

Part B – Health Facility Briefing & Design

Medical Imaging Unit



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International Health Facility Guidelines

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160 Medical Imaging Unit – General

1 Introduction

Description

Medical Imaging, usually referred to as radiography, is the branch of medicine where health professionals take various images of body parts for diagnostic investigations or therapeutic purposes.

Depending on the level of service and the clinical service plan, the Unit may also provide diagnostic screening (general x-ray and fluoroscopy), ultrasound, mammography, bone densitometry, computed tomography (CT), magnetic resonance imaging (MRI) or interventional radiographic procedures such as angiography.

The general Medical Imaging Unit may be co-located with or incorporate other specialties including Nuclear Medicine, and Oncology - Radiotherapy Units in a fully integrated imaging suite.

2 Functional and Planning Considerations

Operational Models

Hours of Operation

The Medical Imaging Unit will normally operate 24 hours per day, seven days per week. Smaller units may operate on a long day basis with an after-hours emergency service, depending on the health facility's operational policy.

Models of Service

The Medical Imaging Unit may be provided as:

- A single unit managed and operated by the hospital or polyclinic or medical centre
- A main facility with satellite units located for ease of patient access under the management of the hospital
- An independent privately owned and operated facility within a hospital, known as a "Radio-Diagnostic Centre", providing a service to all hospital units and sharing support areas with the hospital
- A stand-alone off-site service; smaller hospitals and clinics that cannot justify a full Medical Imaging Unit, may consider access to off-site specialist services
- A small component of a facility such as a Dental Surgery

Diagnostic Imaging services can be provided in a variety of health facilities including Hospitals, Day Surgery Centres, Diagnostic Centres with other diagnostic specialties, and Outpatient care facilities such as polyclinics, medical centres and dental clinics. Interventional imaging may only be performed in a hospital-based setting.

The general Medical Imaging Unit within a hospital may be arranged in a variety of models, depending on the hospital's clinical services plan that may include:

- A comprehensive unit located adjacent to the Emergency Unit and with good functional links to Outpatient Units
- A unit integrated with Nuclear Medicine & Oncology-Radiotherapy, or even more sophisticated units such as Proton therapy units
- A centralised Unit with satellite imaging services for Emergency Unit, outpatient ultrasound, intraoperative imaging, cardiac angiography (Catheter Laboratories) or other interventional imaging specialties

3 Unit Planning Models

The planning of a Medical Imaging Unit will be dependent on the imaging specialties to be included and the operational model adopted.

The location of Medical Imaging within a hospital is important for easy access by emergency patients, ambulant patients and inpatients. The Medical Imaging Unit should ideally be located on the ground floor with direct access to the Emergency Unit (EU) unless satellite imaging is provided within the EU.

The relative location of Outpatients Unit should be considered in the planning stage due to the volume of outpatient referrals to the Unit. Refer to Functional Relationships in this section for ideal internal relationships to be considered during the planning stages.

Functional Zones

The Medical Imaging Unit may consist of the following Functional Zones depending on the Clinical service plan of the Unit and the services to be provided:

- Entry/ Reception areas incorporating:
 - Reception desk for patient registration and to act as an access control point
 - Waiting for a range of occupants including children, families, elderly, and patients with limited mobility
 - Consult room for patient assessment and review
 - Amenities – toilets, vending areas for refreshments
 - Offices and workstations for Unit management and clerical functions
- General X-Ray and Screening areas:
 - General and digital X-ray rooms
 - Screening (Fluoroscopy rooms)
 - Patient Change cubicles associated with each x-ray room
 - Access to patient amenities
 - Support areas including patient bed bays, handwashing bays, storage for linen, supplies
- Dental/ Oral imaging:
 - OPG Room
 - Sub-waiting facilities
- CT Scanning including:
 - CT Scanning rooms
 - Control, reporting and computer module equipment rooms
 - Patient Change cubicles associated with each scanning room
 - Patient Holding Bays and Sub waiting areas
 - Access to patient amenities
 - Support Rooms including bays for Linen, Handwashing, Clean & Dirty Utility rooms, Store rooms, Staff Workstation, Scrub-up for Interventional Procedures
- Ultrasound including specialty rooms such as paediatric and interventional
- Mammography rooms including interventional rooms
- Angiography/ Digital Subtraction Angiography (DSA) with:
 - Scanning, control, reporting and computer module equipment rooms
 - Anaesthetic induction rooms (optional)
 - Patient Change cubicles associated with each scanning room and Waiting areas
 - Patient Holding and Recovery bed bays
 - Support Rooms including bays for Linen, Handwashing, Clean & Dirty Utility rooms, Store rooms, Staff Workstation, Scrub-up for Interventional Procedures
- MRI suite with:
 - Scanning, control, reporting and computer module equipment rooms
 - Anaesthetic induction rooms (if paediatric MRI is performed)
 - Patient Change cubicles associated with each scanning room
 - Sub-waiting area with access to patient toilets
 - Patient Holding and recovery bed bays

- Support facilities including bays for Linen, Handwashing, Resuscitation trolley, Clean & Dirty Utility rooms and Store rooms
- Bone Densitometry Room (optional)
- Shared Support Areas including:
 - Cleaner's room/s
 - Communications room
 - Storerooms for files, stationery, general consumables
- Staff Office and Reporting areas:
 - Offices for Unit Director, Senior Radiologist/s, Senior Radiographer/s, Nurse Manager/ Supervisor
 - Workstations for clerical staff, PACS technical staff, general imaging staff
 - Staff Amenities including Staff Room, Change Rooms with Showers, Toilets, Lockers
 - Meeting Rooms
 - Reporting Room (unless individual offices are provided in privacy)

These functional zones are described briefly below.

Entry/ Reception/ Waiting Areas

The Reception is the receiving hub of the unit where patients are first registered and should therefore ensure the security of the entire department through access control. Patient registration may include a booking and queuing system for effective management of patient bookings.

Waiting areas may be divided into separate male female areas to meet cultural requirements and will require convenient access to public amenities. The Waiting areas should be designed for compliance with accessibility standards and be provided with a range of seating options for occupants of varying mobility including bariatric patients. Waiting areas should include provisions for prams and a play area for children. Bed waiting areas should be separated from the ambulatory patient waiting areas for patient privacy.

X-ray, Screening and Scanning Areas

General X-ray and Fluoroscopy (Screening)

General X-ray rooms may be clustered with Fluoroscopy Screening rooms in order to share support facilities. The General X-ray room equipment will generally include an upright bucky stand for chest X-ray. OPG may be included in a General X-ray room where imaging equipment is not fully utilised based on the operational policy of the facility. Additional equipment will require a slightly larger room.

If satellite imaging rooms are not provided in the Emergency Unit (EU), a minimum of one General X-ray room must be sized and located with rapid access for transfer of patients from Emergency Unit. If the unit cannot be located on the ground floor with a convenient access to the EU, then as a second-best option, it may be located over the EU with a lift connection for patient transfers.

Fluoroscopic radiographic imaging (Screening) procedures involve administration of contrast media to the patient and the timed use of a fluoroscopic imaging system along with sequential repositioning of the patient. The Fluoroscopy room will require a preparation room for barium mixtures and an adjacent toilet/ shower that may be accessed from inside the room and from the external corridor.

Fluoroscopy Screening may be combined with an Angiography room, due to the decreasing incidence of barium usage. The room should include services for anaesthesia.

Orthopantomography (OPG)

OPG is an orbital (panoramic) X-ray of the upper and lower jaws, displaying teeth on a single film, used in dental, trauma, and facio-maxillary services. This equipment may be incorporated into a General X-ray room or within the Dental Unit.

Computerised Tomography (CT Scanning)

CT Scanning uses X-ray and computer technology to create detailed digital images, both two and three dimensional. CT scanning equipment consists of a rotating ring inside a gantry with a sliding table for the patient. Multiple images are taken in slices which are combined using computer technology. The CT Scanning room will have an associated Control Room and computer equipment room. The computer equipment may also be placed in the CT room, if a separate room cannot be provided.

Refer to the Standard Component for CT Scanning for detailed room requirements. A Control Room may service 2 rooms subject to patient privacy being protected. The room should include services for general anaesthesia and be sized for interventional procedures. A bed/ trolley bay adjacent to each room is required for staff observation of waiting patients.

If integrated with the Medical Imaging Unit all the required support such as scrub, pre-op and post-op recover facilities must be provided.

Angiography/ Digital Subtraction Angiography (DSA)

Angiography involves x-ray imaging the inside of blood vessels using an injection of contrast media. Simple angiography procedures such as peripheral studies can be done on fluoroscopy equipment.

Digital Subtraction Angiography (DSA) refers to a process where contrast media is injected into a vessel in the area being examined. Images are taken of the blood vessels before and after injection with contrast media. The pre-contrast images are subtracted from the post contrast images by computer resulting in clear blood vessel images.

Procedures using this type of imaging include angiography, angioplasty, arterial and venous stents, biliary and renal artery imaging. DSA procedures are becoming less popular in favour of CT scanning due to the ability to produce 3D images of vessels using a less invasive procedure.

Endoscopic Retrograde Choleopancreatography (ERCP)

ERCP is a procedure that uses endoscopy and fluoroscopy to diagnose and treat conditions of the biliary and pancreatic ductal systems including removal of gall stones, insertion of stents for strictures, repair of leaks and removal of cancer. These are gastrointestinal endoscopy procedures that may be performed in the Medical Imaging Unit or in an Endoscopy Unit.

If integrated with the Medical Imaging Unit all the required support such as scrub, pre-op and post-op recover facilities must be provided. Mammography

Mammography imaging or breast screening may be included for diagnostic purposes according to the health facility's operational policies. Mammography rooms should provide sufficient area for interventional procedures such as needle biopsy that may require bed access and prone positioning. If biopsy is provided, mammography should be located adjacent to an Ultrasound Room for fine needle biopsies. Change Rooms should be accessible directly from the Mammography room and an Interview Room will be required in close proximity.

Magnetic Resonance Imaging (MRI)

MRIs employ powerful magnets which produce a strong magnetic field that forces protons in the body to align with that field. When a radio-frequency (RF) current is pulsed through the patient, the protons are stimulated, and spin out of equilibrium, straining against the pull of the magnetic field. When the radio-frequency field is turned off, the MRI sensors can detect the energy released as the protons realign with the magnetic field, as well as the amount of energy released, changes depending on the environment and the chemical nature of the molecules.

The location of the MRI is important to restrict access, protect the magnetic field from interference and reduce the extent of electro-magnetic shielding required. Specifically, the MRI should be located:

- With good external access for installing and servicing the equipment; this may be achieved

through an accessible side panel

- Distant to any moving metal objects that may cause interference such as lifts, train rails and, construction equipment. Ideally, keep a distance of 12 m by length from moving metallic objects that can create a radio noise that could lead to image distortion
- The MRI should not be located below a helipad or next to a sub-station

Facilities required in the MRI suite include:

- Patient change rooms with lockers for personal property (personal property particularly items with a metallic content must not be taken into the MRI room including watches, credit cards and keys)
- An Interview Room for patient discussion
- Storage for equipment (non-metallic MRI compliant)

Planning and design should consider the following:

- Structural assessment is required to ensure the floor/ slab will accommodate the weight of the MRI
- The MRI unit and the associated magnetic field must be fully contained within the room, according to the equipment selection and specifications, that will require liaison with the equipment supplier
- The MRI room will require magnetic shielding and RF shielding, to be determined in conjunction with the equipment supplier, according to the machine specifications
- Anaesthetic Induction room with pediatric MRI is provided
- Access control is required to the MRI suite, the MRI room and the support areas within the suite to ensure authorised entry. The required exclusion zones are divided into four stages. Entry to each Zone will require monitoring by staff. The 4 zones are as follows:
 - Zone 1: Entrance which may be shared with general radiology
 - Zone 2: Reception, Waiting which may be shared, patient screening and toilet
 - Zone 3: MRI sub-waiting, patient preparation, changing room, recovery, control, and equipment (MRI compliant) rooms
 - Zone 4: MRI Scanning room
- Equipment and fittings in the room including emergency equipment such as fire extinguishers and gas bottles need to be constructed of non-ferrous material

MRI equipment requires helium for cooling. Allow for helium discharge pipe to the outside (refer to Part E Engineering Guidelines in relation to the permissible discharge)

MRI rooms are to comply with Standard Components, refer to Standard Component – MRI Scanning Room, Room Data Sheet and Room Layout Sheet.

Ultrasound

Ultrasound is a non-invasive procedure using high frequency sound waves for diagnostic purposes. This permits the use of ultrasound for a various type of tissue and organs and is particularly useful in obstetrics, digestive system, renal, cardiac and vascular scanning. Ultrasound does not use ionising radiation and does not require radiation shielding.

Ultrasound examinations may be done in the Medical Imaging unit, in specialist units or at the patient location, as the equipment is mobile. Ultrasound imaging may involve interventional procedures and room size may need to accommodate additional procedures and access for patients on a bed/ trolley. Ultrasound rooms may require close access to drinking water and a toilet for particular scanning procedures.

Bone Densitometry Room (optional)

Bone densitometry is a non-invasive procedure using a special x-ray scanning machine to determine bone density or strength. It is used to identify those at risk of developing osteoporosis and to monitor change in bone density.

The room may have radiation shielding to walls and/ or glazing as advised by a Radiation Consultant.

Support Areas

Preparation Room

The Preparation Room is provided for preparation of contrast media solutions, storage of sterile supplies. The room should be sized to accommodate the quantity of supplies required. The Preparation Room, if conveniently located, may serve several imaging rooms. The Preparation Room shall comply with requirements identified in Standard Components.

Digital Imaging Processing

Picture Archiving and Communication Systems (PACS) have become one of the most popular health care systems between 2003 and 2008. During this period, archiving media and interpretation media changed from film based to digital imaging, which was considered as a big breakthrough, where digital image acquisition devices have become more famous than the classic radiology conventional systems. Therefore, once a digital image of the chest is captured, it can be processed directly by the computer.

The digital imaging PACS is a combination of hardware and software hybrid system that is used to acquire, store, deploy and retrieve medical images using Digital Imaging and Communications in Medicine (DICOM) standard. The images and reports are transmitted digitally via PACS by integrating the system with the radiology information system (RIS) and hospital information system (HIS). This integration of PACS–RIS–HIS would eliminate the need to manually store, retrieve and display film jackets. Earlier, most health care systems were adopting the conventional way of storing and displaying patients' data in hospitals, which delayed the time from imaging to reporting of the interpretation. Providing medical staff with information in a short period of time is an important step in the current medical systems. Therefore, PACS is becoming a vital step and should be included in hospitals to speed up doctors' mission in curing patients.

Staff Areas

Offices and Workstations

Offices and workstations may be provided for the Unit Director/ Manager, Senior Radiographer, Senior Radiologist and Nurse Manager of the Unit, located in a discreet staff accessible area. The number of offices required will be determined by the clinical service plan, dependent on the role and size of the unit.

Reporting Rooms

Picture Archiving Communications Systems (PACS) reporting areas will include Radiologist workstations for viewing and reporting on procedures using diagnostics quality monitors high resolution (LCD) on which images can be manipulated. A minimum of two linked monitors are required, occasionally four screens are provided.

In addition to the reporting monitors, a dedicated computer will be required for access to the Patient Information System and a system for dictating reports.

Locate reporting areas in a quiet area with ready access to the imaging rooms. Several workstations may be located in one room but will need to be visually and acoustically separated.

The reporting area will require:

- Ergonomic design of the workstation to accommodate multiple monitors
- Adequate ventilation and temperature control to individual spaces to minimise risk of monitor failure
- Individual cubicle lighting (dimmable)
- Acoustic measures to ensure quality of voice recordings

Staff Amenities Areas

Staff will need access to the following:

- Toilets, shower and lockers
- Staff room with beverage facilities
- Meeting room/s for meetings, education and training

4 Functional Relationships

External Relationships

The Medical Imaging Unit will have a close relationship with the following:

- The Main Entrance of the facility
- Emergency Unit
- Critical Care Units (ICU/ CCU/ HDU)
- Operating Unit for intra-operative imaging
- Inpatients Units
- Outpatients Units for the volume of patients requiring diagnostic testing
- Radiotherapy/ Oncology for regular patient investigations associated with treatment

The optimum external relationships demonstrated in the diagrams below include:

- Visitors access from a main circulation corridor with a relationship to the Main Entrance
- Separate entry and access for inpatients, critical care units and Medical Imaging Unit
- Access for service units such as Supply and Housekeeping via a service corridor

According to these guidelines, Medical Imaging may be in the basement.

Internal Relationships

Internally, the Medical Imaging Unit will be arranged in functional zones. The entrance to the unit will provide access control with a Reception. Imaging and scanning areas will be located in clusters along with related support facilities such as holding, sub-waiting areas and change rooms for patients. Support areas such as reporting, and processing will be located conveniently to the imaging areas and may be shared. Staff areas may be located in a discreet and staff only accessible area.

The Medical Imaging Unit should have a clear one-way flow of patients from entry, holding, imaging procedures, to recovery and then exit, for both ambulant and bed/ trolley patients.

The optimum internal relationships demonstrated in the diagrams below include the following:

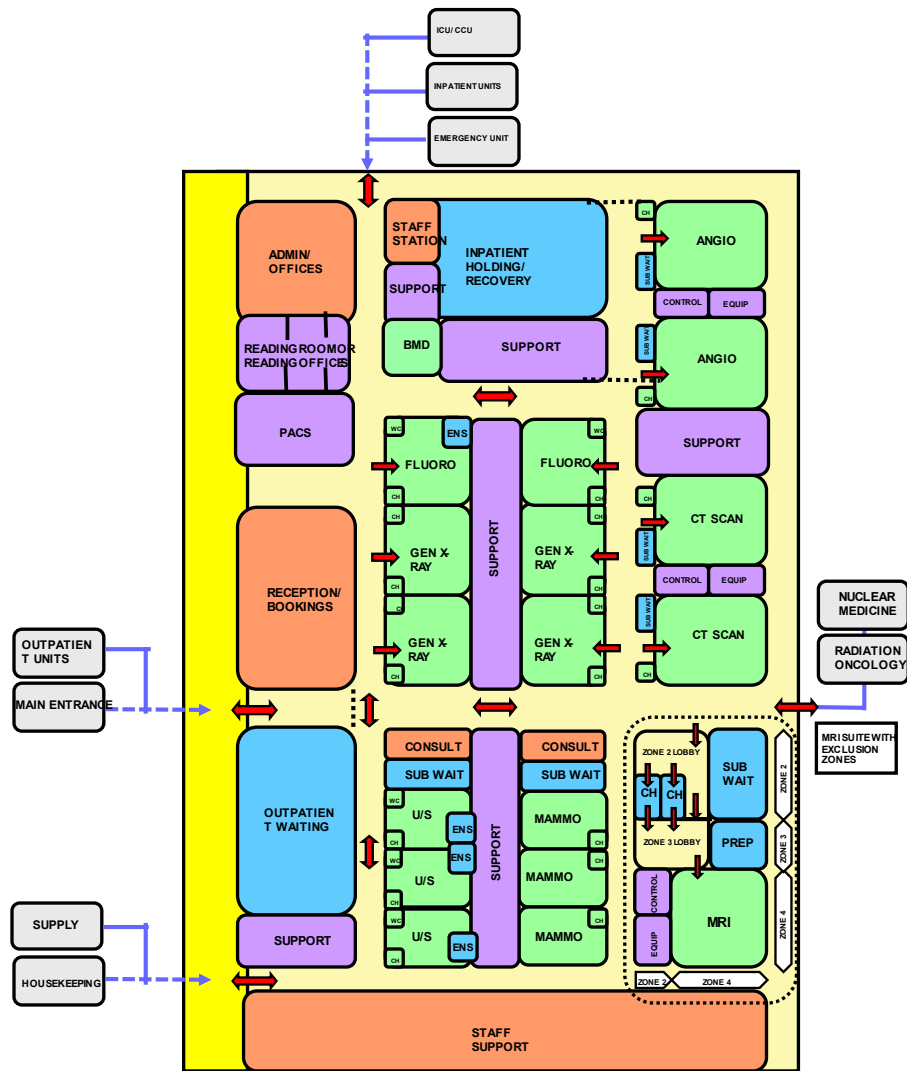
- Reception at the entrance providing access control, with Waiting and amenities
- Ordering of the modalities recommended:
 - Ultrasound
 - Mammography
 - General X-ray
 - Screening
 - CT
 - MR
 - Nuclear Medicine (optional)
 - Oncology- radiotherapy (optional)
- Imaging areas arranged into zones including general X-Ray, Fluoroscopy, CT Scanning, Angiography and MRI
- Patient areas including bed bays and Recovery centrally located convenient to Interventional and Scanning Rooms for sharing between imaging modalities
- Support areas located centrally to imaging rooms and adjacent to areas of need for staff and patient convenience

- If individual offices are provided, a central reporting room will not be required
- Staff areas located in a discreet zone at the Unit perimeter

Functional Relationship Diagram

Medical Imaging Unit – General

The key functional relationships are demonstrated in the diagram below.

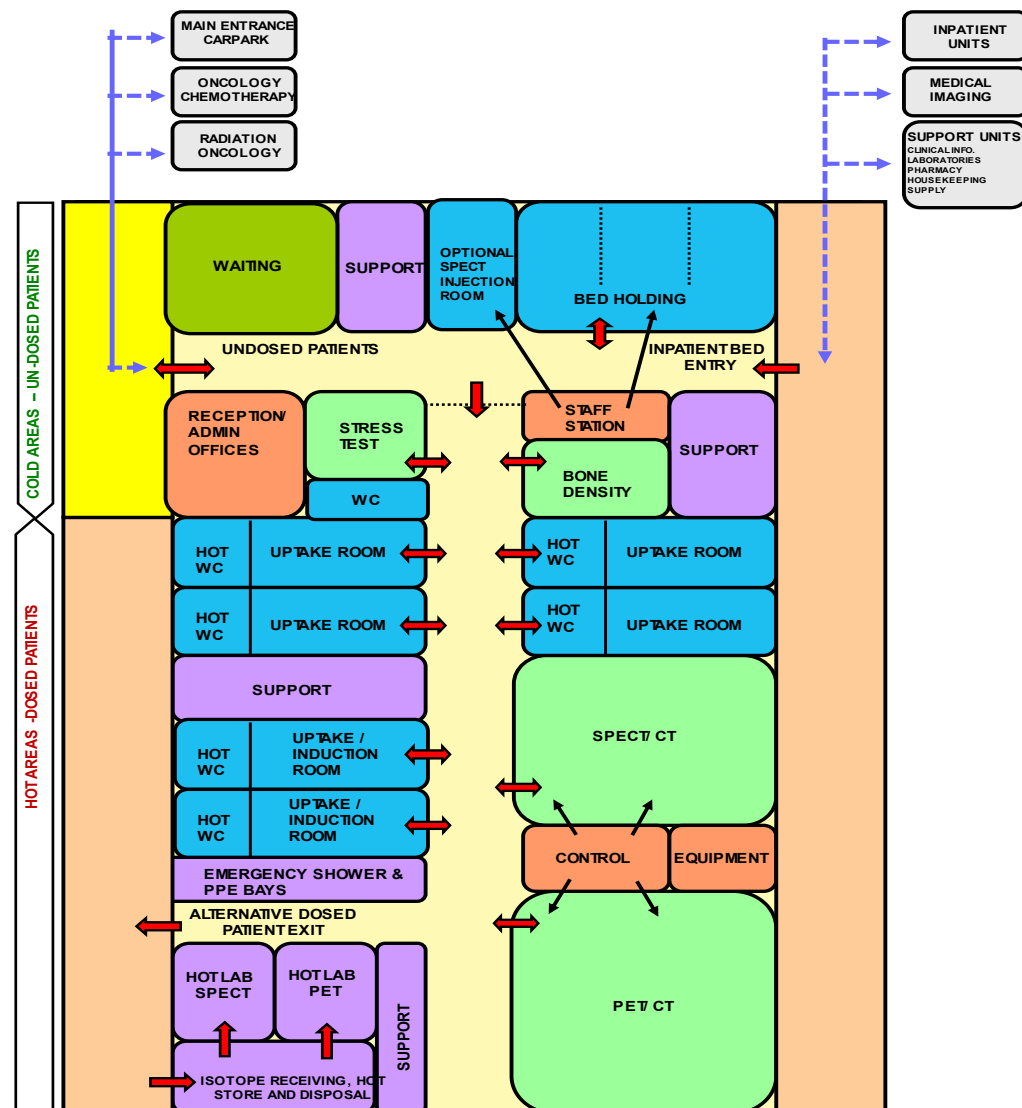


LEGEND

| | | | |
|--|---|---|--|
| Patient Areas | Procedural Areas | X Lifts | → Path of Travel |
| Support Areas | Circulation | → Direct Relationship | - - - - - Controlled Access |
| Staff Areas | Staff/Service Corridor | - - - - - Indirect Relationship | |

Medical Imaging Unit – General, Modular Option (with Nuclear Medicine)

Please refer to Nuclear Medicine FPU in these guidelines for further information on Nuclear Medicine.



5 Design Considerations

Construction Standards

Special attention is to be given to the following in the design of a Medical Imaging Unit:

- Structural support for equipment including equipment mounted to ceilings. Particular consideration must be taken for MRI typically KN/ M²
- Level floor for equipment positioning and safe patient movement
- Provision for cable support trays, ducts or conduits may be made in floors, walls, and ceilings and the impact on room space of large diameter electrical cable trays (to floors or surface mounted on walls)
- Equipment ventilation
- Procedure timing (clocks)
- Task lighting/ dimming and room blackout, as required
- Ceiling heights shall suit the equipment to be installed, but shall not be less than 3000mm for ceiling tube mount installations; ceilings may be higher if required
- A tiled ceiling may be considered for ease of installation, service, and remodelling

Standards & Codes

Radiological facilities are to comply with relevant local legislation, regulations and statutory requirements.

Environmental Considerations

Acoustics

The design should provide acoustic performance according to the function of spaces being provided. Acoustic separation should be provided between Offices, Meeting Rooms, Interview Rooms and adjacent corridors to reduce transfer of noise between rooms and minimise conversations being audible outside the room. This is particularly relevant for teleconferencing and large meetings.

Acoustic privacy should be provided to:

- All imaging rooms
- Interview and Meeting rooms
- Offices and Reporting areas

Additional acoustic privacy considerations include:

- Waiting areas should not be located close to Offices, Meeting and Interview Room/s
- Staff Room/s should not be located close to public and waiting areas

Natural Light/ Lighting

The use of natural light should be optional in the Unit. Windows are an important aspect of sensory orientation and psychological well-being of staff and patients.

Variable lighting levels should be provided in Control/ Reporting rooms, X-ray and Imaging rooms, Angiography rooms, Ultrasound and reporting rooms, where screen visibility is required.

Privacy

Visual patient privacy is an important consideration to be addressed in the design of imaging rooms and waiting spaces. Doors to imaging and screening rooms should be located to avoid patient exposure to circulation areas. Change rooms should be located adjacent to imaging rooms so that a patient is not required to cross corridors to access them. Privacy screening is required to all Patient Bed Bays.

Space Standards and Components

Imaging rooms

The size of imaging rooms will be influenced by the following:

- Ease of movement in and around the room for patients, staff, equipment, bed and trolley access

- The number of staff required in and around the room to operate the equipment and support the patient
- The equipment to be installed; design will need to consider the manufacturer's recommended room sizes but not less than the areas requires in the Schedule of Accommodation with this Functional Planning Unit, equipment placement and services requirements
- Potential future upgrading of equipment
- Scanning rooms should be sized to allow a clear dimension of 920 mm around three sides of the imaging table for patient access and transfers

Ceiling heights shall suit the equipment to be installed but shall not be less than 2800 mm for ceiling tube mount installations; ceilings may be higher if required. The recommended ceiling height is 3000mm.

Accessibility

Wheelchair access is required in all patient areas including Waiting, Consult and Imaging rooms. Waiting areas should also include space and power outlets for charging electric mobility equipment along with suitable seating for patients with disabilities or mobility aids. Waiting and sub-waiting areas should include suitable seating and provisions for bariatric patients.

Doors

Special consideration should be given to the width and height of doorways to ensure delivery and removal of equipment is not impeded or prevented, and that patient trolley and bed movement is not hampered. A minimum of 1400mm clear opening is recommended for doors requiring bed/trolley access. It should be noted that doors may also require radiation shielding.

Ergonomics/ OH&S

Design of clinical spaces including imaging rooms, bed bays and recovery areas must consider Ergonomics and OH&S issues for patient and staff safety and welfare.

Refer to Part C – Access, Mobility, OH&S of these Guidelines for further information.

Size of the Unit

The size of the Medical Imaging Unit will be dependent on the level of service and determined by the facility's Service Plan and Operational Policies. Schedules of Accommodation have been provided for typical Medical Imaging Units in a hospital at role delineation Levels 2 (less complex services) to 6 (teaching/ research facilities).

Safety and Security

Design should consider the following issues:

- Access control to the unit which may be provided at Reception
- Zones within the unit should be organised to allow patients to access the intended area only and prevent patients and visitors entering unrelated areas
- Doors to all perimeters of the Unit and offices should be lockable
- Rooms used for storing equipment and files and records should be lockable
- Meetings and functions scheduled after-hours requiring access by staff and visitors may involve special access arrangements.

Finishes

The Medical Imaging Unit ambience should provide a calm and inviting impression. Finishes should be selected with consideration of the following:

- Infection control and cleaning
- Acoustic properties of the materials
- Durability, replacement of materials

- Fire safety of the materials
- Movement of equipment

Wall protection should be provided where bed or equipment movement occurs including corridors, bed bays and imaging rooms.

Refer also to Part C - Access Mobility, OH&S in these Guidelines for further information on floors and ceilings.

Curtains/ Blinds

Window treatments should be durable and easy to clean. Consideration may be given to use double glazing with internal blinds, tinted glass, reflective glass, exterior overhangs or louvers to control the level of lighting.

Privacy bed screens must be washable, fireproof and cleanly maintained at all times. Disposable bed screens may also be considered.

Fixtures, Fittings and Equipment

Equipment, furniture and fittings shall be designed and constructed to be safe, robust and meet the needs of a range of users.

Imaging equipment and the necessary services will require installation to the manufacturer's recommendations and specifications.

Refer to Part C - Access Mobility, OH&S of these Guidelines, the Room Layout Sheets (RLS) and Room Data Sheets (RDS) for more information.

Building Service Requirements

Information and Communications Technology

The Medical Imaging Unit requires reliable and effective IT / Communications service for efficient operation of the service. The IT design should address:

- Booking, appointment and queuing systems
- Patient/ clinical information systems and electronic records
- Picture Archiving Communications Systems (PACS) and storage for digital archives
- Voice/ data cabling and outlets for phones, fax and computers
- Network data requirements and wireless network requirements to support remote reporting
- Video-conferencing and tele-conferencing requirements, including connection to imaging rooms for educational purposes
- CCTV surveillance if indicated
- Patient, staff, emergency call, duress alarms and paging systems.
- Communications and Server Room/s
- Reporting and recording systems that may include dictation or voice recognition and include printing of reports
- Tele-Consultation and Tele-Radiology provision

Staff Call

Patient and Emergency Call facilities shall be provided in all patient areas (e.g. Holding bays, Recovery bays, Preparation rooms, Change Rooms, Toilets and Imaging rooms) in order for patients and staff to request for urgent assistance.

The individual call buttons shall alert to an annunciator system. Annunciator panels should be located in strategic points visible from Staff Stations and audible in Staff Rooms and Meeting Rooms.

Heating, Ventilation and Air conditioning (HVAC)

The Medical Imaging Unit should be air-conditioned to provide a comfortable working environment for staff and visitors. Interventional Imaging rooms may require air-conditioning equivalent to operating room conditions, i.e. filtered and positive pressured. Rooms with heat generating equipment may require special air-conditioning. Refer to Part E - Engineering Services in these guidelines and to the Standard Components, RDS and RLS for further information.

Medical gases

Medical gas is that which is intended for administration to a patient in anaesthesia, therapy, or diagnosis.

The Unit requires oxygen and suction in all patient investigation rooms, treatment rooms and procedure rooms and patient bays. The Provision of medical air to patient recovery bays and interventional rooms is optional.

Full anaesthetic capability is required within interventional diagnostic rooms, including systems for the delivery of nitrous oxide and the 'scavenging' of gases that have been exhaled by the patient that should not be breathed in by any medical personnel.

Refer to Part E - Engineering Services in these guidelines and to the Standard Components, RDS and RLS for further information.

Radiation Shielding

All rooms that are used for undertaking imaging procedures require radiation shielding. A certified physicist or qualified expert needs to assess the plans and specifications for radiation protection as required by the relevant local Radiation/ Nuclear Safety Authorities. A radiation protection assessment will specify the type, location and amount of radiation protection required for an area according to the final equipment selections, the layout of the space and the relationship between the space and other occupied areas.

The radiation protection requirements are to be incorporated into the final specifications and building plans. Radiation requirements should be re-assessed if the intended use of a room changes during the planning stages, equipment is upgraded, or surrounding room occupancy is altered. Consideration should be given to the provision of floor and ceiling shielding when rooms immediately above and below are occupied.

Infection Control

Standard precautions apply to the Medical Imaging Unit to prevent cross infection between patients, staff and visitors. Paths of travel for inpatients should be separated from outpatients as far as possible. Hand hygiene is important and it is recommended that in addition to hand basins, medicated hand gel dispensers be located strategically in staff areas and circulation corridors.

Consideration should be given to separate clean and dirty workflows in all imaging/ procedure, preparation and clean-up rooms.

Hand Basins

Hand basins will be located in each imaging/ procedure room, patient holding, recovery areas as well as clinical support rooms including clean and dirty utilities. In holding and recovery areas the minimum provision is one hand basin per 4 bed or chair bays.

Interventional imaging rooms such as Angiography may have an adjoining scrub facility.

Hand basins should comply with Standard Components for Bay - Handwashing. Refer to the Standard Components, RDS and RLS of these guidelines for additional information.

Antiseptic Hand Rubs

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

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

Antiseptic Hand Rubs, although very useful and welcome, cannot fully replace Hand Wash Bays, both are required. For further information related to Infection Control refer to Part D – Infection Control in these Guidelines.

6 Schedule of Equipment and Furniture

This Schedule of Equipment and Furniture below lists the major equipment required for the key rooms in this FPU.

| Room/ Space | Standard Room Code | Item Description | Qty | Remarks |
|-------------------------------|--------------------|---|-----|--|
| General X-Ray | genxr-i | Air flowmeter | 1 | |
| | | Oxygen flowmeter | 1 | |
| | | Rack: lead apron | 1 | |
| | | Suction adapter | 1 | with bracket & suction bottle |
| | | X-ray unit: general purpose | 1 | with X-ray table, control console and chest bucky |
| Screening Room (Fluoroscopy) | scrn-i | Air flowmeter | 1 | |
| | | Oxygen flowmeter | 1 | |
| | | Rack: lead apron | 1 | |
| | | Suction adapter | 1 | with bracket & suction bottle |
| | | X-ray unit: radiography/ fluoroscopy, digital | 1 | with X-ray table, control console and optional chest bucky depending on operational policy |
| Mammography | mammo-i | Oxygen flowmeter | 1 | |
| | | Rack: lead apron | 1 | |
| | | Suction adapter | 1 | with bracket & suction bottle |
| | | X-ray unit: mammography | 1 | with control console and optional mammography chair |
| C.T Scanning – Procedure Room | ctpr-i | Air flowmeter | 1 | |
| | | Injector: contrast media, CT | 1 | |
| | | Monitor: cardiac | 1 | optional mobile vital signs monitor |
| | | Oxygen flowmeter | 2 | |
| | | Rack: lead apron | 1 | |
| | | Scanning unit: CT | 1 | |
| MRI Scanning Room | | Suction adapter | 2 | with bracket & suction bottle |
| | mri-42-i | Air flowmeter: MRI | 1 | |
| | | IV pole: mobile, MRI | 1 | |
| | | Injector: contrast media, MRI | 1 | |
| | | Oxygen flowmeter: MRI | 2 | |
| | | Scanning unit: MRI | 1 | |
| Angiography Procedure Room | | Suction adapter: MRI | 2 | with bracket & suction bottle |
| | anpr-i similar | Air flowmeter | 1 | |
| | | Anaesthesia unit: standard | 1 | |
| | | Angiography unit | 1 | with angiography table and control console |
| | | IV pole: mobile | 1 | |
| | | Injector: contrast media, angiography | 1 | |
| | | Light: surgical | 1 | |
| | | Monitor: cardiac | 1 | |
| | | Oxygen flowmeter | 2 | |
| | | Rack: lead apron | 1 | |
| | | Services pendant: ceiling | 1 | optional |

| Room/ Space | Standard Room Code | Item Description | Qty | Remarks |
|-------------|--------------------|-----------------------------------|-----|-----------------------------------|
| Ultrasound | | Suction adapter | 2 | with bracket & suction bottle |
| | ultr-i | Oxygen flowmeter | 1 | |
| | | Monitor: video, medical-grade | 1 | optional, wall or ceiling mounted |
| | | Suction adapter | 1 | with bracket & suction bottle |
| | | Table: examination, ultrasound | 1 | |
| | | Ultrasound scanning unit: general | 1 | |
| | | Warmer: gel | 1 | |

7 Components of the Unit

Standard Components

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

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

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

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

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

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

- Compliance with the text of these Guidelines.
- Minimum floor areas as shown in the schedule of accommodation.
- Clearances and accessibility around various objects shown or implied.
- Inclusion of all mandatory items identified in the RDS.

The Medical Imaging Unit contains Standard Components to comply with details in the Standard Components described in these Guidelines. Refer to Standard Components Room Data Sheets and Room Layout Sheets.

Non-Standard Components

Non-Standard rooms are identified in the Schedules of Accommodation as NS and are described below.

Orthopantomography (OPG) Room

The OPG imaging unit may be located in a room or bay. The room size will be dependent on the equipment to be installed; circulation space will be required around the imaging unit. Access will be required for patients in wheelchairs.

Room requirements will include:

- Radiation shielding of the space with access to lead gowns for the patient and staff
- Radiation warning light
- Patient and emergency call system
- A handbasin in close proximity

Processing Room

The Processing Room is an area for automatic processing equipment with sorting and viewing of images and films. The processing area should be located with ready access to other imaging procedure rooms and reporting rooms. This room will include:

- Area for processing equipment as required
- Storage and sorting bench
- Inset sink to a wet bench may be preferred

8 Schedule of Accommodation

The Schedule of Accommodation (SOA) provided in the Appendices of this FPU represents generic requirements for this Unit. It identifies the rooms required along with the room quantities and the recommended room areas. The sum of the room areas is shown as the Sub Total as the Net Area. The total area comprises of the sub-total areas of these rooms plus an additional percentage of the sub-total applied as the circulation (corridors within the Unit). Circulation is represented as a percentage is the minimum recommended target area. Any external areas and optional rooms/ spaces are not included in the total areas in the SOA.

Within the SOA, room sizes indicated for typical units and are organised into functional zones. Not all rooms identified are mandatory, therefore, some rooms are found as optional in the corresponding Remarks. These Guidelines do not dictate the size of the facilities and the SOA provided represents a limited sample based on assumed unit sizes. The actual size of the facilities is determined by the Service Planning or Feasibility Studies. Quantities of rooms need to be proportionally adjusted to suit the desired unit size and service needs.

The table below shows five alternative SOA's for role delineations 2 to 6 including typical imaging specialties. The inclusion of imaging specialties in health facilities will be dependent on the service plan and operational policy of the facility.

Any proposed deviations from the mandatory requirements, justified by innovative and alternative operational models may be proposed within the departure forms included in Part A of these guidelines for consideration by the health authority for approval.

| ROOM/ SPACE | Standard Component | RDL 2 | | | RDL 3 | | | RDL 4 | | | RDL 5 | | | RDL 6 | | | Remarks |
|--|-------------------------------------|----------------------|---|----|----------------------|---|----|----------------------|---|-----|----------------------|---|-----|----------------------|---|-----|---|
| | Room Codes | Qty x m ² | | | Qty x m ² | | | Qty x m ² | | | Qty x m ² | | | Qty x m ² | | | |
| Entry / Reception | | | | | | | | | | | | | | | | | |
| Reception/ Clerical | recl-9-i recl-12-i recl-15-i | | | | | | | 1 | x | 9 | 1 | x | 12 | 1 | x | 15 | 1, 2 & 3 staff. |
| Waiting | wait-10-i wait-15-i wait-20-i | | | | | | | 2 | x | 15 | 2 | x | 20 | 2 | x | 25 | Public. May be divided into gender segregated areas. 1.2sqm per seat, 1.5sqm w/chair. |
| Bay – Drinking Fountain, 1m ² | bwf-1-i | | | | | | | | | | 2 | x | 1 | 2 | x | 1 | Optional |
| Bay – Vending Machines | bvm-3-i bvm-5-i | | | | | | | | | | 1 | x | 3 | 1 | x | 3 | Optional |
| Bay – Wheelchair | bwc-i | | | | 1 | x | 4 | 2 | x | 4 | 2 | x | 4 | 3 | x | 4 | |
| Consult/ Exam Room | cons-i | | | | 1 | x | 14 | 1 | x | 14 | 2 | x | 14 | 2 | x | 14 | Number dependent on volumes and patient requirements |
| Office -Shared | off-2p-i off-3p-i off-4p-i | | | | 1 | x | 9 | 1 | x | 15 | 1 | x | 20 | 1 | x | 20 | Clerical/ bookings; 2, 3 or 4 person shared office. |
| Office – Workstation | off-ws-i | | | | | | | 1 | x | 5.5 | 1 | x | 5.5 | 1 | x | 5.5 | Transport Staff. May be located adjacent to trolley parking |
| Play Area | plap-10-i plap-15-i plap-20-i | | | | | | | 1 | X | 10 | 1 | x | 10 | 1 | x | 10 | Adjacent to Family waiting 4-5 places for children. |
| Toilet – Accessible, 6m ² | wcac-i | | | | | | | 2 | x | 6 | 2 | x | 6 | 2 | x | 6 | May be divided into gender segregated areas. |
| Toilet – Public, 3m ² | wcpu-3-i | | | | | | | 2 | x | 3 | 2 | x | 3 | 2 | x | 3 | May be divided into gender segregated areas. |
| General X-ray & Fluoroscopy (Screening) | | 1 room | | | 2 rooms | | | 4 rooms | | | 5 rooms | | | 8 room | | | |
| General X-Ray | genxr-i | 1 | x | 35 | 1 | x | 35 | 2 | x | 35 | 3 | x | 35 | 4 | x | 35 | |

| | | | | | | | | | | | | | | | | | |
|--|---------------------------|---|---|-----|---|---|-----|---|---|-----|---|---|-----|---|---|-----|--|
| Screening Room (Fluoroscopy) | flou-i | | | | 1 | x | 36 | 1 | x | 36 | 1 | x | 36 | 2 | x | 36 | Includes control area; qty of rooms to suit service plan. |
| Interventional Screening Room (Fluoroscopy) | flou-i (similar) | | | | 1 | x | 45 | 1 | x | 45 | 1 | x | 45 | 2 | x | 45 | Optional. For both vascular and Non-vascular procedures |
| Bay – Handwashing, Type B | bhws-b-i | | | | 1 | x | 1 | 1 | x | 1 | 1 | x | 1 | 2 | x | 1 | For patient bed bay areas |
| Bay - PPE | bppe-i | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | 2 | x | 1.5 | For Lead Apron storage |
| Bay - Linen | blin-1 | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | |
| Bay – Resuscitation Trolley | bres-i | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | |
| Change Cubicle – Patient | chpt-2-i | | | | 2 | x | 2 | 3 | x | 2 | 4 | x | 2 | 4 | x | 2 | May be divided into gender segregated areas. |
| Change Cubicle – Accessible | chpt-d-i | 2 | x | 4 | 2 | x | 4 | 3 | x | 4 | 4 | x | 4 | 4 | x | 4 | May be divided into gender segregated areas. |
| Clean Utility | clur-8-i clur-12-i | | | | | | | 1 | x | 8 | 1 | x | 12 | 1 | x | 12 | May be shared |
| Dirty Utility | dtur-10-1 | | | | 1 | x | 10 | 1 | x | 10 | 1 | x | 10 | 1 | x | 10 | Disposal, clean-up, dirty linen storage; may be shared , |
| Patient Bay – Holding, 10m2 | pbtr-h-10-i | | | | 2 | x | 10 | 4 | x | 10 | 4 | x | 10 | 4 | x | 10 | May be divided into gender segregated areas. |
| Preparation/ Set-up Room (Imaging) | prep-s-i | | | | 1 | x | 9 | 1 | x | 9 | 1 | x | 9 | 1 | x | 9 | For contrast media storage and preparation |
| Property Bay | prop-2-i prop-6-i similar | | | | | | | 2 | x | 2 | 2 | x | 2 | 2 | x | 2 | Optional; patient lockers. Separate Male/ Female areas. |
| Waiting | wait-sub-i wait-10-i | 2 | x | 5 | 2 | x | 5 | 2 | x | 10 | 2 | x | 10 | 2 | x | 10 | Optional for level-2 & 3. May be divided into gender segregated areas. |
| Shower – Patient - Accessible | shd-i | | | | 2 | x | 4 | 2 | x | 4 | 2 | x | 4 | 2 | x | 4 | Optional May be divided into gender segregated areas. |
| Toilet – Patient | wcpt-i | | | | 1 | x | 4 | 1 | x | 4 | 1 | x | 4 | 2 | x | 4 | May be divided into gender segregated areas. |

| | | | | | | | | | | | | | | | | | |
|-------------------------------|----------------------|--|--|--|---|---|-----|---------------|---|-----|----------------|---|-----|----------------|---|-----|--|
| Toilet – Accessible | wcac-i | | | | 1 | x | 6 | 1 | x | 6 | 1 | x | 6 | 2 | x | 6 | May be divided into gender segregated areas. |
| Bone Densitometry | boden-i | | | | | | | 1 | x | 16 | 1 | x | 16 | 1 | x | 16 | Locate near the entry in the 'Cold – Un-dosed' area |
| Dental/Oral Radiology | | | | | | | | | | | | | | 1 room | | | |
| OPG Room | n/s | | | | 1 | x | 7 | 1 | x | 7 | 1 | x | 7 | 1 | x | 7 | Room area depends on equipment selected |
| Bay - PPE | bppe-i | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | Lead aprons, adjacent to imaging rooms |
| Waiting | wait-sub-i | | | | 1 | x | 5 | 1 | x | 5 | 1 | x | 5 | 1 | x | 5 | May be shared with adjacent imaging areas. |
| C.T Scanning | | | | | | | | 1 room | | | 2 rooms | | | 2 rooms | | | |
| C.T Scanning – Procedure Room | ctpr-i | | | | | | | 1 | x | 45 | 2 | x | 45 | 2 | x | 45 | Room size is dependent on equipment selected |
| C.T Scanning – Control Room | ancrt-i similar | | | | | | | 1 | x | 14 | 1 | x | 20 | 1 | x | 24 | May be shared between 2 |
| CT Computer Equipment Room | coeq-i | | | | | | | 1 | x | 8 | 2 | x | 8 | 2 | x | 8 | Room size dependant on equipment selected. |
| C.T Scanning – Reporting Room | xrrr-i similar | | | | | | | 1 | x | 9 | 1 | x | 9 | 1 | x | 9 | One workstation/2 scanning rooms |
| Waiting | wait-sub-i wait-10-i | | | | | | | 2 | x | 5 | 2 | x | 10 | 2 | x | 10 | May be divided into gender segregated areas. |
| Patient Bay – Holding, 10m2 | pbtr-h-10-i | | | | | | | 2 | x | 10 | 2 | x | 10 | 2 | x | 10 | 1 outside each scanning room. May be divided into gender segregated areas. |
| Bay – Handwashing, Type B | bhws-b-i | | | | | | | 1 | x | 1 | 1 | x | 1 | 1 | x | 1 | 1 per 4 bed bays; Refer to Part D Infection Control |
| Bay – Linen | blin-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be shared |
| Bay - PPE | bppe-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 2 | x | 1.5 | For Lead Apron storage |
| Bay – Resuscitation Trolley | bres-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | May be shared if located in close proximity to another unit |

| | | | | | | | | | | | | | | | | | | |
|----------------------------------|--------------------|--|--|--|---|--------|----|---|---------|-----|---|---------|-----|---|---------|-----|---|--|
| Change Cubicle – Accessible, 4m2 | chpt-d-i | | | | | | | 1 | x | 4 | 1 | x | 4 | 1 | x | 4 | May be divided into gender segregated areas. 1 cubicle per scanning room | |
| Change Cubicle – Patient | chpt-2-i chpt-12-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be divided into gender segregated areas. 1 cubicle per scanning room | |
| Clean Utility | clur-8-i clur-12-i | | | | | | | 1 | x | 8 | 1 | x | 12 | 1 | x | 12 | May be shared | |
| Dirty Utility | dtur-s-i dtur-12-i | | | | | | | 1 | x | 8 | 1 | x | 12 | 1 | x | 12 | May be shared | |
| Office – Workstation | off-ws-i | | | | | | | 1 | x | 5.5 | 1 | x | 5.5 | 1 | x | 5.5 | Optional, staff base | |
| Property Bay, 2m2 | prop-2-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be shared | |
| Scrub-up/ Gowning, 6m2 | scrb-6-i | | | | | | | 1 | x | 6 | 1 | x | 6 | 2 | x | 6 | May be shared | |
| Toilet –Patient | wcpt-i | | | | | | | 2 | x | 4 | 2 | x | 4 | 2 | x | 4 | May be divided into gender segregated areas; may share amenities with adjacent imaging areas. | |
| Ultrasound & Mammography | | | | | | 1 room | | | 4 rooms | | | 6 rooms | | | 8 rooms | | | |
| Ultrasound | ultr-i | | | | 1 | x | 14 | 2 | x | 14 | 4 | x | 14 | 6 | x | 14 | For general and obstetrics | |
| Ultrasound – Paediatric | ultr-i similar | | | | | | | | | | 1 | x | 20 | 2 | x | 20 | Optional. As required by service plan | |
| Ultrasound - Interventional | proc-20-i similar | | | | | | | | | | 1 | x | 30 | 2 | x | 30 | For Interventional ultrasonography procedures | |
| Mammography | mammo-i | | | | | | | 1 | x | 16 | 2 | x | 16 | 3 | x | 16 | | |
| Mammography - Interventional | mam-int-i | | | | | | | 1 | x | 16 | 2 | x | 16 | 3 | x | 16 | For symptomatic and needle biopsy procedures | |
| Patient Bay – Holding, 10m2 | pbtr-h-10-i | | | | | | | 2 | x | 10 | 4 | x | 10 | 4 | x | 10 | May be shared. May be divided into gender segregated areas. | |
| Bay – Handwashing, Type B | bhws-b-i | | | | 1 | x | 1 | 1 | x | 1 | 1 | x | 1 | 1 | x | 1 | 1 per 4 bed bays; Refer to Part D Infection Control | |

| | | | | | | | | | | | | | | | | | |
|---|---------------------------|--|--|--|---|---|-----|---------------|---|-----|----------------|---|-----|----------------|---|-----|---|
| Bay – Linen | blin-i | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be shared with adjacent area |
| Bay – Resuscitation Trolley | bres-i | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | May be shared if located in close proximity to another trolley |
| Change Cubicle – Patient | chpt-2-i chpt-12-i | | | | 1 | x | 4 | 1 | x | 2 | 2 | x | 2 | 4 | x | 2 | Total of 1 per U/S or Mammography room |
| Change Cubicle – Accessible | chpt-d-i | | | | 1 | x | 4 | 1 | x | 4 | 2 | x | 4 | 2 | x | 4 | Total of 1 per U/S or Mammography room |
| Clean Utility | clur-8-i | | | | | | | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | Optional |
| Dirty Utility | dtur-s-i | | | | | | | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | Optional |
| Office – Workstation | off-ws-i | | | | 1 | x | 5.5 | 1 | x | 5.5 | 1 | x | 5.5 | 1 | x | 5.5 | For Sonographers |
| Processing | dpro-i similar | | | | | | | 1 | x | 6 | 1 | x | 6 | 1 | x | 10 | For Mammography |
| Property Bay | prop-2-i prop-6-i similar | | | | | | | 2 | x | 4 | 2 | x | 8 | 2 | x | 8 | For patient lockers. May be divided into gender segregated areas. |
| Toilet – Patient | wcpt-i | | | | | | | 1 | x | 4 | 3 | x | 4 | 4 | x | 4 | For Ultrasound. Within ultrasound room |
| Toilet – Accessible | wcac-i | | | | 2 | x | 6 | 1 | x | 6 | 1 | x | 6 | 2 | x | 6 | Patient. May be divided into gender segregated areas. |
| Waiting | wait-sub-i wait-10-i | | | | 2 | x | 5 | 2 | x | 5 | 2 | x | 10 | 2 | x | 10 | May be divided into gender segregated areas. |
| Viewing and Reporting Room | xrrr similar | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | 1 | | 12 | Adjust size to suit service plan. |
| Angiography/ Digital Subtraction Angiography (DSA)/ Optional Computed Tomography Angiography (CTA) | | | | | | | | 1 room | | | 2 rooms | | | 3 rooms | | | |
| Angiography Procedure Room | anpr-i similar | | | | | | | 1 | x | 55 | 2 | x | 55 | 3 | x | 55 | Number of rooms to suit service plan. |
| Angiography Control/ Reporting Room | ancrt-i | | | | | | | 1 | x | 14 | 1 | x | 14 | 1 | x | 14 | May be shared between rooms |
| Computer Equipment Room | coeq-i | | | | | | | 1 | x | 8 | 2 | x | 8 | 3 | x | 8 | 1 per Angiography room |

| | | | | | | | | | | | | | | | | | |
|---|---------------------------|--|--|--|---|---|---|---|---|-----|---|---|-----|---|---|-----|---|
| Anaesthetic Induction Room | anin-i | | | | | | | 1 | x | 15 | 1 | x | 15 | 1 | x | 15 | Optional |
| Bay – Linen | blin-i | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be shared |
| Bay – PPE (Personal Protective Equipment) | bppe-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | For Lead Apron |
| Bay – Resuscitation Trolley | bres-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | May be shared if located in close proximity to another unit |
| Change Cubicle – Patient | chpt-2-i chpt-12-i | | | | | | | 1 | x | 2 | 2 | x | 2 | 4 | x | 2 | May be divided into gender segregated areas. |
| Change Cubicle – Accessible | chpt-d-i | | | | | | | 2 | x | 4 | 4 | x | 4 | 4 | x | 4 | Patient. May be divided into gender segregated areas. |
| Clean Utility | clur-8-i clur-12-i | | | | | | | 1 | x | 8 | 1 | x | 12 | 1 | x | 12 | May be shared |
| Dirty Utility | dtur-s-i dtur-12-i | | | | | | | 1 | x | 8 | 1 | x | 12 | 1 | x | 12 | May be shared |
| Patient Bay – Holding, 10m2 | pbtr-h-10-i | | | | | | | | | | | | | | | | Refer to Holding/Recovery Areas for patient bays. |
| Preparation/ Set-Up Room (Imaging) | prep-s-i | | | | | | | 1 | x | 9 | 1 | x | 9 | 1 | x | 9 | |
| Property Bay | prop-2-i prop-6-i similar | | | | | | | 2 | x | 4 | 2 | x | 8 | 2 | x | 8 | For patients; may be divided into gender segregated areas. |
| Scrub-Up/ Gowning | scrb-6-i | | | | | | | 1 | x | 6 | 1 | x | 6 | 1 | x | 6 | May be shared. |
| Store – Sterile Stock | stss-12-i stss-24-i | | | | | | | 1 | x | 12 | 1 | x | 18 | 1 | x | 24 | |
| Toilet – Patient | wcpt-i | | | | | | | 1 | x | 4 | 2 | x | 4 | 2 | x | 4 | Within Angiography Suite |
| Toilet – Accessible | wcac-i | | | | | | | 1 | x | 6 | 1 | x | 6 | 1 | x | 6 | Patient May be divided into gender segregated areas. |
| Waiting | wait-sub-i wait-10-i | | | | | | | 2 | x | 5 | 2 | x | 10 | 2 | x | 10 | May be divided into gender segregated areas. |
| X-Ray Viewing and Reporting | xrrr-i | | | | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | May be combined with Control room |

| MRI | | | | | | | | 1 room | | | 2 rooms | | | 2 rooms | | | May be provided at any RDL |
|-----------------------------------|--------------------|--|--|--|--|--|--|--------|---|-----|---------|---|-----|---------|---|-----|---|
| MRI Scanning Room | mri-42-i | | | | | | | 1 | x | 42 | 1 | x | 42 | 2 | x | 42 | Room size dependant on equipment selected |
| MRI Computer Equipment Room, | coeq-8-i similar | | | | | | | 1 | x | 8 | 1 | x | 8 | 2 | x | 8 | MRI. requirements as per manufacturers specifications |
| MRI Control/ Reporting Room, 14m2 | ancrt-14-i similar | | | | | | | 1 | x | 14 | 1 | x | 14 | 2 | x | 14 | Shared between 2 MRI rooms |
| Anaesthetic Induction Room | anin-i | | | | | | | 1 | x | 15 | 1 | x | 15 | 1 | x | 15 | Optional |
| Viewing and Reporting Room | xrrr-12-i similar | | | | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | May be combined with Control Room. |
| Patient Bay - Holding, 10m2 | pbtr-h-10-i | | | | | | | 1 | x | 10 | 1 | x | 10 | 2 | x | 10 | May be shared. May be divided into gender segregated areas. |
| Bay – Handwashing, Type A | bhws-a-i | | | | | | | 1 | x | 1 | 1 | x | 1 | 2 | x | 1 | 1 per MRI room, in close proximity to MRI rooms |
| Bay – Linen | blin-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 1 | x | 2 | May be shared |
| Bay – Resuscitation Trolley | bres-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | May be shared if located in close proximity to another unit |
| Change Cubicle – Accessible | chpt-d-i | | | | | | | 1 | x | 4 | 1 | x | 4 | 2 | x | 4 | May be divided into gender segregated areas. |
| Clean Utility | clur-8-i clur-12-i | | | | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | May be shared |
| Dirty Utility | dtur-s-i dtur-12-i | | | | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | May be shared |
| Property Bay | prop-2-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 4 | x | 2 | Patient lockers. May be divided into gender segregated areas. |
| Store - Dewar Tank | n/s | | | | | | | 1 | x | 6 | 1 | x | 6 | 1 | x | 6 | As required, accessible to MRI rooms |
| Store – Files, 8m2 | stfs-8-i | | | | | | | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | Optional |
| Toilet – Accessible | wcac-i | | | | | | | 1 | x | 6 | 1 | x | 6 | 2 | x | 6 | Patient. May be divided into gender segregated areas. |

| | | | | | | | | | | | | | | | | | |
|--|------------------------------|--------|--|---|---|---|----|---------------|---|-----|---------------|---|-----|----------------|---|-----|---|
| Waiting – Sub | wait-sub-i | | | | | | | 1 | x | 5 | 1 | x | 5 | 2 | x | 5 | May be divided into gender segregated areas. |
| Patient Holding/ Recovery Areas | | | | | | | | 4 bays | | | 8 bays | | | 12 bays | | | Optional if centralized Holding/Recovery Area |
| Patient Bay – Holding, 10m2 | pbtr-h-10-i | | | | | | | 4 | x | 10 | 6 | x | 10 | 8 | x | 10 | Holding/ recovery. 2 Bays per interventional imaging room; May be divided into gender segregated areas. |
| Staff Station | sstn-10-i sstn-14-i | | | | | | | 1 | x | 10 | 1 | x | 10 | 1 | x | 14 | |
| Bay – Beverage | bbev-op-i | | | | | | | 1 | x | 4 | 1 | x | 4 | 1 | x | 4 | Optional |
| Bay – Handwashing, Type B | bhws-b-i | | | | | | | 1 | x | 1 | 2 | x | 1 | 2 | x | 1 | |
| Bay – Linen | blin-i | | | | | | | 1 | x | 2 | 1 | x | 2 | 2 | x | 2 | |
| Bay – Resuscitation Trolley | bres-i | | | | | | | 1 | x | 1.5 | 1 | x | 1.5 | 1 | x | 1.5 | May be shared if located close to another trolley |
| Consult Room | cons-i | | | | | | | | | | 1 | x | 14 | 2 | x | 14 | Optional |
| Clean Utility, 12m2 | clur-s-i clur-10-i clur-12-i | | | | | | | 1 | x | 8 | 1 | x | 10 | 1 | x | 12 | |
| Dirty Utility | dtur-s-i dtur-10-i dtur-12-i | | | | | | | 1 | x | 8 | 1 | x | 10 | 1 | x | 12 | |
| | | | | | | | | | | | | | | | | | |
| Store – Equipment, 10m2 | steq-10-i | | | | | | | 1 | x | 10 | 1 | x | 10 | 2 | x | 10 | |
| Support Areas - Shared | | | | | | | | | | | | | | | | | |
| Bay – Mobile Equipment | bmeq-4-i bmeq-6-i | | | | 1 | x | 4 | 1 | x | 6 | 2 | x | 6 | 2 | x | 6 | Depends on facility requirement |
| Cleaner's Room, 6m2 | clrm-6-i | | | | | | | 1 | x | 6 | 1 | x | 6 | 2 | x | 6 | |
| Communications Room | comm-12-i comm-20-i similar | | | | 1 | x | 10 | 1 | x | 12 | 1 | x | 20 | 1 | x | 30 | For PACS Server. Size determined by Operational Policy |
| Digital Processing | dpro-i similar | | | | 1 | x | 16 | 1 | x | 24 | 1 | x | 30 | 1 | x | 40 | Digital processing/ printing. As required by service plan |
| Disposal Room, 8m2 | disp-8-i | shared | | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | 8 | Share by the whole unit |

| | | | | | | | | | | | | | | | | | |
|--|----------------------------|---|---|---|---|---|---|---|---|-----|---|---|-----|---|---|-----|--|
| Store – Files | stfs-8-i stfs-20-i | 1 | x | 8 | 1 | x | 8 | 1 | x | 12 | 1 | x | 16 | 1 | x | 20 | Films/ CDs/ Discs. Size determined by Operational Policy |
| Store – General | stgn-9-i | 1 | x | 9 | 1 | x | 9 | 1 | x | 12 | 1 | x | 12 | 1 | x | 16 | |
| Store – Photocopy/ Stationery, 8m2 | stps-8-i | | | | | | | 1 | x | 8 | 1 | x | 8 | 1 | x | 8 | Laser Printing/ Digitiser; may be included in work space for radiographers. |
| Staff Offices & Reporting Areas | | | | | | | | | | | | | | | | | |
| Office – Single Person, 12m2 | off-s12-i | | | | | | | 1 | x | 12 | 1 | x | 12 | 1 | x | 12 | Director |
| Office – Single Person, 9m2 | off-s9-i | | | | | | | 1 | x | 9 | 1 | x | 9 | 2 | x | 9 | Radiologists |
| Office – Single Person, 9m2 | off-s9-i | | | | | | | 1 | x | 9 | 1 | x | 9 | 2 | x | 9 | Radiographers |
| Office – Single Person, 9m2 | off-s9-i | | | | | | | 1 | x | 9 | 1 | x | 9 | 2 | x | 9 | Nurse Manager/ Supervisor |
| Office – Shared | off-2p-i off-3p-i | | | | | | | 1 | x | 12 | 1 | x | 15 | 1 | x | 15 | PACS Operation/ Management. 2-3 person; see Notes |
| Office – Shared | off-2p-i off-3p-i off-4p-i | | | | | | | 1 | x | 12 | 1 | x | 16 | 1 | x | 20 | 2, 3 & 4 person shared areas. May be used as a film study/ library room; as required by operational policy |
| Office - Workstation | off-ws-i | | | | | | | 2 | x | 5.5 | 4 | x | 5.5 | 6 | x | 5.5 | General imaging staff |
| Office - Workstation | off-ws-i | | | | | | | 2 | x | 5.5 | 4 | x | 5.5 | 6 | x | 5.5 | Picture Archiving Comms Systems (PACS) Reporting. Qty will depend on service plan |
| Change – Staff (Male/ Female), 14m2 | chst-14-i | | | | | | | 2 | x | 14 | 2 | x | 14 | 2 | x | 14 | May be divided into gender segregated areas. Includes shower/ toilets/ lockers |
| Meeting Room | meet-9-i meet-12-i | | | | | | | 1 | x | 9 | 1 | x | 9 | 1 | x | 12 | |
| Meeting Room – Medium/ Large | meet-l-15-i meet-l-20-i | | | | | | | 1 | x | 15 | 1 | x | 15 | 2 | x | 20 | |

| | | | | | | | | | | | | | | | | | |
|----------------------------------|--------------------|--|--|--|--|--|--|---|---|---------------|---|---|---------------|---|---|---------------|---|
| Store – Photocopy/ Stationary | stps-8-i stps-10-i | | | | | | | 1 | x | 8 | 1 | x | 8 | 1 | x | 10 | |
| Staff Room | srn-15-i srn-20-i | | | | | | | 1 | x | 15 | 1 | x | 20 | 1 | x | 20 | May be divided into gender segregated areas. |
| Sub Total | | | | | | | | | | 1299 | | | 1787 | | | 2333 | |
| Circulation % | | | | | | | | | | 35 | | | 40 | | | 40 | |
| Area Total | | | | | | | | | | 1753.7 | | | 2501.8 | | | 3266.2 | including the centralized holding/ recovery area |

Notes

- Areas noted in Schedules of Accommodation take precedence over all other areas noted in the Standard Components.
- Rooms indicated in the schedule reflect the typical arrangement according to the sample bed numbers.
- All the areas shown in the SOA follow the No-Gap system described elsewhere in these Guidelines.
- Exact requirements for room quantities and sizes will reflect Key Planning Units (KPU) identified in the Clinical Service Plan and the Operational Policies of the Unit.
- Room sizes indicated should be viewed as a minimum requirement; variations are acceptable to reflect the needs of individual Unit.
- Office areas are to be provided according to the Unit role delineation and number of endorsed full time positions in the Unit.

9 Future Trends

Imaging is widely used as an essential adjunct to clinical assessment for diagnosis and staging of human disease, and increasingly in the design of appropriate therapies and then monitoring response to these treatments and has been described as one of the fastest growing healthcare sectors in the developed world. Medical liability considerations also weigh heavily in many decisions by physicians to utilise medical imaging if clinically warranted.

It is expected that radiation dosages will continue to drop and utilisation of imaging services will become more efficient, with fewer healthcare resources wasted.

With the Internet, borders have blurred between the concepts of information and communication systems, making access to data and distribution of information faster and more efficient. Mobile and wearable media will accelerate these trends.

New energy sources—magnetic, radiofrequency, sonic, optical and nuclear—combined with fast, dynamic, digital methods of applying and recording them, will continue to add dozens of parameters to the imaging toolkit. Future images will be photo realistic; using all the sources of data combined, enhanced using interactive rendering with additional details, and available remotely at the desktop.

Future new technologies (e.g., molecular imaging) could yield rapid utilisation changes if these provide the clinical value that has been attributed to traditional advanced imaging during its recent boom.

Artificial Intelligence is an emerging field and operators may be consider its provisions to be built into the ne facilities operational policies and the AI Vendors.

10 Further Reading

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

- American College of Radiology (ACR) Medical Imaging: 'Is the Growth Boom Over' Neiman Report Oct 2012 <http://www.acr.org/Research/Health-Policy-Institute/Neiman-Report-Index/Brief-01-Is-the-Medical-Imaging-Growth-Boom-Over>
- Australasian Health Facility Guidelines, Part B Health Facility Briefing and Planning, Medical Imaging - General, Rev 6 2016 refer to website https://aushfg-prod-com-au.s3.amazonaws.com/HPU_B.0440_6_0.pdf
- Department of Health, Queensland Government, Australia Medical Imaging Services; CSCFv3.2 Module Overview. Refe to website: <https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/service-delivery/cscf/modules/default.asp>
- NHS Estates, Department of Health Estates and Facilities Division, HBN 6 Facilities for diagnostic imaging and interventional radiology, HMSO, London, 2001, <https://www.gov.uk/government/organisations/departement-of-health>
- RSNA Radiological Society of North America, James H. Thrall, M.D 'Look Ahead The Future of Medical Imaging' Aug 2015 <http://www.rsna.org/News.aspx?id=17019>
- The Facilities Guidelines Institute, Guidelines for Design and Construction of Health Care Facilities, 2014 refer to website: <https://www.fgiguideines.org>
- University of Oxford, Department of Physics, Future Trends in Medical Imaging 2016; refer to website: <https://www2.physics.ox.ac.uk/events/2013/07/10/future-trends-in-medical-imaging>
- Department of Veterans Affairs (US) Office of Facilities Management, VA Design Guide Magnetic Resonance Imaging, 2008, refer to website: <http://www.cfm.va.gov/til/dGuide/dgmri02.pdf>
- Agency for Science, Technology and Research, Clinical Imaging Research Centre, Singapore, Professor David W. Townsend, PhD, FRCR (Hon) Director, lecture: Future Trends in Medical Imaging refer to website: <http://infieri->

network.eu/sites/default/files/users/user270/DT_INFIERI_Lecture_Final.pdf