipment should be provided where possible (to avoid the use of fossil fuel powered equipment).

Key planning and design implications relating to energy efficiency are included in Section **Error! Reference source not found.** Air Handling.

Water

Water efficient fittings and equipment should be used where possible.

Indoor Environment Quality (IEQ)

A significant trend in health design is improving IEQ to deliver health and wellbeing benefits for both staff and patients. Operating Suites should utilise low toxicity materials (such as low Volatile Organic Compounds (VOC) finishes, adhesives, and sealants), provide natural light and high-quality external views where feasible, and include décor that is calming and incorporates biophilic design principles where possible.

Key planning and design implications relating to IEQ are included in Section **Error! Reference source not found.** Environmental Considerations and Section 3.8.2 Volatile Organic Compounds.

2.2 OPERATIONAL POLICIES

2.2.1 General

The following issues should be considered in developing the operational model for the Unit, as they will impact the configuration of the Unit and overall space requirements.

Operational policies should be developed as part of the project planning process. Refer to Part B Section 80 General Requirements for further information.

2.2.2 Access

Three zones are identified within the Operating Suite to ensure that patient outcomes are optimised. These include:

- **unrestricted** areas where staff and visitors may wear street clothes or perioperative attire. Examples of these areas includes change rooms, entries and public areas
- **semi-restricted** areas where staff and selected visitors are usually wearing perioperative attire. In some cases, visiting staff may instead be wearing a uniform, e.g. handover of patients. These areas may include holding areas, recovery and other support spaces; and
- **restricted** areas are only accessible by approved staff wearing perioperative attire, e.g. operating and procedure rooms.

The 'red line,' use of colour or other treatments concept can still be used to provide visual cues to staff working within the Operating Suite to reinforce restricted access areas. This will be used in addition to electronic access control systems.

Refer to 'Asepsis' and 'Perioperative Attire' in ACORN 2023 Standards for Safe and Quality Care in the Perioperative Environment (SSQCPE).

2.2.3 Case Assembly Set-up

Assembly or set-up is the process of compiling all of the reusable medical devices and sterile consumables required for each surgical case or procedure. A range of equipment may be used for case assembly, and will be stored on the unit, including:

- shopping trolley-like containers - one surgical case per trolley
- shelved trolleys that may contain the requirements for several surgical cases, and
- case carts - one surgical case per cart.

The requirements for the next day's cases will be assembled using information related to the procedure and surgeon preferences. The carts or trolleys with wrapped and sealed RMDs and sterile consumables, will be stored overnight in a dedicated area, usually a sterile supply room or sterile core. Some facilities may undertake initial set-up processes in a decentralised sterile 'set-up' room attached to the OR. This may be required to optimise workflows for high volume units or where surgical cases frequently require multiple stages or disciplines. Optimal workflows should be determined on a project by project basis.

In line with ACORN Standards, the opening and laying out of the reusable medical device (RMD) packs and sterile consumables occurs in the operating/procedure room and is performed under sterile conditions by the circulating nurse for use by the instrument nurse who is 'scrubbed' to ensure sterility is maintained.

Facilities must comply with:

- ACORN 2023 Standards for Safe and Quality Care in the Perioperative Environment (SSQCPE)
- AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities

- Standards Australia 2012, AS 1668.2: The use of air conditioning and ventilation in buildings, SAI Global
- Jurisdictional engineering services guidelines for healthcare facilities.

2.2.4 Consignment and Loan RMDs

Most Operating Suites utilise consignment and loan RMD (also known as 'loan sets'). As many as 10 trays delivered in crates/boxes will be delivered for each surgical case. A designated area in the Sterilizing Services Unit (SSU) will be needed to receive, receipt and reprocess the loaned RMD. The items will then be sent to the Operating Suite or stored within an identified area until needed.

For further information refer to:

- AusHFG HPU 190 Sterilizing Services Unit; and
- Design and handling of surgical instrument transport cases, a guide on health and safety standards, WorkCover NSW, May 2011.

2.2.5 Management of Prostheses

Prostheses may arrive with consignment or loan instruments, or separately. On arrival, the prosthesis will be checked through a Radio Frequency Identification Device (RFID) reader (where available) and then stored within an identified area, e.g. sterile store, fridge within the Operating Suite. Once a case is completed, the related prostheses are again checked through the RFID reader to update information relating to stock on hand.

For services providing high volumes of orthopaedic surgery, a designated prostheses store may be provided close to the orthopaedic ORs.

2.2.6 Immediate Use Sterilization

Most health services do not support immediate use sterilization for RMDs that can be terminally sterilized and instead have implemented systems within the SSU to ensure urgent items can be processed in a timely way so that clinical care is not compromised.

2.2.7 Clean-up

Reusable medical devices should be wiped clean with a sponge by nursing staff after immediate use. In some selected orthopaedic cases, RMD are soaked during the case as the debris can be difficult to remove once it is left for a period of time.

Recommended cleaning methods will be prescribed by the manufacturer of the RMD in their instructions for use. Manual cleaning and rinsing of an RMD should only be used where it is deemed necessary by the manufacturer, and this will occur in the SSU.

The use of 'clean up' rooms within the Operating Suite will vary between jurisdictions and facilities. They are not designed for manual cleaning of used RMDs before transporting to SSU but are typically used to support short-term holding of used RMD awaiting collection, waste management and cleaning of ORs. Where a surgical waste management system is in use, and this will be specialty dependent, these units will usually be docked within the clean-up room. It is likely that one of these units will serve six to eight ORs.

Once a case is completed and the count is finalised, used equipment may be transferred to the clean-up room when carts/trolleys are stripped of sharps, waste and instrument trays. Staff will collect covered trolleys and transfer RMD to the SSU for reprocessing. In some facilities, soiled RMDs will be transferred directly from the OR to SSU.

Where an SSU is not provided on site and RMDs are transported off-site for sterilisation, the unit will require facilities to support cleaning, packing, dispatch and receipt of reprocessed RMDs. Further details are provided in HPU 190 Sterilizing Services and Endoscope Reprocessing Unit Section 2.1.5 Off-site or Outsourcing of Reprocessing.

2.2.8 Waste Management

There is a strong move towards optimising waste management within Operating Suites to improve environmental sustainability. This includes reducing clinical waste generation, efficient use of single use items, and optimising recycling. Reducing single use items needs to be considered with caution given reusable alternatives requires the use of other resources, sometimes of greater environmental impact.

It is essential that the design of the unit supports recycling processes at all stages including clean-up areas, disposal rooms and loading docks. Typical waste streams within Operating Suites will include general waste, clinical waste and recycling including separate streams for paper/cardboard, sterile wraps, hard plastics, PVC, single use metal instruments, and glass. In selected clean-up rooms, cytotoxic waste streaming will also occur.

The type and quantity of bins to be accommodated within the clean-up and disposal rooms will depend on the casemix, jurisdictional approaches to waste management and the frequency of waste collection.

2.2.9 Heater-Cooler Units

Services undertaking cardiothoracic surgery will require consideration of the heater-cooler units used to control the temperature of blood, such as during cardiac bypass surgery and extracorporeal membrane oxygenation (ECMO). These units have previously been linked to mycobacterium chimaera infections as a result of substandard maintenance processes. Services will need to refer to local jurisdictional advice to ensure support for any heater cooler units procured, and that the required cleaning and disinfection processes can be implemented.

These units may be stored within the associated ORs or in a separate store area. Cleaning and disinfection processes will need to be undertaken in line with the manufacturer's recommendations. It is recommended that these processes are undertaken in SSU to minimise the impact on perfusion staff and to support optimal cleaning practices. However, in some services a perfusion clean-up room may be provided in the Operating Suite that supports the required cleaning and disinfection regime including sufficient exhaust to manage the chemicals involved. Further information can be sourced from the Therapeutic Goods Administration (TGA): https://www.tga.gov.au/news/safety-alerts/infections-associated-heater-cooler-devices.

2.2.10 Medical Imaging

The use of medical imaging in the Operating Suite is increasing. This is in part due to the trend towards less invasive procedures. A range of equipment is used including:

- Mobile imaging such as C-arms (also often referred to as mobile image intensifiers - IIs), O-arms, general x-ray, ultrasound, video laryngoscopes for tracheal intubation, stereotactic equipment and in some instances, mobile CT, and
- fixed imaging such as C-arms, angiography, CT, ultrasound and in some instances, MRI.

Mobile equipment needs to be 'parked' in a dedicated location when not in use, that does not impede access and transport of other items or people. Recharging and data access requirements must also be considered. Door clearances must support transport of mobile imaging equipment to the relevant rooms. Integration between equipment items must also be supported where required, for example integration of CT and stereotactic equipment. New technology, such as a mobile CT, is very large.

Selected rooms will require radiation shielding (or electro-magnetic shielding for MRI) and personal protective equipment (PPE) while others will just require PPE for staff (refer to Section 3.10.9). Shielding requirements will require assessment by a suitably qualified expert in line with relevant radiation regulatory requirements.

In hybrid environments, the fixed imaging unit is best designed so that it can be parked away from the sterile field. This makes the room more flexible when this technology is not being used.

Matters relating to shielding and signage are detailed in Section 3 Design.

2.2.11 Pathology

A range of pathology related activities support an Operating Suite including:

- **frozen sections** whereby a fresh tissue specimen is taken in the operating room, reviewed by an anatomical pathologist and then results provided to the surgeon within a 20 minute timeframe. Where a pathology department is located close-by, a courier will take the specimen to the pathology department where a scientist and pathologist will be on standby to freeze, slice and stain the specimen so that it can be examined on a microscope by the anatomical pathologist. The results will be relayed from the pathologist to the surgeon so the surgical procedure can continue. This approach means that the time of pathology staff is better used.

  Where a hospital does not have an anatomical pathology service on site, or the pathology service is located some distance from the Operating Suite, technology can be used to provide timely advice and efficient care. A scientist will need to be present within the Operating Suite but the pathologist will work remotely. The slide will usually be prepared (as outlined above) in a dedicated space in the Operating Suite. The slide will then be placed under a microscope with camera attachment and the digital slide image sent to the pathologist where it will be viewed. The design and service arrangements should support remote analysis rather than specimens needing to be transported large distances. Digital pathology is also impacting traditional workflows, whereby glass slides can be captured with a scanning device to provide a high-resolution digital image that can be viewed on a computer screen and shared over networks, rather than requiring individual analysis via a microscope.

- **other tissue specimens** that are not time critical may be placed in formalin (formaldehyde) and sent to the pathology department for preparation and examination. Most samples will be transported in pre-filled specimen containers. Larger specimens may require formalin to be decanted. The provision of a suitable exhaust ventilation system to manage fumes will be guided by a risk assessment and will depend on how frequently the service is needing to decant formalin. Staff will also require appropriate PPE and have access to spill kits. Dedicated chemical cupboards are required to store formalin and other chemicals. Requirements will be guided by the Workplace Exposure Standards (WES) provided by Safe Work Australia and WorkSafe New Zealand and associated safety data sheets. The sourcing of suitable containers and ensuring correct use is essential so that hospital, transport and/or receiving pathology workers are not exposed to risk. Extraction systems will be required for storage of formalin-fixed tissues and whole organs. Storage requirements will need to consider cultural requirements relating the return of tissues to the patient.

- **point of care testing** equipment, such as blood gas machines, are typically accommodated within the pathology bay/room.

- **blood storage** within an Operating Suite may be needed if the distance from the main blood storage supply in the pathology unit is considered to be too far. This matter will usually be referred to a health services transfusion committee for consideration.

The transfer of specimens may be supported via a **pneumatic tube system (PTS)**. A PTS is a rapid and reliable method for transporting medical specimens and materials between different areas within a hospital, including the operating suite and the pathology department. These systems enable the swift and secure delivery of fresh specimens to the pathology laboratory for an intraoperative assessment. It is however acknowledged, that a significant proportion of specimens cannot be transported via PTS (e.g., blood products) so travel distances must be considered with appropriate design and operational strategies implemented to support optimal workflows.

The model for pathology services must be confirmed early in the planning process to inform associated pathology areas and equipment with consideration of safety and infection control requirements for pathology staff.

2.2.12 Medications

Central storage for medications will be needed within an Operating Suite with decentralised storage required to support holding and recovery.

A high proportion of scheduled medications are used in Operating Suites with specific storage and security requirements in line with legislation and jurisdictional policies. Many services will locate a drug safe for scheduled medication storage within each operating room module in either the anaesthetic or operating room. There are pros and cons of each approach including:

- the anaesthetic bay can be accessed throughout the day so the medications can be checked at each shift without disturbing ongoing surgical cases. In turn, this room is not always supervised, and
- the operating room is occupied throughout the day so medications are supervised. Nursing staff do have to access the room to check the count which can be disruptive.

A separate locked cupboard may be provided for the storage of propofol. The provision of this will be guided by local jurisdictional policies in line with the risk of misuse, whilst supporting rapid access for use in surgery.

Automated medication dispensing units may be used within operating suites. Appropriate investigation and analysis should be undertaken prior to confirmation of the preferred system in line with whole of hospital approach to medication management (refer to HPU 560 Pharmacy Unit for further information). If automated dispensing systems are to be used, consider the dimensions of the units (either fixed or mobile) and the provision of power and network connections.

Ideally, refrigerated medications will be centrally stored within the Operating Suite and accessed as required.

2.2.13 Biomedical Engineering

A room for equipment testing and repair is ideal, especially in large Operating Suites. This room will be accessed by biomedical engineering staff who will require access to a workbench, storage for equipment and consumables. Where staff need to maintain a back-up anaesthetic machine, a place to ‘park’ this large unit will be needed along with a medical services panel so that all gases used by the machine can be tested. Given the size of some equipment, the doorway requires a 1400mm clear opening.

The space requirements to support biomedical engineering is increasing given growth in the types and complexity of equipment provided within ORs. Biomedical engineering rooms are typically provided within a semi-restricted area with access both internally to ORs and externally for technicians. Some facilities may require provision of an equipment hoist to support safe work practices.

2.2.14 Pre-Admission Clinics

These clinics are typically located in an ambulatory care zone of a health care facility to support day of surgery admission processes. Facilities will include consult rooms with ready access to medical imaging and pathology specimen collection services.

2.2.15 Patient Property

Requirements may vary depending on the patient type. For example:

- inpatients being transferred to the Operating Suite should have no belongings to manage, however some may have personal items requiring appropriate management
- patients presenting for a day of surgery procedure who will then require an inpatient stay may need to store luggage, so a locked room within the Operating Suite is useful for storage until the patient is transferred to an inpatient unit, and
- day-only patients may instead have access to a locker that they can access in pre and post-operative settings or property may remain with the patient e.g. on the patient trolley. They will be encouraged to limit the amount of personal items that they bring for the day.

2.2.16 Education and Training

Staff will need access to meeting, education and training space within the Operating Suite or shared with adjacent units for smaller services. As it is ideal to minimise movement within the operating room to reduce potential contamination of the surgical field, cameras can now transmit video and images to an alternate site such as a device or meeting room either within, or external to the Operating Suite. These cameras form part of the digital integration system.

There is an increasing requirement for simulation based operating room team training and access to appropriate facilities to support this should be considered.

Education and training requirements must consider all disciplines working within operating suites. The types of training, e.g. advanced life support and hazardous manual tasks; the volume of staff participating; and any networked training arrangements must be considered.

2.3 PLANNING MODELS

2.3.1 General Principles

There are a range of issues and planning parameters that will require evaluation prior to commencing the internal planning of the Unit as described in the following sections.

The operational model chosen for the Operating Suite, as outlined in Section 2.1, will greatly influence the required planning model.

2.3.2 Number of Operating Rooms

The number of operating and procedure rooms is described in the clinical services plan and will be determined by:

- the case mix and complexity of the surgical and procedural caseload as defined in the service plan
- surgical and technology trends that may influence future patterns of activity
- the anticipated volume of procedures including some assumptions regarding the anticipated number of cancellations
- operating hours, such as the length of time a room operates per day e.g. eight to 10 hours
- management of emergencies, and
- the length of changeover time between procedures.

The number of ORs provided must consider the number and allocation of emergency ORs in line with projected emergency surgery activity based on historical trends. This must include sufficient reserved OR capacity to manage time critical emergency surgery.

The Royal Australian and New Zealand College of Obstetricians (RANZCOG), 2019, recommends that large teaching hospitals will require at least one dedicated obstetric OR ideally located adjacent to the birth suite and which is quarantined from non-obstetric cases in all but the most dire of circumstances. It is recommended that an additional OR is required for every 4000 births (or part thereof).

The number of ORs will be used to estimate the number of recovery bays or rooms required and the extent and configuration of support and other facilities. Refer to Section 2.4.6 for further information regarding the recommended number of recovery bays per OR/procedure room.

2.3.3 Operating Room Sizes

Advances in surgical techniques and the use of new equipment and technology are driving a requirement for larger ORs. The sizes listed in this HPU are appropriate for most surgical specialties, however a final space allocation will depend on many factors including surgical case mix and the use of new equipment and technology in the room.

The usable floor area should be considered. For every door into the operating room or item fixed onto a wall, the usable space in the room is reduced. Careful consideration should be given to the number of doors and fixed workstations and their locations in terms of their impact on usable floor area.

Flexibility of use should be considered when planning new units including future changes to the case mix, equipment and technology over time. The provision of a standard operating room size provides a flexible footprint when changes to the types of procedures, new technologies or practices are adopted, however some larger sized ORs, with associated support areas, may be required to appropriately accommodate large items of equipment and technology and the ability to adapt to future changes. Hybrid rooms will require additional floor space to accommodate fixed imaging equipment and additional team members, and will need to be supported by an attached control room. Trenching requirements and floor coverings for in ground services between the hybrid OR and control room must be considered, with attention to cleaning requirements and minimising trip hazards.

Growing utilisation of technology in surgery is anticipated and should be considered, including the types of robots to be provided. Surgical robots are generally decreasing in size and most can be accommodated within a standard operating room, particularly those that are mobile and will be moved between rooms. Large robots that are often sited within a nominated operating room may require additional space, particularly where they are used to support training which typically requires a secondary device for observation and learning, and where flexible use of the room is required so the robot needs to be moved out of the way for some procedures.

Refer to the Schedule of Accommodation for further information.

2.3.4 Operating Room Layout

ORs should be planned to consider the flow of patients, staff (including those who are scrubbed), a range of supplies and equipment and waste. Wherever possible, the layout should be consistent, but this should not interfere with function and usability.

There are two options for operating room layouts - single handing and mirror reversal. A mirrored approach to pairs of ORs is a more common approach given it provides spatial efficiencies through sharing of support areas such as scrub bays. Single handing means that the layout of each room is identical including door locations and the layout of equipment and fittings. Single handing enables staff to be familiar with the room layout regardless of which OR they are working in, however regardless of the layout adopted, the design of the OR and pendant arrangements should support flexible use that will enable a consistent OR design where appropriate.

The Operating Suite Modules (appendix 5.3) illustrate the two approaches and opportunities for sharing of support areas.

2.3.5 Generic Versus Specialised Operating Rooms

Where possible, a standard approach should be used to plan and design ORs to improve flexibility over time, promote efficiency and reduce errors. Even so, volumes and specialist requirements may impact on this approach. For example:

- a number of specialties now use microscopes in the operating room. They are typically stored within the room. Microscopes are typically large and mobile
- an obstetric operating room will need additional gases located on the wall to support a newborn. Tertiary centres may need to support multiple births
- some ORs will require the provision of fixed equipment, such as the provision of a dedicated table and drainage for urology. This may be beneficial in larger units where work volumes justify this specialisation. In smaller units the benefits of flexible use usually outweighs the benefits of specialisation. The consideration of servicing and repair of fixed equipment should also be considered given this typically precludes the use of the room, and
- some ORs may require collocation / grouping, such as intraoperative MRI with ORs used for neurosurgery, and grouping cardiac ORs in pairs allows them to share specialised facilities such as perfusion rooms. These ORs are generally larger with some specialised fixed equipment.

Planners should identify the anticipated surgical casemix so that any specialist equipment or procedure that may drive the need for a larger footprint is considered.

2.3.6 Location

The location the Operating Suite will be informed by the external functional relationship requirements described in Section 2.5.1. This will also require consideration of the location of other units such as the Day Surgery Unit, EDO Unit, SSU, admissions, bookings and administrative services.

2.3.7 Multi-storey Units

Where possible, facilities should be located on the one horizontal level. However, many Operating Suites will require a large footprint and it is not unusual for project teams to have to consider locating some functions on a different but connected level of the building, e.g. change rooms and SSU.

All patient-related facilities should be collocated, but facilities such as staff change rooms, staff lounge, meeting and training rooms and some offices may be located on a floor above or below the main Operating Suite. Consideration must be given to staff safety in these areas, particularly after hours. In this model, ease of access to ORs and the recovery area via internal lift and, where possible, stairs, is essential. Stairs and lifts should be centrally located and designed so that clothing disciplines can be maintained. Consideration must be given to access for staff with mobility limitations or disability working between floors. Stairs should be of adequate width to accommodate the anticipated traffic. Adequate communication facilities are required to reach staff in case of emergency, e.g. phone or pager system.

A small satellite staff room and additional staff toilets should be provided on the main floor near where staff work.

Work areas to support nursing management of the Operating Suite and recovery areas must be closely located to the main floor.

2.3.8 Arrangement of Operating Rooms

Traditional Operating Suite designs featured clean and dirty zones and completely separate corridor systems for patients and for clean and dirty goods. In contemporary practice, operational policies play a greater role in managing and controlling the different flows but control of these flows remains a key issue in unit design.

The following designs are common approaches for Operating Suites. Under any arrangement, the travel distances to support areas must be carefully considered.

Single Corridor Design

A single corridor is an option where goods, clean and used and all pre and post-operative patients traverse the one corridor. This option works well when the main circulation corridor is sufficiently wide to permit separation of the passage of patients on beds, equipment, consumables and waste. It can also provide an opportunity for natural light within ORs. This approach is better suited to smaller units to avoid significant travel distances or for larger units where it is used in combination with the models below.

Race Track Design

This model aims to separate dirty from clean traffic by controlling the use of each corridor. Sterile stock and RMD storage is usually centralised in a sterile 'core' which prevents duplication of supplies and staff. While a central sterile core is a good option for operational efficiency, the use of this approach on a large number of ORs means that travel distances to recovery become significant. First stage recovery should be located so it is easily accessible from each operating room. In large units, a sterile core option can be used but for a smaller number of rooms.

Clusters and Pods

A cluster of two to four ORs with a shared sterile stock store is a model often considered during the planning stages. Clusters of rooms are often grouped around surgical specialities. The operational costs of providing dedicated staff and stock duplication in this arrangement of ORs need to be considered.

Decentralisation of sterile stock storage and equipment storage will be required within this arrangement, acknowledging that where possible sterile stock storage should be centralised for ease of stock management and to minimise the impact on capital and recurrent costs.

This model can also add to the corridor space and circulation space and staff may prefer the extra space to be allocated to stock storage.

2.4 FUNCTIONAL AREAS

2.4.1 Unit Functional Zones

The Operating Suite/Perioperative Unit comprises the following functional zones:

- entry, reception and waiting for the reception and identification of patients to the unit with general supervision of day-to-day administrative management of the unit, control of the main entry and general administrative tasks
- holding area for the medical admission, holding and preparation of patients prior to their surgery or procedure
- operating room where procedures are carried out. This generally comprises operating room, anaesthetic preparation room, scrub bay, exit lobby and clean-up areas
- clinical support areas such as utilities and storage
- recovery area(s) where patients are assisted through the process of recovering from the effects of surgery and anaesthesia. This may be PACU, stage 2 and Stage 3/discharge, and
- staff areas – office space and amenities including male and female change rooms, staff room and teaching and meeting spaces.

Where endoscopy reprocessing areas are provided as part of the unit, refer to:

- HPU 270 Day Surgery/Procedure Unit, and

- HPU190 Sterilizing Services and Endoscope Reprocessing Unit.

2.4.2 Entry, Reception and Waiting

Day of surgery admissions will present to a main reception point where a clerical admission will be finalised. Waiting space will be needed to accommodate the patients and at least one carer, Visitor amenities, such as toilets, should be provided unless located nearby. This area is classified as an unrestricted zone and will act as a control point for entry into semi-restricted areas of the Unit. Inpatients will not use this entry point.

Local requirements to best support carers/family/whānau should be considered. The role of arts to support improved cultural safety for staff, patients and carers is strongly encouraged. Refer to section 3.5 for further guidance on arts integration.

2.4.3 Preparation and Holding

Facilities to support patient preparation and holding may include change rooms, patient toilets, 'changed' waiting areas, holding bays (with beds/trolleys or recliners) and access to interview and consult rooms. Patient lockers may be required depending on the approach to patient property. The design of pre-operative holding areas should support a forward direction of patient flow rather than them needing to return to the waiting area. To support patient wellbeing, consideration should be given to visual art and soft personalised music.

Where patients are wheeled into the operating room, **one holding bay per operating / procedure room** is typically provided to support both inpatients and day of surgery patients, however total numbers will depend on the proportion of cases for elective and emergency surgery, and the provision of anaesthetic preparation rooms will contribute to pre-procedure holding capacity. Collocating pre-procedure holding and Stage 2 recovery bays supports flexible management as demand changes over the day. Sufficient holding and recovery bays are essential to optimise efficient patient flow.

The provision of one holding bay with a ceiling mounted hoist may be considered depending on the anticipated patient cohort for ease of transferring dependent patients. This may be flexibly used with Stage 2 recovery.

The emotional wellbeing of children is an important consideration for preparation and holding spaces. This may be achieved by providing a separate room or pod of holding bays with appropriate child friendly, creative play and digital experiences to provide positive distraction and a sense of calm. Refer to section 3.5 for further guidance on arts integration.

Consideration must be given to emergency protocols and escalation of care with access to emergency call buttons.

A staff control point may be located between the preparation, holding and ORs where a patient is identified and checked for surgery. This site may also act as a coordination centre for larger services.

2.4.4 Operating Room Module

An operating room module will typically comprise of an anaesthetic preparation room, an operating room, a scrub bay, an exit bay and clean up room. In most cases, this module will also include a sterile store for holding consumables, RMD and trolleys with stock assembled but unopened for the next number of cases.

The module is configured so that the patient flow in and out of the operating room is optimised and staff travel distances are very short.

Depending on the preferred operational model, some services may not provide anaesthetic preparation rooms and will manage patients in pre-procedure holding bays only. Depending on local jurisdictional policies, as noted at Section 2.2.7, clean-up rooms may not be provided within every module but shared between multiple ORs. This approach is typically adopted when trolleys/ carts with used/soiled RMDs are transferred direct from OR to SSU, and the 'clean up' room function is focussed on cleaning and waste management only.

Examples of modules are contained in Appendix 5.3.

A hybrid OR module will be the same as a traditional operating room module with the inclusion of a control room and computer/equipment room.

2.4.5 Clinical Support

The Operating Suite is a major user of RMD and sterile stock and the size of the **sterile store(s)** and its relationship to the ORs is of high importance. Consideration will need to be given to local approaches to the use of disposable instruments, linen and other supplies, and the use of reusable items given this will impact on preparation and storage requirements. A receiving and de-boxing area will be needed.

Storage for a wide range of **equipment** will be needed. Considerable attention should be given to the quantity, size and range of equipment to be stored and to storage locations and storage methods in order to maximise efficiency, reduce unnecessary duplication and minimise staff travel. In large units particularly, an equipment tracking system may be installed. This equipment will be stored in a range of locations including:

- the operating room. For example, much of the equipment routinely used within a room will be stored there. Specialist equipment, such as a robot, may also be stored in the room it is routinely used
- equipment rooms for equipment not in everyday use, and
- equipment bays should be provided for storage or parking of equipment in regular use such as balloon pumps, lead aprons, warming devices, and auxiliary lamps. Additional space may be required to store mobile imaging equipment.

It is recommended that local staff confirm projected major and minor equipment to be stored on the unit to confirm storage area requirements.

Other rooms needed to support the Unit include:

- medication store
- dirty utility accessible to pre and post-operative holding areas
- disposal and cleaners rooms
- pathology room with point of care testing capability (this may include refrigerated and frozen storage of human tissue), and
- linen bays.

2.4.6 Recovery

Three stages of recovery are detailed in this section however, the provision of stages 2 and 3 will be dependent on the model of service delivery, as noted in Section 2.1.2. For example, where services provide a dedicated day only/day of surgery unit, the main Unit may only provide PACU / Stage 1 recovery. Where these functions are combined, all three stages are typically provided.

Services that treat children may provide a separate recovery zone. Alternatively, children could be scheduled or cohorted to maintain separation from adult patients. Access by caregivers must be considered.

Local cultural requirements will need to be considered regarding the arrangement of recovery areas. This is a short-stay area used by patients as well as carers and the design needs to support the provision of culturally safe and equitable care. A curated arts experience that reflects the ward arts integration is encouraged. The number of recovery bays provided will depend on the casemix and projected throughput of the unit. Typical numbers provided per operating/procedure room include:

- PACU: 1.5 per OR/procedure room depending on the casemix and projected throughput. Units that are predominantly providing day surgery services may require a higher number of bays to manage the increased patient throughput. The NSW 'High Volume Short Stay Surgical Model Toolkit' recommends the provision of 2.5-3 beds per high volume short stay surgery OR. Refer to HPU 270 for further information
- Stage 2 recovery: three trolley/chair spaces per OR/procedure room used for day only cases, and
- Stage 3 recovery/discharge: two chairs per OR / procedure room used for day only cases, however this will be subject to anticipated throughput.

PACU

Open plan bays will be provided to support high levels of patient observation and short length of stay. Placement of PACU central to the ORs is preferred to enable equitable access for specialties including paediatrics, quick turnover of cases and decreased travel distances for anaesthetic/transport staff between cases.

A small number of single, enclosed rooms may be provided for patients with an infectious disease requiring isolation, children, maternity, mental health (e.g., for electroconvulsive therapy – ECT), end of life care, patients with cognitive or intellectual impairment or patients that may be disruptive to others. The number of enclosed and larger sized rooms will depend on the projected patient casemix. For example, larger sized PACU spaces are required to support obstetric and ventilated patients.

Where advanced recovery models are an endorsed model of care for the unit, a number of PACU bays may be designated to support this model. Patients in these bays will require proximal access to bathrooms and may receive a light meal so access to a beverage bay will be required. Access to support areas such as medical imaging should be considered, as well as access for visitors.

Recovery Stage 2

Depending on the size and complexity of the service, these spaces may also be used to hold patients prior to their procedure as the peaks in activity change across the day.

Bays will be arranged in an open-plan arrangement with direct access to PACU and Stage 3 (where provided) areas. Depending on the patient, access to recliner chairs or a trolley bay is needed.

Access is required to toilets, a beverage bay and pre-procedure lockers (where provided). A patient shower may be shared with the pre-operative holding area.

Recovery Stage 3 (Discharge Lounge)

This area will accommodate comfortable chairs with adequate space between them for small tables. Centres which have a high volume of more rapid turnover patients with shorter first stage recovery, e.g. endoscopy, cystoscopy, ophthalmology, plastic surgery may require larger discharge lounges with more chairs to avoid overcrowding.

Access is required to toilets, lockers and a beverage bay and are typically shared with Stage 2 recovery.

Access to a small interview room is commonly required for confidential follow-up discussions and instructions. Depending on configuration, this room may be shared with holding.

The exit from the discharge area may be separate from the admission entrance.

2.4.7 Staff Areas – Work Space and Amenities

Facilities include:

- change rooms which will include toilets, showers and lockers with sufficient capacity to accommodate the number of staff on each shift to change and move safely
- staff room/s
- meeting/tutorial room, and
- office space to support the service.

Work spaces to support nursing management of the Operating Suite and recovery areas must be located within the units to ensure appropriate staff support and access during emergency situations.

Definition of space for areas such as change rooms and staff rooms will be dependent on a good understanding of staffing numbers so adequate space is provided. As staff are in surgical attire, they typically do not leave the Unit. Proximal access to a staff room and toilets from the operating suite is essential. The provision of staff change areas and toilets must consider requirements for disabled accessible and all gender/gender neutral facilities. Where a Day Surgery Unit is collocated with the Operating Suite, provision of a separate staff room is required.

Change areas will need to accommodate shoes (inside and outside shoes) and perioperative attire including scrubs, hats and overshoes. Scrub dispensing machines may be considered within change rooms for efficient staff access to scrubs and to minimise loss of stock. These would typically be considered for new build projects only given there are significant challenges associated with installing them retrospectively. Consideration must be given to the associated capital cost, space requirements and ongoing operational arrangements.

Staff amenities must be designed to support staff wellbeing and an opportunity to relax away from the clinical environment.

2.5 FUNCTIONAL RELATIONSHIPS

2.5.1 External

Patients may enter the Unit from a number of locations. Some of these will be emergencies in need of urgent surgery or procedure.

Direct access is needed to:

- Day Surgery Unit
- SSU.

Ready access is needed to:

- emergency unit
- birthing suite
- ICU/CCU/NICU
- interventional radiology and interventional neuroradiology (where these services are not provided within the operating suite). These services may share access to anaesthetic and recovery services
- helipad via lift
- anaesthetic clinical department, and
- surgical inpatient units.

To minimise stress to patients and other hospital users, transfer of patients between these units and the Operating Suite should be rapid, direct and discreet and the use of public corridors and lifts avoided.

Critical care lifts must be appropriately sized to accommodate critically ill and ventilated (ICU and trauma) patients and should be provided with redundancy to ensure patients can be transferred safely and efficiently at all times. This will include capacity to accommodate ICU sized beds, as well as accompanying staff and equipment e.g., monitor, ventilator, ECMO on a trolley etc. Priority control during emergency situations must be considered. Refer to jurisdictional engineering services guidelines for further information (AusHFG External Resources https://www.healthfacilityguidelines.com.au/content/external-resources).

- Other units that are intimately linked with the day-to-day running of the Operating Suite and are often planned as a part of the unit include the perioperative/extended day only unit and SSU.

Other units that may require a functional link include

- pathology unit, including the blood bank, and
- medical imaging.

2.5.2 Internal

Planning of an Operating Suite is complex and requires the correct relationships to be achieved between the functional zones listed previously.

Ideally all zones, including pre-procedure areas, ORs and recovery areas should be located on the same floor to optimise patient flows, however this not always achievable. Refer to Section 2.3.7 for further information.

Direct collocation of the ORs and PACU is essential.

Key issues to be managed include:

- logical patient flow from arrival at reception, through preoperative holding, ORs and recovery back to either the perioperative unit, an inpatient unit or discharge to home,
- ready access to sterile stores and equipment from all ORs
- an environment that seeks to prevent the spread of infections
- the ability of staff to monitor the condition and safety of patients at all times
- the ability of staff to manage some patient groups, e.g. children with some degree of separation
- maintenance of patient privacy, and
- the efficient management of the Unit, in particular, consideration of staffing and equipment costs.

03 DESIGN

3.1 ACCESS

Access to the Operating Suite should be controlled but will need to accommodate:

- patients attending for planned procedures
- patients from inpatient units or the emergency department
- families or participants in care e.g. accompanying a patient having a caesarean section
- a range of staff, students and other visitors (e.g. contractors), many who will need to get changed into surgical attire on entry
- the movement of consumables, equipment, linen and waste, and
- the movement of RMD to and from SSU.

Generally, this is achieved by having one only point of entry for DOSA, day only patients and the public (planned), and separate security-controlled entries for inpatients, staff and goods and supplies.

Operating Suites are zoned to control access as described in Section 2.2.2.

During design, a clear understanding of these zones will be needed to ensure access control mechanisms are incorporated.

3.2 PARKING

Consideration should be given to drop-off parking for DOSA and day only patients and non-emergency ambulances. In addition, staff may be on-call and will need to get to the Operating Suite without delay so systems for parking for these staff will be needed.

For staff parking, refer to AusHFG Part C: Section 6.0 Security.

3.3 DISASTER PLANNING

A management plan should be in place that describes the role of the healthcare facility and jurisdictional plans. In case of a disaster, elective cases may be cancelled and these facilities used to provide additional unplanned capacity.

Refer to AusHFG Part B Section 80 General Requirements for further information.

3.4 INFECTION CONTROL

Infection prevention and control is a key consideration in the design and planning of the Operating Suite due to the invasive procedures undertaken. Aseptic and surgical sterility techniques are used by the perioperative team to minimise the patient's risk of exposure to microorganisms when the body's natural defences are breached during a surgical procedure.

Specific issues include:

- air handling (airflow management, air filtration, pressure gradients and humidity) as described in Section 3.10.4
- access control (as described in Sections 2.2.2 and 3.1)
- hand hygiene, surgical hand antisepsis (scrub and alcohol based surgical hand rub). While a 'rub-scrub' may replace a traditional water scrub, the scrub sink design is likely to remain the same, with additional dispensers added

- design of selected spaces such as ORs to identify zones such as the critical aseptic field, within the room. This critical aseptic field includes 'the area immediately surrounding the draped patient, the sterile surgical personnel and the sterile draped instrument tables and equipment' ('Asepsis' standard in the ACORN 2023 'Standards for Safe and Quality Care in the Perioperative Environment')
- adequate storage to accommodate a range of requirements including sterile consumables and RMD, unsterile consumable, medications, anaesthetic consumables and equipment, linen, operating room attire and equipment
- surfaces and finishes to promote easy cleaning and durability e.g. able to withstand hospital grade disinfectants. Cleaning can be challenging where there is significant wall and ceiling mounted equipment
- selecting equipment that is easy to clean and follow manufacturer's instructions. Personal computers are increasingly being used in the operating room and all components, including keyboards, should be easy to clean
- detailing of ceiling mounted equipment to ensure that cabling is enclosed and cannot easily collect dust
- cleaning and waste management. The location of clean-up rooms close to ORs will provide an easily accessible area to store cleaning equipment and dispose of used single use consumables and fluids and space for used RMDs to be transported to SSU
- provision of RMD reprocessing areas that are compliant with relevant standards, including endoscope, probe reprocessing that may be included as part of the unit
- the management of patients with an infectious disease requiring isolation and transmission based precautions (airborne, droplet and contact). Patient management pre, during and post procedure needs to be considered based on risk assessment including scheduling, timing and type of cases in addition to any enhanced mitigation strategies required, and
- the use of heating and cooling devices for cardiac bypass procedures has been identified as a risk where some units have been contaminated with Mycobacteria chimaera requiring additional and specific OR risk mitigation processes. Refer to Section 2.3.5 for further details.

For further information refer to:

- AusHFG Part D: Infection Prevention and Control
- Australian Guidelines for the Prevention and Control of Infection in Healthcare
- ACSQHC, National Hand Hygiene Initiative
- ACORN Standards S2 Aseptic Technique and S7 Infection Control
- AS 5369:2023 Reprocessing of reusable medical devices and other devices in health and non-health related facilities, and
- jurisdictional policies.

3.4.1 Airborne Precautions and Pandemic Preparedness

The information below outlines strategies to support increased resilience of health systems in response to pandemics, as well as prevention of transmission associated with acute respiratory infection (ARI) cases and surges outside of pandemics. Further information is provided in AusHFG Pandemic Preparedness – Health Infrastructure Planning & Design Guidance.

The air handling systems supporting new ORs are designed to AS1668.2 with positively pressured, HEPA- filtered air handling systems that achieve a minimum of 20 air changes per hour (ACH). The aim of these systems is to ensure the air is effectively free from aerosolised 'particles' that may result in surgical site infections, noting that filters are never 100% efficient. The air changes significantly reduce the opportunity for aerosols to linger as based on 20 ACH, 99.9% of airborne contaminants are removed every 21 minutes (Centers for Disease Control and Prevention, 2003). The air handling design, along with PPE, ensure that the risk of airborne spread to both patients and staff is extremely low.

Negatively pressured ORs are not routinely provided as this is not permitted by AS1668.2. However, in order to reduce the time taken for airborne contaminants to be removed during pandemic periods, jurisdictions may consider temporarily adopting higher minimum ACH adequate to achieve required pressure regimens. Although this will impact on operational costs, it is anticipated to be minimal given this would only be implemented during a pandemic when operational restrictions relating to surgery/procedures will be applied, or when other high risk cases are expected. Some specialised units may consider provision of HVAC systems that enable the OR to be provided at a lower level of pressure in comparison to the corridor to more appropriately manage patients with an airborne infection e.g. patients with TB.

Aerosol Generating Procedures (AGPs) can still be undertaken in ORs during pandemic or high risk periods as the air change regime will ensure there is sufficient and ongoing dilution of the air within the room.

Endoscopy and bronchoscopy procedural services are recommended to conduct high risk procedures in a room with negative pressure. This is routinely provided where bronchoscopy services are delivered.

The provision of a single enclosed room/s within PACU will support recovery of patients that have an infectious disease requiring isolation. Operational practices that may supplement this approach include scheduling these patients at a point of minimal onward transmission risk (e.g. end of lists, the last procedure of the day), or recovering the patient within the operating room. Larger recovery areas may be zoned to support cohorting of patients when required. HVAC system strategies should be implemented to optimise ventilation rates and support airflow direction away from staff areas.

3.5 ENVIRONMENTAL CONSIDERATIONS

3.5.1 Natural Light

An Operating Suite is a workplace for staff and where possible, access to natural light and high quality internal or external views is highly desirable. This includes the provision of windows within an operating room, staff rooms and recovery.

3.5.2 Windows in ORs

An operating room is a workplace. An external aspect may be achieved by locating the ORs on external walls or around an internal light court.

Borrowed daylight may be achieved by locating windows in the operating room opposite a corresponding window in a corridor running between the operating room and external wall. Depending on the purpose of the corridor, these windows can be useful for supervision and training purposes.

Many procedures require black-out so windows will need coverings to control light and glare within the room, with consideration of cleaning requirements. Consideration must be given to the use of laser and the potential for laser light to be reflected from glass.

Windows or viewing panels in doors to lead-lined operating or other rooms should be protected to maintain the level of protection required. See the section on glazing in Part C: Section 3.0 Space Standards and Dimensions.

3.5.3 Interior Décor

Where possible, a sterile clinical environment should be avoided through use of interior décor, including artworks. Colour and design can be used to mitigate an institutional atmosphere. However, in areas where patient observation is critical such as ORs, anaesthetic preparation rooms, recovery, holding areas, colours should be chosen that do not alter the observer's perception of skin tones. Interior décor and artworks should be calming and offer positive distractions to reduce stress, utilising biophilic design principles where feasible. Features that distract patients, e.g. artwork may also be helpful.

An operating room will typically have an area identified as the location where the bed is positioned in the operating room. This identifies the ‘sterile’ zone but the vinyl used in this area is typically a darker colour so that staining does not occur. While it is important that vinyl is selected so that instruments can be found, the use of white and other light shades can become discoloured through the use of surgical scrub and patient skin preparation solutions.

Options to clearly identify the emergency call button should also be considered. This may include a clear indication on the wall or floor to the emergency call button for quick identification.

3.5.4 Arts Integration

Arts integration can support a range of wellbeing initiatives for patients, carers and family, and staff to mitigate anxiety and acute stress for improved clinical outcomes. Art can also be used to create distraction and ensure that a sense of passage of time is lost for patients.

The areas below should be considered as a priority for arts integration:

- Entry, reception and waiting areas
- Patient preparation and pre-operative holding areas
- Recovery and discharge areas

Options include:

- Acoustics for calming and/or personalised music and/or soundscapes
- Wall and floor wraps
- Ambient lighting
- VR and AR technology
- Projections
- Virtual skylights and windows

For further advice on initiating the arts integration process from early planning, refer to the AusHFG Arts in Health Framework.

3.6 SPACE STANDARDS AND COMPONENTS

3.6.1 Human Engineering

Human engineering covers those aspects of design that permit effective, appropriate, safe and dignified use by all people, including those with disabilities. It includes occupational ergonomics, which aims to fit the work practices, furniture, fittings and equipment (FF&E) and work environment to the physical and cognitive capabilities of all persons using the Unit.

The requirements of occupational health and safety and antidiscrimination legislation will apply. Refer to AusHFG Part C: Section 7.0 Safety and to WHS legislation.

3.6.2 Ergonomics

Operating Suites should be planned and designed to prevent exposure of patients, staff, visitors and maintenance personnel to avoidable risks of injury.

Examples include:

- floor finishes that prevent slips and falls, especially in areas where water and other fluids will be used, e.g. scrub bays, operating room, clean-up
- automatic opening doors in rooms where beds pass through, e.g. exit bay. Where sliding doors are used at the entry to an anaesthetic preparation room, automation is not needed and locating a suitable button for door release is problematic
- hazardous manual tasks including transfer of the patient to the operating table and within holding and recovery areas. This risk is increased where bariatric patients are managed
- managing cables so that trips and falls are avoided
- workstations, particularly those used within the operating room that are adjustable and allow the user to work in a comfortable ergonomic position, and
- systems to locate equipment (real time locator systems) can result in the need for less equipment as staff can find what they need. This will reduce clutter over time.

Refer to Part C: Section 730, Human Engineering for further information.

3.6.3 Access and Mobility

Accessible toilets, showers and change rooms should be provided as necessary for patients, public and staff and must comply with AS/NZS 1428Design for Access and Mobility (Set) (Standards Australia, 2010) and the Building Code of Australia. Also Refer to Part C: Section 730, Human Engineering.

3.6.4 Building Elements

Building elements include walls, floors, ceilings, doors, windows and corridors and are addressed in detail in Part C: Section 3.0, Space Standards and Dimensions. Ensure that doorways are sufficiently wide and high enough to permit the manoeuvring of wheelchairs, trolleys and equipment without risk of damage or risks associated with hazardous manual tasks.

3.7 SAFETY AND SECURITY

3.7.1 Safety

Employers and employees have a statutory obligation to ensure the health, safety and welfare of all employees at work.

The design of the Unit should seek to prevent injury, minimise potential hazards and promote safety through considered design.

Hazards that may be found in the Operating Suite environment include:

- exposure to infectious substances
- exposure to chemicals
- exposure to surgical plume
- exposure to lasers and radiation
- exposure to anaesthetic gases
- exposure to ceiling mounted fixtures, and
- hazardous manual tasks.

Healthcare facilities utilising lasers or intense light in their treatments are now able to do so with clearer guidance, with the importance of staff training and best practice featuring prominently in the publication of a revised standard, AS/NZS 4173 - Safe Use of Lasers and Intense Light Sources in Health Care. The impact of this standard will go beyond hospitals, extending to private medical facilities, dental practices and the cosmetic industry.

For further information on the management of hazards refer to:

- AS/NZS 4173: Safe use of lasers and intense light sources in health care (Standards Australia)
- ACORN 2023 Standards for Safe and Quality Care in the Perioperative Environment, including sections relating to electrosurgical safety, laser safety, patient positioning and manual handling, and surgical plume
- NSW Health Guideline GL2023_018 Work Health and Safety - Controlling Exposure to Surgical Plume, 2023
- Jurisdictional engineering services guidelines – refer to AusHFG 'External Resources' link
- WorkSafe Victoria, Managing Surgical Plume Exposure in Healthcare, and
- ARPANSA Radiation Protection Series No. 14 Code of Practice for Radiation Protection in the Medical Applications of Ionizing Radiation (2008).

3.7.2 Security

Access control systems will be needed to ensure that only those authorised will have access to restricted areas of the Unit. Duress points may also be needed at staff stations and receptions. Patient and visitor escorted access only will be provided beyond the waiting area.

The design will need to consider that staff may work out of hours and will access ORs, recovery areas and staff amenities.

Refer to individual jurisdiction guidelines and to Part C: Section 6.0 Security.

3.8 FINISHES

3.8.1 General

As with most units, the selection of finishes for the Operating Suite is influenced by both durability and infection control.

The finishes in the Operating Suite should be easy to clean, hard wearing and impervious to moisture. Refer to:

- Part C: Section 3.0 Space Standards and Dimensions
- Part D Section 4.0 Surfaces and Finishes for further information, and
- Room Data Sheets and Room Layout Sheets for recommended finishes and further information.

3.8.2 Volatile Organic Compounds

To improve indoor air quality, all paints, adhesives, sealants, wall, floor, and ceiling coverings should meet total volatile organic compounds (TVOC) levels in line with local jurisdictional sustainability guidelines and relevant industry benchmarks, such as the Australian Paint Approval Scheme (APAS) AP-D181. This includes the following products:

- Interior wall and ceiling paint
- General purpose adhesives and sealants, trims, varnishes, wood stains, primers, sealers, and preparation coats

- One and two pack performance coating for floors, acoustic sealants, architectural sealant, waterproofing membrane and sealant, fire retardant sealants and adhesives, structural glazing adhesive, wood flooring and laminate adhesives and sealants
- All plywood, particleboard, medium density fibreboard (MDF), laminated veneer lumber (LVL), high pressure and compact laminates to meet recommended formaldehyde limits.

3.8.3 Floor Finishes

Floor finishes should be impervious to moisture, easily cleaned, stain resistant, comfortable for long periods of standing and suitable for wheeled traffic such and beds and equipment. In ORs and procedure rooms, the colour should allow for sufficient contrast to find small, dropped items. Light coloured floors can stain easily and a darker colour is often preferred. In areas where fluids are likely to fall on the floor, the floor covering used should be fit for purpose, e.g. scrub bays, ORs and travel areas from scrub to gowning areas.

A slip resistant, resilient floor finish with welded joints and coved skirtings is considered appropriate throughout the Unit with higher slip resistance specified for wet areas e.g. scrub bay. Where there are changes in types of floor finishes, e.g. vinyl to carpet, there should not be a change in floor levels. Ridged cover strips and humps where two surfaces meet represent an infection control risk, and a safety hazard for potential slips, trips and falls. Refer to Part C: Section 3.0 Space Standards and Dimensions for further information.

3.8.4 Wall Finishes

Due to the high number of trolley movements in the Unit, wall protection is an important issue. Wall and corner protection is required wherever there is the potential for damage. Durability and resistance to damage is essential to minimise the requirement for repairs / joins which can create challenges with cleaning. All wall surfaces in the Operating Suite are subject to the cleaning protocols documented in the operational policies for the Unit.

Ceramic tiles are not appropriate within an operating room. Floor to ceiling wall vinyl is preferred, or proven alternative wall protection material that is durable, impact resistant, hygienic, and easy to clean and maintain.

Gaps between dissimilar surface, for example, gaps between the top edge of vinyl skirting and wall, window frames and walls etc, are not permitted.

While flush mounted equipment such as display screens may be desirable, the size may change over time, causing issues. All areas where possible gaps between dissimilar materials may occur should be checked and sealed prior to occupation.

3.8.5 Ceiling Finishes

Ceiling performance requirements include aesthetics, acoustics, infection control, access to services and durability. With a significant amount of ceiling mounted equipment access is needed.

Key risks in ORs include potential for drop-down contamination, splash or soiling. The material chosen should meet the performance requirements and there may be a need for supporting operational policies to be developed to maintain relevant standards. Acoustic tiles should not be used in key clinical and related areas such as the operating room and sterile stores. Ceilings will be subjected to the cleaning protocols documented in the Operational Policy for the Unit.

Refer to section 3.10.2 regarding support for flexibility to adapt to new technology.

3.8.6 Bench Tops

Consideration should be given to the use of the bench tops and the type of material most suitable to the task. Bench tops should be of a smooth, impervious finish, resistant to damage and stains. Joins should be avoided if possible because they are difficult to keep clean. A range of products is suitable, e.g. laminates (providing post-forming or other means of avoiding jointing is considered), and synthetics such as moulded acrylic and stainless steel.

3.8.7 Window Treatments

Window treatments to patient bed areas may require external or internal (between double glazing) treatments for light and temperature control.

See Part C: Section 3.0, Space Standards and Dimensions for further information.

3.8.8 Environmental Cleaning Requirements

The cleaning process for the Operating Suite should be determined during the design period. Design layout, fittings, furnishings, floor coverings and finishes will have significant impact on the cleaning of the Unit. Ledges, corners and all other surfaces which are difficult to clean should be minimised.

Facilities should be provided that will assist in the efficient cleaning of the Unit such as suitable location of power outlets, adequate storage for cleaning materials and equipment, waste disposal and hand washing facilities.

3.9 FIXTURES, FITTINGS AND EQUIPMENT

3.9.1 Definition

Within the context of the AusHFG, Room Data Sheets (RDS) and Room Layout Sheets (RLS), Fixtures and Fittings are defined as follows:

- **Fixtures**: Refers to fixed items that require service connection, e.g. electrical, hydraulic, mechanical and includes basins, light fittings, clocks, medical service panels, etc., but excluding fixed items of serviced equipment such as operating lights; and
- **Fittings**: Refers to fixed items attached to walls, floors or ceilings that do not require service connections such as curtain and IV tracks, hooks, mirrors, blinds, joinery, pin boards etc.

Also refer to Part C: Design for Access, Mobility, Safety and Security, Space Standards and Dimensions and to the Standard Components - Room Data Sheets (RDS) and Room Layout Sheets (RLS) for further detailed information.

3.10 BUILDING SERVICE REQUIREMENTS

3.10.1 General

In addition to topics addressed below, refer to local jurisdictional guidelines relating to engineering services.

3.10.2 Planning For Future Technology - Adaptable Infrastructure

Consideration should be given to planning for flexibility to adapt to new technology solutions and capability as they become available. This may include:

- structural considerations for floors and ceilings;
- planning for future access to conduits/wiring to enable ease of wiring new equipment; and
- infrastructure for digital ORs.

3.10.3 Ceiling Structure

Increasingly, services and equipment are ceiling rather than floor mounted to promote efficient use of space through increased available floor area. Increasing use of IT and medical imaging within Operating Suites results in additional space being used within the ceiling space above ORs. The design of these rooms will require significant coordination to set out imaging equipment with ductwork, pendants, HEPA filters, access panels and lighting.

Lighting should be flush to the ceiling to support cleaning requirements.

Ceiling heights also need to accommodate equipment requirements such as operating lights and ceiling mounted equipment. Provide appropriately designed, rigid support structures located above the finished ceiling.

A minimum ceiling height of 3m is required within operating rooms, as noted in the National Construction Code.

3.10.4 Air Handling

Key considerations for the HVAC systems within ORs and sterile stores include:

- ORs will each have separate air handling units and separate exhaust systems that are best located as close as practical to the areas served, and
- some ORs have extensive IT and medical imaging equipment included which places a high heat load onto the room. This will need to be considered in the design of air handling systems.

Dedicated computer rooms supporting selected imaging modalities and AV equipment cupboards will require a dedicated cooling system to mitigate the build-up of heat within the small enclosed environment. These cooling systems will be separate from that of the OR.

Endoscope cleaning (dirty) rooms may require a localised exhaust system to capture and remove air that may be contaminated with vapours from the chemical disinfectants.

Provide ventilation, air-conditioning and humidity in accordance with relevant standards, and to meet the needs of the patient and clinical team. Refer to:

- jurisdictional engineering services guidelines (accessed via the AusHFG External Resources link)
- AS 1668.2The Use of Ventilation and Air-conditioning in Buildings, Part 2, and
- ASHRAE TC 2.4 Particulate Contaminants.

Engineering services that require ceiling access for maintenance or replacement should be located outside of the footprint of the OR areas.

Designing for reduced system fan power through decreased face velocity across air handling unit coils and filters can provide energy savings. For non-24-hour Operating Suites, implementing a setback mode when not in use can provide significant energy savings.

3.10.5 Medical Gases

The main storage of medical gases is to be located outside the unit, reticulated internally to gas outlets. Provision should be made for additional separate storage of reserve gas cylinders necessary to complete at least one day's procedures and for special gases that are not reticulated.

Requirements are detailed in Standard Components.

Each operating room will include an emergency isolation valve and alarm panel. A standby power supply will be needed for each medical alarm panel.

The use of nitrous oxide in operating theatres, procedural suites and emergency departments is declining due to a range of clinical and environmental concerns. Reticulated systems have been

found to increase leakage of nitrous oxide (a potent greenhouse gas) to atmosphere, can increase facility operating costs and potentially expose staff to nitrous oxide.

Reticulated nitrous oxide and associated scavenge outlets are not mandatory for any healthcare service and point of care cylinders can meet clinical requirements for the majority of healthcare facilities.

Where found to be clinically necessary, the provision of nitrous oxide via piped outlets or via cylinder is to be determined at a project level, based on an assessment of expected clinical need and associated risk assessment, particularly for services with high utilisation such as birthing suites. Birthing suites may have a dedicated reticulated nitrous oxide system, whilst the rest of a facility is supplied by point of care cylinders. The associated cost impacts should be considered including the storage and management of cylinders.

Due consideration must be given to a range of operational considerations including:

- monitoring and measurement of usage
- management of leakage
- Work Health and Safety (WHS) requirements relating to the use of cylinders
- approach to the provision of scavenge where cylinders are used
- appropriate storage for cylinders, and
- security of gas sources given it is used as a recreational drug.

3.10.6 Information Technology and Communications

ORs and the broader suite of facilities within an Operating Suite are becoming increasingly integrated with other ICT infrastructure with a significant reliance on audio visual equipment to integrate video and biomedical equipment with display and output destinations such as display screens. When planning an Operating Suite, consider:

- wireless technology. This will facilitate many devices including workstations on wheels (WOW) and other equipment
- the increasing use of point of care clinical systems used during a surgical procedure. This requires access to:
    - display screens to view results, PACS images etc.
    - PCs and/or mobile devices to access electronic medical records (EMR) and to discuss matters with other members of the multi-disciplinary team. It is now common for PC access to be needed to support surgical, anaesthetic and nursing staff within an operating room
- technology to assist with the management of:
    - consumables, e.g. bar coding
    - equipment, e.g. Real-Time Locating Systems (RTLS)
    - prosthesis, e.g. RFID reader systems
    - RMD tracking
- call systems including staff assist, porter or orderly, and emergency call systems
- patient monitoring systems, including telemetry and integrated anaesthetic devices
- high speed networks to support the requirements of digital ORs and other equipment
- cameras within selected ORs:

  - these may be used to record patient information (photos and videos) or broadcast footage from the procedure for the purposes of training and education. While vendors will provide limited archival storage when a system is purchased, an ongoing system to store these images will be needed with appropriate privacy and security of patient data
  - cameras are not routinely required in every OR and will require consideration of patient privacy policies. Requirements are to be confirmed through consultation with key stakeholders
- patient journey boards in operating suite, PACU and day surgery units
- support for virtual models of care through the use of video recording and videoconferencing to support consultation, clinical support and advice for care teams, and other education requirements. This will require appropriate provision of microphones and speakers
- support for remote surgery/telesurgery to enable remote assistance during surgical procedures (or training for surgical procedures) including the use of Augmented Reality (AR) and Virtual Reality (VR), and
- use of closed network environments for equipment with high clinical risk e.g. surgical robots and increased use of AI in robotic surgery.

Consideration may be given to ensuring infrastructure cables are '8K ready' and associated conduits for cabling are sufficiently sized so that 3D images can be provided.

In addition, the integration required to support a digital environment will generally require the inclusion of an AV equipment room or cupboard. These are typically located directly outside of the operating room so it can be accessed without interrupting the surgical case and consideration should be given to consolidating these between a number of ORs. The design of AV systems should be such that failure of the AV system should still allow a surgical procedure to continue and should not impact the AV system associated with another OR.

Depending on the solution, AV racks can generate significant heat and will require adequate cooling and ventilation which can be problematic when placed outside each OR. The store / cupboard will have access to both the front and rear of the rack by sufficient side space or swing mechanism, without compromising any of the cabling and connections to the rack. Special care should be given to the protection of critical AV equipment rooms from the ingress and built up of lint from external spaces.

In future, information provided by display screens within an operating room may be replaced or supplemented with augmented reality (AR) technology where a surgeon views critical information on a set of glasses.

The design of the ORs should ensure future flexibility to readily adapt to changes in technology.

3.10.7 Electrical Services

Considerations include:

- all patient areas within the Operating Suite will be wired at least as body protected electrical areas
- patient areas should only be wired as cardiac protected electrical areas as defined in AS/NZS 3003, that is where cardiac-type procedures are regularly and routinely undertaken. In the case of an Operating Suite, this includes cardiac and thoracic ORs and interventional radiology. Refer to AS/NZS 2500 for guidance on area classification by the responsible organisation
- stand-by lighting and power systems (also known as back-up or emergency power) will be provided in accordance with AS/NZS 3009 Standby Power System, and local jurisdictional guidelines relating to engineering services

- within an operating room, 100% of all power outlets will be connected to the emergency supply
- uninterruptible power supply (UPS) for critical equipment. In an operating room, this may include operating lights, pendants, monitors and anaesthetic machines or monitors, robotics, operating room integration products and integrated imaging systems
- equipment with higher power requirements (e.g. requiring access to 3 phase power outlets)
- provision of General Power Outlets (GPOs) in equipment bays and equipment storage rooms so that equipment can be recharged
- consolidating operating lights and system controls in a central location for efficient access, and
- all plant serving the OR should be backed up via emergency power supplies. Redundancy of all critical plant serving the zone must be considered in the event of plant failure and service continuity.

Additional requirements are contained in the following codes and standards including:

- National Construction Code
- AS/NZS 3003 Patient Areas Electrical Installations, and
- jurisdictional guidelines relating to engineering services.

Service requirements are also detailed for key rooms such as an operating room, in the AusHFG Standard Components.

3.10.8 Signage

Specialised signage requirements may include:

- lasers in use
- X-ray in use, and
- infection control precautions in place.

3.10.9 Radiation Shielding

Imaging equipment is increasingly used in Operating Suites. Radiation shielding will be needed in rooms with:

- fixed fluoroscopy units (i.e. single plane and bi-plane angiography, floor or ceiling mounted C-arms), and
- rooms containing other fixed imaging modalities such as CT or MRI.

A shielding assessment must be carried out by a consulting radiation expert, in line with relevant radiation regulatory requirements, and a report produced for the facility, detailing the extent of shielding required.

Other ORs will not have fixed imaging equipment but will use mobile units such as image intensifiers. There may be no need for radiation shielding when these are used as the amount of ionising radiation may be low and classified as a low-risk. Again, a shielding assessment must be carried out to determine the likely radiation exposures. Staff will need access to PPE.

As the radiation safety issues are considerable, it is recommended that medical imaging staff are included in planning related to this equipment, both fixed and mobile.

This document does not include planning, design or spatial requirements for planning rooms such as intraoperative MRI. Planning teams should refer instead to the HPU 440 Medical Imaging Unit and seek advice from recently planned projects.

Provision of stud/service walls for hydraulic fixture water services and drainage systems with rough-in pipework should be considered to eliminate impacts on shielding systems.

3.10.10 Hydraulic Services

Where scrub up bays are provided, consideration should be given to the provision of sensor taps, plaster arrestors and individual thermostatic mixing valves (per trough) in the design stage. Prototyping is recommended, or alternatively a review of the existing scrub up bays compared with the new design, to ensure that the planned set out does not result in splashing onto scrubs.

Solutions to assist in the reduction of water consumption should be considered in line with local sustainability guidelines, and infection, prevention and control requirements.

Consideration must be given to the impact of negative pressure on floor wastes and floor waste traps. Trap depths should be increased to address this impact. Rooms with positive pressure do not typically have a floor waste.

3.10.11 Fire Protection Services

Considerations include:

- facilities and equipment to support the intraoperative fire management plan, acknowledging this is a high risk clinical area due to the use of diathermy, laser, alcohol based solution and high oxygen environment
- where the unique requirements of an Operating Suite require departures from the deemed to satisfy requirements of the relevant fire protection standards, they shall be addressed in a performance solution developed by a fire safety engineer (consultation to be undertaken with key stakeholders including the local fire brigade)
- removal of fire safety speakers and strobes within operating rooms may be considered to avoid disruption during surgical procedures in accordance with the operational requirements of the facility
- final operation of the mechanical air handling systems and required interfaces must be confirmed to suit the operational requirements of an operating room/suite in the event of a fire
- fire sprinklers shall be of concealed type (commonly referred to as flush) to minimise dust collection and cleaning requirements within the sterile space (note: the ceiling void above must not have positive pressure relative to the OR, acknowledging this will vary for some rooms as noted under section 3.4.1 in relation to pandemic or special use rooms),
- operating theatre audio visual equipment interface in the event of a fire to suit the operational requirements of the hospital/facility.

3.10.12 Commissioning an Operating Suite

Prior to commissioning an Operating Suite, air sampling must be undertaken as outlined in ACORN Standards, ‘Planning and Design of the perioperative environment’ (16th Edition). The air sampling will occur after a builders clean and specialist project clean is undertaken.

04 COMPONENTS OF THE UNIT

4.1 STANDARD COMPONENTS

Rooms/spaces in the attached Schedule of Accommodation are defined as:

- standard components (SC) which refer to rooms or spaces for which room data sheets, room layout sheets (drawings) and textual description have been developed
- standard components – derived rooms (SC-D) 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, and
- non-standard components which are unique rooms that are usually service-specific and not common.

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

4.2 NON-STANDARD COMPONENTS

Non-Standard Components are unit-specific and are listed and described below:

4.2.1 Anaesthetic Workroom and Biomedical Equipment

Description and Function

This is area for the repair, maintenance and calibration of both anaesthetic and biomedical equipment, and a work base for anaesthetic and biomedical technicians when visiting the Unit.

Location and Relationships

It may be located on the perimeter of the Unit with internal and external access.

Considerations

Fixtures and fittings may include:

- medical gases - oxygen, suction, medical air, nitrous oxide (including associated scavenging, disposal and absorption systems as required)
- power for recharge and checking
- workbenches
- storage shelving for small items
- sink, and
- hand basin.

4.2.2 Audiovisual Integration Server Cupboard

Description and Function

This is a cupboard for audio-visual technicians to manage the recording, editing, broadcast and storage of video images used for teaching purposes.

Location and Relationships

These are typically located within the exit bays attached to ORs. Consideration should be given to consolidating these between a number of ORs rather than providing AV racks outside of each OR.

Considerations
Given the heat generated appropriate temperature control and ventilation is essential.

Where AV cupboards are consolidated, cable lengths must be considered.

4.2.3 Perfusion Room –Set Up

Description and Function
An area for the set up and maintenance of perfusion equipment that is used to temporarily replace the function of the heart and lungs during cardiac and thoracic surgery e.g., cardiopulmonary bypass machines. It is not used for the cleaning of equipment. In sizing, consider the volume of equipment, machines, number of staff accessing this space and the specialty ORs served.

Location and Relationships
Direct access is required to the ORs in which the equipment is used i.e. cardiothoracic ORs and the Perfusion Store.

Considerations
Key requirements of this room include:

- Benchspace with computer access
- ICT integration with cardiothoracic ORs.
- Underbench fridge
- Cupboards for storage (note cupboards and solid shelving structures require consideration of cleaning requirements)
- Parking space for heart-lung equipment
- Medical services panel
- Stainless steel sink
- Handwash basin type B

4.2.4 Perfusion Room – Store

Description and Function
Storage room for perfusion equipment and consumables.

The size of this room will depend on the volume of equipment to be accommodated.

Location and Relationships
Direct access is required to the Perfusion Set-Up room.

Considerations
Key requirements of this room include:

- open equipment parking zone with access to power
- shelving for smaller items of equipment and consumables.

4.2.5 Hybrid OR

Description and Function
Refer to Section 2.1.4

Location and Relationships
A hybrid OR will require a collocated control room and computer equipment room as noted in the schedule of accommodation. Access to sterile stock and equipment stores will be required as per other ORs.

The location of the room/s requires consideration of major equipment transfers including for replacement that may occur a number of times over the life of the operating room.

Considerations

Some hybrid ORs will be dedicated to a specific specialty, where justified through anticipated utilisation. In these instances, the design of the room and procurement of the operating room table and imaging equipment will be specific to that specialty. However, many hybrid ORs will also be used for other specialties and/or non-hybrid procedures. This will require the room to support flexible use through:

- procurement of an appropriate operating room table that supports flexible use for a range of procedures. This may include models where the table top can be interchanged, acknowledging there will be a significant capital cost associated with these and appropriate storage will be required to store the table top when not in use.
- design of the OR to enable the imaging equipment to be moved out of the way.

Imaging equipment may be floor or ceiling mounted or provided through a mobile unit. Ceiling mounted equipment typically provides a greater area of movement around the table, takes up less floor space and can more easily be moved out of the way. The floor mounted equipment does take up more room around the table but allows cabling to be hidden supporting ease of cleaning.

The floor structure must be informed by the equipment weight, not only within the hybrid OR but also along equipment transfer paths and storage locations.

Ceiling coordination is essential for all fixtures and services and will include the following priorities:

- fixed pendant surgical/equipment/anaesthetic
- fixed pendant operating lights
- fixed pendant monitoring systems
- fixed imaging system
- mechanical HVAC over table
- room lighting/HVAC exhaust

Air handling requirements should align with standard ORs.

05 APPENDICES

5.1 SCHEDULE OF ACCOMMODATION

A Schedule of Accommodation for Operating Suites follows.

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.

The model of care, size and scale of surgical and procedural services will need to be determined before detailed spatial planning to begin.

Three scenarios have been outlined to demonstrate how support space changes as the size and scale of a service changes. These scenarios are intended to be indicative only and local requirements should be based on detailed clinical service planning. In addition, office space and staff amenities will be based on detailed workforce planning.

DAY SURGERY / DAY OF SURGERY ADMISSIONS

Entry / Reception / Waiting

This area will receive patients and their carers where services provide day only and day of surgery admission (DOSA) services. Patients from inpatient units will not enter via this area.

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
WAIT-30	Waiting, 30m2	Yes	1	10	1	30	1	50	Indicative area allocation. Requirements will depend on the proportion of cases anticipated to be day only and DOSA admissions and casemix / throughput. 1.2m2 recommended per seat, 1.5m2 per wheelchair / bariatric space.
WCAC	Toilet - Accessible, 6m2	Yes	1	6 (o)	1	6	1	6	Optional. Include if no shared facilities available nearby.
WCPU	Toilet - Public, 3m2	Yes	1	3 (o)	2	3	2	3	Optional. Include if no shared facilities available nearby.
RECP-15	Reception, 15m2	Yes	1	10	1	15	1	20	
OFF-WS	Office-Workstation	Yes		4.5		4.5		4.5	Administration workstations collocated with reception. Number of workstations dependent on staff profile.
OFF-CLN	Office- Clinical Workroom	Yes			1	15	1	20	Central coordination point for unit.
BMFD-3 BMFD-7	Bay - Multifunction Device	Yes	1	3	1	7	1	7	
Intradepartmental (discounted) circulation				30%		30%		30%	

Preoperative Holding

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
INTV	Interview Room	Yes	1	12	1	12	2	12	Interviews with nursing staff to check details and undertake baseline observations. Clinical examinations are typically undertaken in the patient bays however consult rooms may be required for some services.
PT-HOLD-B	Patient Bay - Holding, Bed	Yes	2	9	8	9	16	9	1 per OR, sized for trolleys, but some may be recliner chairs. Holding capacity for inpatient flows will depend on local operational policies. These may be combined with the day only holding area, PACU or a designated area depending on travel distances, patient flow and workforce implications. For high volume services eg opthalmology, 2 bays per theatre / procedure room may be required in line with HPU 270 (1 may be provided as an anaesthetic preparation room as noted below). 6.5m2 bay may be used for high volume day surgery services as per HPU 270. Isolation rooms are not typically provided in this zone, however project teams are advised to refer to local operational policies.
SHPT	Shower - Patient, 4m2	Yes	1	4	1	4	1	4	Number provided will depend on shared access with Stage 2/3 recovery.
WCPT	Toilet - Patient, 4m2	Yes			1	4	1	4	
WCAC	Toilet - Accessible, 6m2	Yes	1	6	1	6	1	6	
CHPT	Change Cubicle - Patient, 2m2	Yes			2	2	3	2	Number provided will depend on shared access with Stage 2/3 recovery.
CHPT-AC	Change Cubicle - Patient, Accessible	Yes	1	4	1	4	1	4	
	Property Bay - Patient		1	1 (o)	1	2 (o)	1	3 (o)	Optional. Assumes quarter height lockers. Property may instead travel with the patient. Access from Stage 2 recovery also required.
SSTN-10	Staff Station, 10m2	Yes					1	10	Only allocated for larger units as reception could be the base used for smaller units. Locate to provide oversight of holding bay areas. Can be shared to support pre and post-operative areas.
BHWS-B	Bay - Handwashing, Type B	Yes	1	1	2	1	4	1	Refer to AusHFG Part D for further details, accessible from OR and patient holding areas.
BLIN	Bay - Linen	Yes			1	2	1	2	Min. 1 per 16 Patient Bay - Holding; corridor location with ready access to Bays. Assume share with recovery for small units.
BBW	Bay - Blanket/ Fluid Warmer	Yes			1	1	1	1	Blanket warmer only
CLN-10	Clean Store	Yes					1	8	Shared with recovery area for smaller units.
DTUR-S	Dirty Utility - Sub, 8m2	Yes					1	8	May be shared with recovery depending on travel distances.
Intradepartmental circulation				40%		40%		40%	

Stage 2/3 Recovery

Stage 2/3 recovery is typically collocated with the pre-operative holding area to support flexible use of bays as demand changes over the day. Where possible, these bays should also be collocated with PACU / Stage 1 recovery to minimise patient travel distances and optimise staffing efficiencies and shared use of support areas.

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
PT-HOLD-B	Patient Bay – Holding, Bed	Yes		9		9		9	Stage 2 Recovery. Number of bays will be guided by clinical services planning - Recommend 3 patient bays per OR used for day surgery. 6.5m2 bay may be used for high volume day surgery services as per HPU 270.
	Recovery Stage 3 / Discharge Lounge					4 (o)		4 (o)	Optional. Recommend 2 per OR used for day surgery.
WCPT	Toilet - Patient, 4m2	Yes					1	4	Number provided will depend on number of holding bays. Shared access to toilets, change cubicles and shower in preoperative holding.
WCAC	Toilet - Accessible, 6m2	Yes			1	6	1	6	Number provided will depend on number of holding bays. Shared access to toilets, change cubicles and shower in preoperative holding.
SSTN-10	Staff Station	Yes			1	8	1	12	Assume smaller units will share with PACU or pre-operative holding. Size will depend on number of bays provided.
BHWS-B	Bay – Handwashing, Type B	Yes		1		1		1	1 per 4 patient bays.
BBEV	Bay- Beverage	Yes	1	4	1	4	1	4	
BLIN	Bay – Linen	Yes				2	1	2	1 per 16 spaces. Assume smaller units will share with PACU or pre-operative holding.
BBW	Bay - Blanket / Fluid Warmer	Yes				1	1	1	1 per 16 spaces. Assume smaller units will share with PACU or pre-operative holding.
BMEQ	Bay - Mobile Equipment	Yes			1	3	2	2	Assume smaller units will share with PACU or pre-operative holding.
BRES	Bay - Resuscitation Trolley	Yes			1	1.5	1	1.5	Assume smaller units will share with PACU or pre-operative holding.
CLN-10	Clean Store	Yes					1	10	Assume smaller units will share with PACU or pre-operative holding. Size will depend on volume of day only bays.
MED-14	Medication Room	Yes					1	12	Assume smaller units will share with PACU. Size will depend on volume of day only bays.
STEQ-14	Store - Equipment	Yes					1	10	Size will depend on volume and range of equipment. Include power for re-charging.
	Dirty Utility / Disposal Room						1	14	Assume smaller units will share with PACU or pre-operative holding. Area is indicative and will need to be confirmed depending on the waste streams / types of bins and bin sizes to be accommodated.
CLRM	Cleaner's Room	Yes					1	5	Assume smaller units will share with PACU or pre-operative holding. Provide at least 1 room per 1000m2.
SRM-35	Staff Room	Yes	1	12	1	18	1	24	Indicative only, requirements will depend on staff profile / capacity of unit that will be informed by the percentage of ORs used for day surgery. External window desirable.
WCST	Toilet - Staff	Yes	1	3	1	3	2	3	Also consider access to disabled accessible staff toilets.
Intradepartmental circulation				40%		40%		40%	

OPERATING ROOM AREA

Operating Rooms

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
ANAE-16	Anaesthetic Preparation Room, 16m2	Yes	2	16 (o)	8	16 (o)	16	16 (o)	Optional. Anaesthetic preparation rooms are typically provided to facilitate patient flow and support patient preparation. Provision to be determined during planning with consideration of local operational policies and patient throughput. A larger size may be required in some cases although the use of sliding doors at the entry to the room will maximise available space.
ORGN	Operating Room - General	Yes	2	60	8	60	16	60	This is the minimum recommended area requirement and is sufficient for the majority of routine surgery. Larger sized ORs may be required for some surgical specialties where additional equipment and staff need to be accommodated, eg cardiac surgery, neurosurgery, trauma and obstetrics. The number of larger sized theatres will be informed by an analysis of the projected casemix and additional equipment and staff to be accommodated.
	Operating Room, Hybrid / Large					75 (o)		75 (o)	Optional depending on confirmed scope. Minumum area noted. Requirements will depend on equipment and staff to be accommodated. 75m2 for hybrid OR assumes a single plane angiography system. Also refer to local jurisdictional guidelines where available. Hybrid ORs incorporating biplane systems and where flexibility is required to support flexible use for non-hybrid procedures will require a
	Control Room, Hybrid OR					15 (o)		15 (o)	Optional depending on confirmed scope. 1 per Hybrid OR.
	Computer Room, Hybrid OR					10 (o)		10 (o)	Optional depending on confirmed scope. 1 per Hybrid OR.
SCRB-4	Scrub Up, 4m2	Yes	2	4	8	4	16	4	For surgical hand antisepsis.
	Exit Bay		2	11	8	11	16	11	1 per Operating Room; if shared between 2 rooms, increase to 16m2.
	AV Integration Server Cupboard		2	1	8	1	16	1	Audiovisual integration equipment. May be consolidated between a number of ORs. Temperature control is required. Cabling distances must be considered.
CLUP	Clean-Up Room - Shared, 12m2	Yes	1	12	4	12	8	12	1 per 2 ORs maximum. 1 per 3 or 4 ORs may be achievable depending on travel distances and operational practices. Area allocation includes fluid management system dock which will not be required to every Clean-Up Room. Area requirements will vary depending on local operational arrangements relating to processing of RMDs, waste streaming and provision of fluid management systems. This area allocation may be reduced where trolleys / carts with used / soiled RMDs are transferred direct from theatre to SSU, and the 'clean up' room function is focussed on cleaning and waste management only.
Intradepartmental (discounted) circulation				40%		40%		40%	

Endoscopy Areas (Optional)

The following areas are optional, depending on the service profile for the unit. Endoscope reprocessing areas located close to the point of care is typically preferred to reduce the number of scopes needed and reduce opportunities for damage.

Refer to HPU 270 Day Surgery / Procedure Unit and HPU 190 Sterilising Services and Endoscopy Reprocessing Unit for further information.

CODE	ROOM/SPACE	SC / SC-D	1 - 2 Procedure Rooms						REMARKS
			Qty	m2					
ENPR	Procedure Room - Endoscopy	Yes		45 (o)					Optional. To be provided, depending on the service profile, where dedicated endoscopy rooms are required. Procedural services may also be provided in general ORs for flexible use of rooms and to support future changes to the case mix. Specialised units requiring angiography eg for ERCPs will also require a control room.
	Endoscope Reprocessing - Dirty		1	13					One double basin sink per one-two procedure rooms is assumed.
	Automated Flexible Endoscope Reprocessors (AFERs)		1	4					The number of AFERs should provide capacity to process two endoscopes for each procedure room. Some AFERs are able to process two endoscopes at a time or asynchronously. Rural and remote health services will require a minimum of 2 AFERs. Check dimensions of preferred supplier's AFERs to confirm allowances. Note that the Quantity "1" refers to the number of spaces, not the number of AFERs or other equipment.
	Endoscope Reprocessing - Clean		1	8					
	Endoscope Reprocessing - Storage (CESC or equivalent system)		1	4					Fleet size and the number of storage positions required must be confirmed with the user. Note that the Quantity "1" refers to the number of spaces, not the number of storage cabinets or storage positions. Where a storage bag system is used instead of CESCs, space will be required for the storage of the bagged endoscopes.
	Store - Chemicals		1	2					Area allocation will depend on the volume of chemicals required to service the projected workload. Some reprocessing agents used for endoscopy reprocessing are flammable and/or toxic. Storage of these agents will comply with jurisdictional workplace health and safety regulations. This space may need to be ventilated to exhaust air to a safe location outside the building.

Clinical Support Areas

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
BBW	Bay - Blanket/ Fluid Warmer	Yes			2	1	4	1	Final number required will depend on the unit layout and associated travel distances.
BLIN	Bay - Linen	Yes	1	2	4	2	8	2	1 per 2 Operating Rooms; corridor recess with ready access to Operating Rooms.
BMEQ	Bay - Mobile Equipment, 4m2	Yes	1	4	4	4	8	4	1 bay per 2 Operating Rooms; provide power outlets for recharging and data.
STSS-20	Store - Sterile Stock	Yes	2	20	8	20	16	20	20m2 per Operating Room; direct relationship to SSU; may be provided as a single central sterile core or a number of smaller rooms to support a pair or pod of Operating Rooms. Requirements will vary depending on the surgical casemix and location of the unit, eg for paediatrics an increased range of equipment sizes is required, a high volume of orthopaedics will require greater storage than opthalmology and remote locations may need to hold a larger volume of stock.
	Store - Prosthesis						1	20 (o)	Optional. For services undertaking high volume orthopaedics, locate close to orthopaedic ORs.
STGN	Store - General	Yes	1	10	1	12	1	20	IV and other fluid storage.
STGN	Store - General	Yes	1	20	1	30	1	40	For Non-Sterile/ Deboxing storage. Storage of medical gas cylinders to be considered eg if reticulated nitrous oxide is not provided.
STEQ-20	Store - Equipment (Major)	Yes	1	12	1	48	1	96	Plan at 6m2 per Operating Room, for major equipment.
STEQ-20	Store - Equipment (Minor)	Yes	1	10	1	40	1	80	Plan at 5m2 per Operating Room, for minor equipment.
	Anaesthetic Workroom & Biomedical Equipment		1	10	1	15	1	20	
STGN-9	Store - General	Yes	1	15	1	25	1	50	Anaesthetic store for consumables.
	Perfusion Room - Set-up						1	40	Assumes area shared between 2 cardiothoracic operating rooms
	Store - Perfusion						1	20	Assumes area shared between 2 cardiothoracic operating rooms.
	Clean-Up - Perfusion						1	9 (o)	Optional. Cleaning and disinfection of heater-cooler units is recommended to be undertaken in SSU, however some units may provide this service within the unit. Appropriate exhaust of room is essential. Refer to HPU Section 2.2.9 for further information.
	Dispatch - Dirty (offsite sterilising)		1	18 (o)					Optional, for off-site sterilisation models. Includes packing and storage in preparation of dispatch. May include washer disinfector for gross decontamination of instruments prior to transport (this may be located with the OR cleanup area). Refer to HPU 190 for further information.
	Receiving - Clean (offsite sterilising)		1	10 (o)					Optional, for off-site sterilisation models. For receipt of sterilised instruments. Refer to HPU 190 for further information.
CLRM	Cleaner's Room, 5m2	Yes		5		5		5	Provide at least 1 room per 1000m2; ready access to all areas of the unit, preferred on perimeter; one room may be sized to accommodate a scrubber
DISP-10	Disposal Room	Yes	1	10	1	15	1	20	Area is indicative and will need to be confirmed depending on the waste streams / types of bins and bin sizes to be accommodated
BBLD	Bay - Blood	Yes	1	2	1	2	1	2	May be for whole health care facility.
BPATH	Bay - Pathology	Yes	1	6	1	9	1	14	To support POCT, frozen sections etc. May also be used to store fridges/ freezers for human tissue including freezer to support orthopaedic work (bone fridge). Refer to HPU Section 2.2.11 for further informtion regarding management of formalin.
MED-14	Medication Room	Yes	1	6	1	10	1	14	
OFF-WI-5	Office - Write-up, 3m2	Yes	1	3 (o)	4	3 (o)	8	3 (o)	Optional depending on staff profile; 1 per 2 Operating Rooms
OFF-S9	Office - Single Person, 9m2	Yes					1	9	Requirements will depend on staff profile.
	Radiographer Workroom				1	15 (o)	1	25 (o)	Optional, depending on radiography staff profile based in the operating suite. Work area for imaging processing and workspace.
SRM-15	Staff Room	Yes						tbc (o)	Optional, satellite staff room for those units where staff amenities are located on a separate floor.
WCST	Toilet - Staff, 3m2	Yes		3		3		3	Number and location so staff have access close to where they work
Intradepartmental (discounted) circulation				40%		40%		40%	

PACU / STAGE 1 RECOVERY

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
PT-RS1	Patient Bay - Recovery, Stage 1	Yes	5	9	11	9	22	9	1.5 - 3 bays per Operating Room depending on casemix (refer to HPU Section 2.4.6)
PT-RS1	Enclosed Patient Bay - Recovery, Stage 1	Yes	1	12 (o)	1	12 (o)	2	12 (o)	Optional, enclosed Stage 1 recovery bay, for infectious patients, feeding mothers, paediatrics etc. Alternative management of infectious patients includes placing patients last on the list and recovering in the OR. Ratio of enclosed rooms to open bays will depend on the anticipated casemix acknowledging that open bays should be prioritised to support optimal patient observation. Obstetric patients require the larger size space to accomodate a cot and additional staff. Refer to HPU Sections 2.4.6 and 3.4.1.
WCAC	Toilet - Accessible, 6m2	Yes					1	6	Not frequently used in PACU. Smaller units will share with Stage 2 recovery. Close access to toilets will be required for units where advanced recovery models are an endorsed model of care.
SSTN-10	Staff Station, 10m2	Yes	1	10	1	14	2	10	
BRES	Bay - Resuscitation Trolley	Yes		3		3		3	Access from Operating Rooms and Preoperative Holding Area; number to be determined on local requirements. Number to be determined based on local requirements / casemix. Includes difficult intubation trolley and paediatric trolley where applicable.
BHWS-B	Bay - Handwashing, Type B	Yes	1	1	3	1	6	1	
BLIN	Bay - Linen	Yes	1	2	1	2	2	2	1 per 16 spaces
BMEQ	Bay - Mobile Equipment	Yes	1	2	1	3	2	2	Number depends on equipment stored and frequency of use. Include power for recharging equipment.
BBW	Bay - Blanket/ Fluid Warmer	Yes	1	1	1	1	2	1	1 per 16 spaces
CLN-10	Clean Store	Yes	1	8	1	10	1	10	Assumed to be shared with pre-operative holding and recovery for smaller scenarios. May be provided as a combined space including medication store depending on local jurisdictional policies.
MED-14	Medication Room	Yes	1	10	1	12	1	14	Assumed to be shared with pre-operative holding and recovery. May be provided as a combined space including medication store depending on local jurisdictional policies.
DTUR-12	Dirty Utility, 12m2	Yes	1	10	1	12	1	14	Direct access from Recovery Area, may be shared with Preoperative Holding Area
STGN-8	Store - Equipment	Yes		6		8		10	Large enough for cots, IV poles, blood warmers, etc. Wide and shallow room size preferred.
MEET-9	Meeting Room, 9m2	Yes					1	9	Optional; may be used for interview and other purposes
WCST	Toilet - Staff	Yes				3(o)		3 (o)	Number and location dependent on travel distances to staff change rooms.
Intradepartmental circulation				40%		40%		40%	

STAFF AREAS

Staff Areas – Amenities

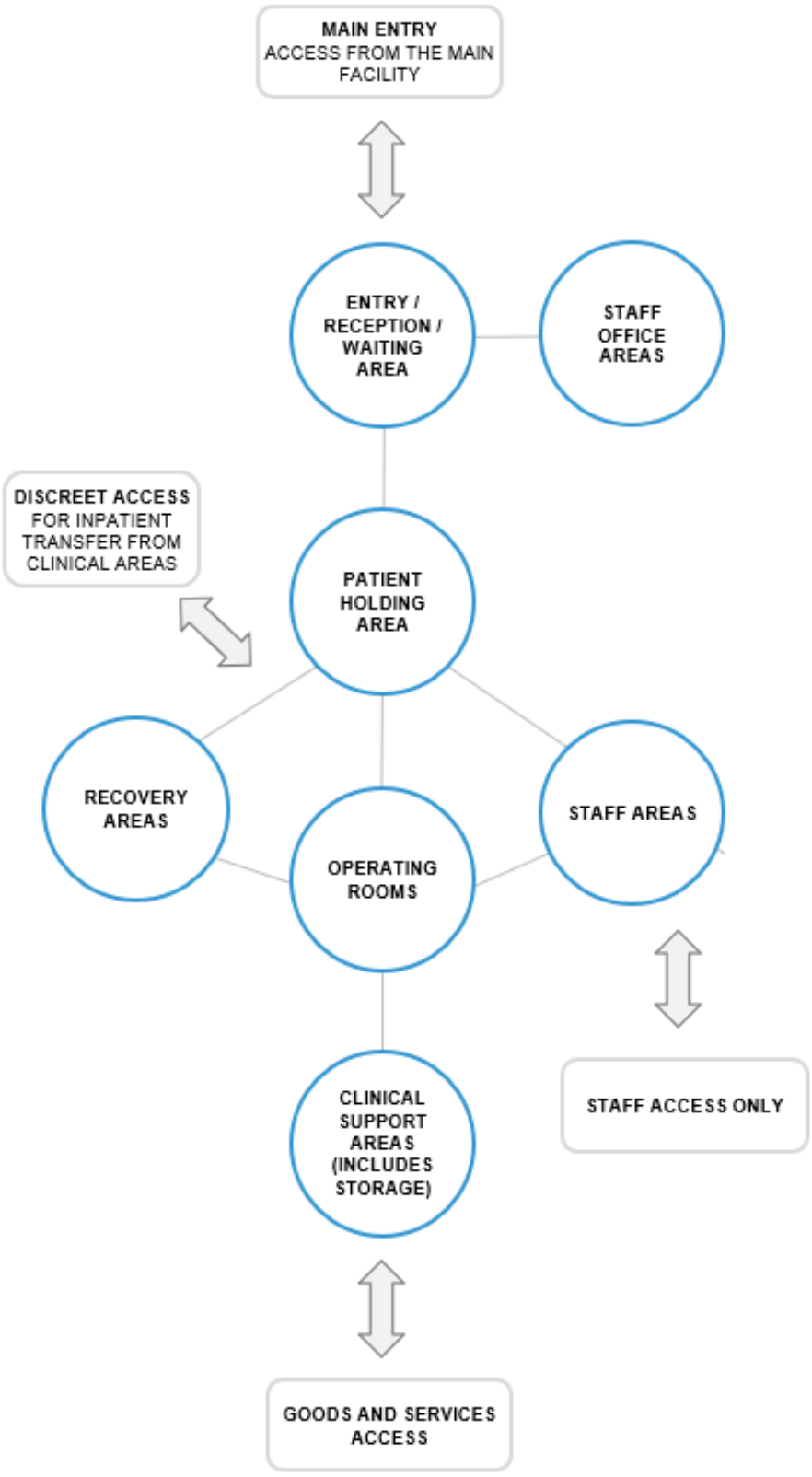
CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
CHST-35	Change - Staff (Male/Female/All Gender)	Yes	1	30	1	100	1	180	Indicative only; peak access periods need to be assessed; separate male and female and support for all gender / gender neutral facilities needed in line with local policies.
SRM-35	Staff Room	Yes	1	20	1	50	1	90	Smaller units may share as appropriate; external window desirable. Satellite staff room may be required where staff amenities are located on a different level to the main OR floor.
WCAC	Toilet - Accessible, 6m2	Yes			1	6	1	6	Unless readily available elsewhere
Intradepartmental (discounted) circulation				25%		25%		25%	

Staff Areas – Work Areas and Support

CODE	ROOM/SPACE	SC / SC-D	2 ORs		8 ORs		16 ORs		REMARKS
			Qty	m2	Qty	m2	Qty	m2	
OFF-S12	Office - Single Person, 12m2	Yes				12		12	Number and area allocation will depend on staff profile and local jurisdictional policies.
OFF-S9	Office - Single Person, 9m2	Yes		9		9		9	Number and area allocation will depend on staff profile and local jurisdictional policies.
OFF-WS	Office - Workstation	Yes		5		5		5	Number and area allocation will depend on staff profile and local jurisdictional policies.
BMFD-3	Bay - Multifunction Device	Yes			1	3	1	3	Assume desktop printers in smaller facilities.
MEET-15	Meeting Room	Yes		15		20		30	Quantity to be determined by service demand, may be used for educational purposes including simulation training. This will require consideration of the types of training, e.g. advanced life support and manual handling; volume of staff participating; and any networked training arrangements.
MEET-L-55	Meeting Room	Yes				30		50	Quantity to be determined by service demand, may be used for educational purposes including simulation training. This will require consideration of the types of training, e.g. advanced life support and manual handling; volume of staff participating; and any networked training arrangements.
Intradepartmental (discounted) circulation				25%		25%		25%	

5.2 FUNCTIONAL RELATIONSHIPS/DIAGRAMS

A diagram showing the functional relationships in the zones of the Operating Suite is shown below.

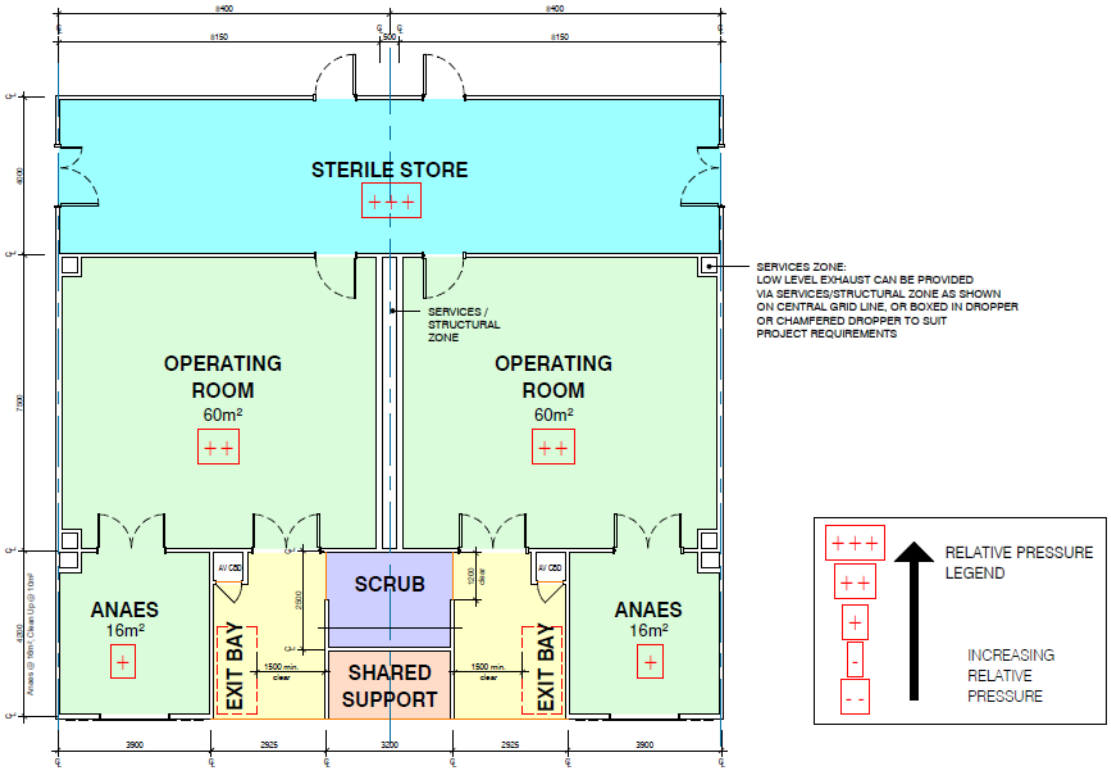


5.3 OPERATING SUITE MODULES

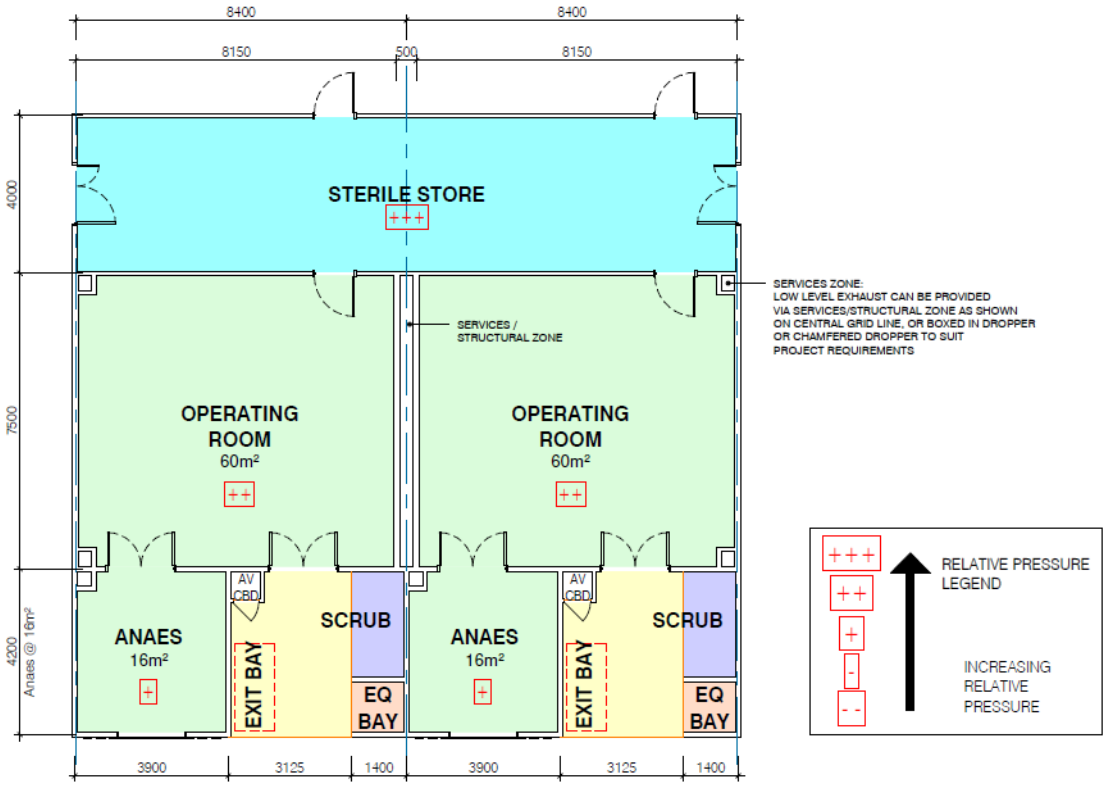
Example **layouts** of key rooms that support the operating room are shown below. The purpose of these layouts is to demonstrate how these spaces might be configured but also to demonstrate that each standard component has been developed to work as a set of components. These layouts are indicative only and other configurations are possible.

Layouts for mirror reversal and single handing arrangements are included (refer to Section 2.3.4 for further detail). A mirrored approach is more common given they enable spatial efficiencies through sharing of support areas such as scrub bays. Regardless of the layout adopted, the design of the OR and pendant arrangements should support flexible use that will enable a consistent OR design where appropriate.

5.3.1 Mirrored layout



5.3.2 Single Handed layout



5.4 RADIATION REGULATORS - AUSTRALIA / NEW ZEALAND

ACT	ACT Health – Health Protection Service, Radiation Safety Contact: hps@act.gov.au / (02) 6205 1700 http://www.health.act.gov.au/public-information/businesses/radiation-safety
NSW	Environment Protection Authority – Hazardous Materials, Chemicals & Radiation Section Contact: radiation@epa.nsw.gov.au / (02) 9995 5959 http://www.epa.nsw.gov.au/radiation/
NZ	Ministry of Health, Office of Radiation Safety Contact: orsenquiries@moh.govt.nz http://www.health.govt.nz/our-work/radiation-safety
NT	Department of Health – Radiation Protection Contact: envirohealth@nt.gov.au / (08) 8922 7152 https://health.nt.gov.au/professionals/environmental-health/radiation-protection
Queensland	Department of Health – Radiation Health Contact: radiation_health@health.qld.gov.au / (07) 3328 9310 https://www.health.qld.gov.au/radiationhealth
SA	Environment Protection Authority – Radiation Protection Contact: radiationprotection@epa.sa.gov.au / (08) 8463 7826 http://www.epa.sa.gov.au/environmental_info/radiation
Tasmania	Department of Health & Human Services – Radiation Protection Unit Contact: radiation.protection@dhhs.tas.gov.au / (03) 6166 7256 http://www.dhhs.tas.gov.au/publichealth/radiation
Victoria	Department of Health & Human Services – Radiation Team Contact: radiation.safety@dhhs.vic.gov.au / 1300 767469 https://www2.health.vic.gov.au/public-health/radiation
WA	Radiological Council Contact: radiation.health@health.wa.gov.au / (08) 9388 4999 http://www.radiologicalcouncil.wa.gov.au/

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- Standards Australia, AS/NZS 4360 Risk Management
- Standards Australia, AS/NZS 3003 Electrical Installations - Patient Areas
- Standards Australia, AS/NZS 1428Design for Access and Mobility (Set)

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