Part B – Health Facility Briefing & Design

230 Oncology Unit - Radiation

iHFG

International Health Facility Guidelines

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Table of Contents

230 Oncology Unit - Radiation

1 Introduction

Description

The purpose of the Radiation Oncology Unit is to provide facilities and equipment for radiotherapy treatment. Radiotherapy is mainly used for the treatment of cancer, often in conjunction with other treatments, including chemotherapy and surgery. The Radiation Oncology Unit contains spaces to support patient consultation, treatment simulation, planning and the administration of treatment.

Radiation therapy is typically administered through equipment known as Linear Accelerators (LINACs) which are installed in rooms commonly referred to as Bunkers due to the thick walls required for radiation shielding. Access to the bunker is typically via a twisted corridor known as “the Maze”, to contain the radiation.

In addition to external radiotherapy via LINAC, the Unit may also provide internal radiotherapy via Brachytherapy.

A simulation room, typically using a CT or MRI is used for the planning of the treatment. Although not recommended, a Simulation Room may be omitted in small facilities where other positioning geometry is provided.

Room sizes and specifications for a Radiation Oncology Unit should comply with the equipment manufacturer's recommendations/ requirements, as space requirements are highly equipment-specific and may vary from one system to another and one manufacturer to another.

2 Functional and Planning Considerations

Operational Models

Hours of Operation

The Radiation Oncology Unit will typically operate from 8am to 6pm daily, week days; however, extended hours of operation may occur according to the unit operational policy.

Model of Care

The preferred radiation oncology model is one in which cancer services are consolidated and delivered in a purpose-built facility, ideally with links to other modes of cancer treatment. The benefit of this model is improved communication between all team members, leading to optimal, efficient clinical management, better patient experience and treatment outcomes. Ideally, planning and therapy should not be separated.

Possibly the best model of care involves a Comprehensive Cancer Care Centre offering all modes of diagnosis and treatment within the facility as a one-stop-shop.

3 Unit Planning Models

Location

Ideally, the Radiation Oncology Unit should be located on ground level due to the weight of the equipment and shielding as well as the ease of installation and replacement of specialised equipment. Radiation Oncology Unit is sometimes located in a basement, often in association with the construction of a basement carpark. Due to the height requirements of the LINAC bunkers the Unit will be equal to 2 levels of basement carpark.

If the technical challenges can be overcome, Radiation Oncology Unit can be on any level of the healthcare facility.

The Unit should be located with ready access for outpatients, including:

- people with disabilities
- people arriving by patient transfer services
- ambulances

- inpatients in wheelchairs and on beds or trolleys

If the Unit is located in a free-standing building on a hospital campus, careful consideration must be given to covered links between the Unit and the main hospital particularly for inpatients on beds/ trolleys, the delivery of goods and supplies, and access to other departments such as Medical Imaging or Laboratory.

Functional Areas

The Radiation Oncology Unit may include the following Functional Areas:

- Entry/ Reception areas:
  - Interview Room
  - Waiting areas with access to refreshments
  - Public amenities
  - Reception with storage for files and stationery
- Patient Consult areas:
  - Consult rooms
  - Interview room
  - Specimen collection and access to patient toilets
- Treatment Planning and Appliance areas:
  - Simulator rooms with Control and Equipment rooms
  - Mould fitting room
  - Mould workshop
  - Patient holding bay for patients on a bed or trolley
  - Support rooms including Change cubicles, stores for consumables and equipment, patient toilets and sub-waiting areas
- Medical Physics areas:
  - Offices and workstations for Physicists
  - Physics laboratory and storage for technical equipment
- Radiation Therapy Treatment areas:
  - LINAC bunkers with Control rooms
  - Procedure room
  - Change cubicles
  - Patient sub-waiting, locker area and access to toilets
  - Ready access to Interview rooms
- Support areas including:
  - Bays for Handwashing/PPE, Linen, Resuscitation trolley, holding of mobile equipment and wheelchairs
  - Clean and Dirty Utilities with waste holding areas
  - Cleaners Room
  - Staff Station
  - Store rooms for equipment and consumables
- Administration / Office areas:
  - Offices and workstations for key personnel according to the approved service plan
  - Meeting room
- Staff areas:
  - Staff Room
  - Locker area
  - Toilets and Showers, gender separated

The Unit may incorporate the following Optional areas depending on the Service Plan:

- Brachytherapy Suite:
  - Brachytherapy bunker with Control room

  - Anaesthetic room
  - Operating/ Procedure room (optional)
  - Scrub up room
  - Patient Bays for holding and recovery with access to patient toilets
  - Patient Waiting area
  - Support areas including Bays for handwashing basins/PPE, Linen and resuscitation trolley
  - Radioactive seed and loading room
  - Store room for sterile stock and equipment
  - Shared utility rooms

- Medical Imaging (optional satellite unit) including:
  - CT Scanning room with Control and Equipment rooms
  - General X-ray room
  - MRI imaging room with Preparation, Control, Equipment rooms
  - Mammography room
  - Patient facilities such as holding bays, property bays, waiting areas, toilets, Staff and support rooms including

Entry/ Reception

Sufficient parking should be made available for ambulances, staff and patients. If possible, patients should be allocated parking closest to the department with a discrete entrance to provide a degree of privacy. It is important to take into account the fact that, although there would be a limited number of patients being actively attended to in the Unit at any given point in time, patients nevertheless spend many hours inside the department when undergoing imaging or planning, consulting with doctors or receiving treatment.

The Reception area will provide for administrative tasks, such as booking appointments and record keeping, as well as receiving and directing patients to the appropriate zone for consulting, treatment planning or radiotherapy treatment. The waiting area should accommodate a range of patients and visitors with varied levels of ability and provide clear access to conveniently located public and patient amenities.

Waiting areas, where appropriate, may be designed with gender separation to meet cultural requirements. A child play area can be incorporated into the main waiting area. Facilities for volunteers and transport staff may also be provided in this area.

Patient Consult Areas

The Consult area should include individual consultation rooms as well as facilities for multidisciplinary teams for patient consultation, follow-up and case review. Patients are generally assessed weekly by a Radiation Oncologist throughout the course of their treatment and may be referred to other specialists and allied health personnel as required including Dieticians, Physiotherapists, Occupational Therapists and Social Workers. Interview and conference rooms are required for patient and family education which may include computers for review of treatment programs.

The Consult area should be located with easy access for outpatients without entering radiation treatment zones. The Consult area should have access to blood collection rooms and patient toilets for specimen collection. This area may include Procedure rooms for minor procedures including endoscopic examinations, pleural taps and peritoneal drains.

Treatment Planning and Appliance Areas

Treatment planning requirements include:

- Treatment planning rooms with computer workstations for Radiotherapy and possibly Brachytherapy as required by the service plan
- Simulator/ CT suite or MRI suite
- Patient and visitor amenities (change cubicles, toilets, sub-waiting, patient holding, etc.)
- Offices and workstations for radiation therapists, trainees and students
- Offices for data checking and transfer in a quiet and discreet area

- Server Room dedicated to the Radiotherapy Unit

The Appliance area allows mask and mould manufacturing for use in radiotherapy treatment and includes:

- Mould Fitting Room; accommodates patient trolley and positioning accessories
- Mould Workshop which will require special exhaust systems for the molten metal used to fabricate photon and electron shielding, foam cutters and vacuum formers used to manufacture custom masks
- An optional separate dirty/ noisy workshop to accommodate machinery and drills
- Materials storage for immobilization devices and heavy moulds used in mask manufacture
- Mould storage for items held in the unit for the patient's treatment duration
- Depending on the preferred optional model and the number of patients expected, the Mould workshop, storage and fitting room may be inter-connected or merged with appropriate zonal separation

Medical Physics/ Biomedical Engineering

Medical Physicists supervise the physical aspects of radiation treatment and radiation safety of staff, patients and visitors. They provide scientific support for all treatment machines, simulators, CT, MRI and PET imaging, computer planning systems, brachytherapy sources and equipment as well as dosimetry, quality assurance and radiation safety.

Biomedical Engineering services may be provided in-house or by external contractors. The service provides maintenance and service support to an extensive range of treatment and non-treatment equipment in Radiation Oncology. Biomedical engineers work closely with Medical Physicists to provide regular calibration and compliance checks of all treatment delivery and diagnostic machines.

Facility requirements include:

- Offices and workstations for physicists, physics assistants and biomedical engineers
- Physics laboratory to manufacture equipment not available commercially for patient treatment such as installation of rigid attachments for patient hoists, calibration jigs for physics, mask creation appliances
- Storage for Medical Physics equipment including bulky water tanks and phantoms
- Technical support (IT office and work area/ equipment storage)
- Electronic/ biomedical engineering workshop

Radiation Therapy Treatment Area

The radiation treatment zone includes:

- LINAC Bunkers with entry/ exit maze and Control rooms
- Change cubicles and patient toilets immediately adjacent to radiation treatment areas
- Sub-Waiting areas located conveniently to each bunker and access to Interview rooms
- Support areas including patient bays, utilities, staff station, preparation and storage areas

Support Areas

Support areas include clean and dirty utilities, storage, disposal rooms, linen bays and handwashing facilities.

The following optional support areas may be required:

- Quality control area
- Dosimetry equipment area
- Hypothermia Room (may be combined with an Examination Room)

Administration/ Offices

Offices should be provided for the clinical director of the unit, radiation oncologists, and radiation therapy managers, nursing managers, allied health professionals, cancer care co-ordinators and specialist nurses. In a stand-alone facility, additional offices/ workstations may be required for human resources, finance, legal services, public relations and information technology professionals. Quantities and configuration of offices is according to needs analysis.

At RDL 5 and 6, adequate access to meeting rooms should be provided to facilitate education, training and research activities within the Unit.

Staff Areas

Staff Areas will consist of:

- Staff Room
- Toilets, Showers and Lockers
- Staff room

Staff areas may be shared with adjacent Units as far as possible.

Optional Areas

Brachytherapy Treatment Areas

The Brachytherapy treatment room is used for delivery of a radiation source through a tube or applicator, implanted during minor surgery. The Brachytherapy room is similar to a radiation bunker (but with lesser shielding requirement) and is equipped as a minor operating room with services to provide for anaesthesia. Support facilities include an anaesthetic induction room, scrub room, patient recovery bays, and sterile stock areas. The suite of rooms required and their relationships are similar to day surgery.

Medical Imaging/ Nuclear Medicine

Computed tomography (CT), magnetic resonance imaging (MRI), ultrasound (US), positron emission tomography (PET), Bone Densitometer and general x-ray imaging may be used for the visualization of bone or soft-tissues during planning and review of radiotherapy treatment.

If a facility is a distinct entity or does not have an efficient functional relationship with a medical imaging department it may need to accommodate medical imaging facilities.

CT and MRI are the most commonly used imaging facilities for treatment planning. However, there are certain conditions under which ultrasound may be used. The types of imaging facilities required will be determined by the service plan.

In smaller Radiation Oncology Units, it is possible to use a CT located within the Medical Imaging Unit for planning purposes.

4 Functional Relationships

A Functional Relationship can be defined as the correlation between various areas of activity whose services work together closely to promote the delivery of services that are efficient in terms of management, cost and human resources. In a Radiation Oncology Unit, due to its makeup of several components and the need for patients to utilize more than one service per visit, highly efficient functional relationships in the Unit will be imperative.

The Radiation Oncology Unit should be located with ready access for ambulant outpatients as well as inpatients arriving by wheelchairs and beds. The Unit may be co-located with Medical Imaging Unit, Nuclear Medicine Unit, Chemotherapy Unit and related Inpatient Units to increase efficiency.

If intra-operative therapy is proposed, the Radiation Oncology Unit should be located close to the Operating Unit or with a direct link. Alternatively an operating room, with all required support rooms similar to a Day Surgery Unit can be incorporated within the Radiation Oncology Unit for this purpose.

External Relationships

If the Unit is part of a larger medical complex, the principal relationships with other Units include ready access to:

- Diagnostic facilities such as Medical Imaging, Nuclear Medicine and Laboratory
- Chemotherapy
- Emergency and Critical Care Units
- Clinical Laboratories
- Pharmacy
- Outpatient Rehabilitation and Complementary Medicine facilities
- Material Management and Housekeeping
- Operating/ Day Procedures Units
- Public amenities and cafeteria
- Parking

Internal Relationships

Optimum internal relationships outlined in the diagram include:

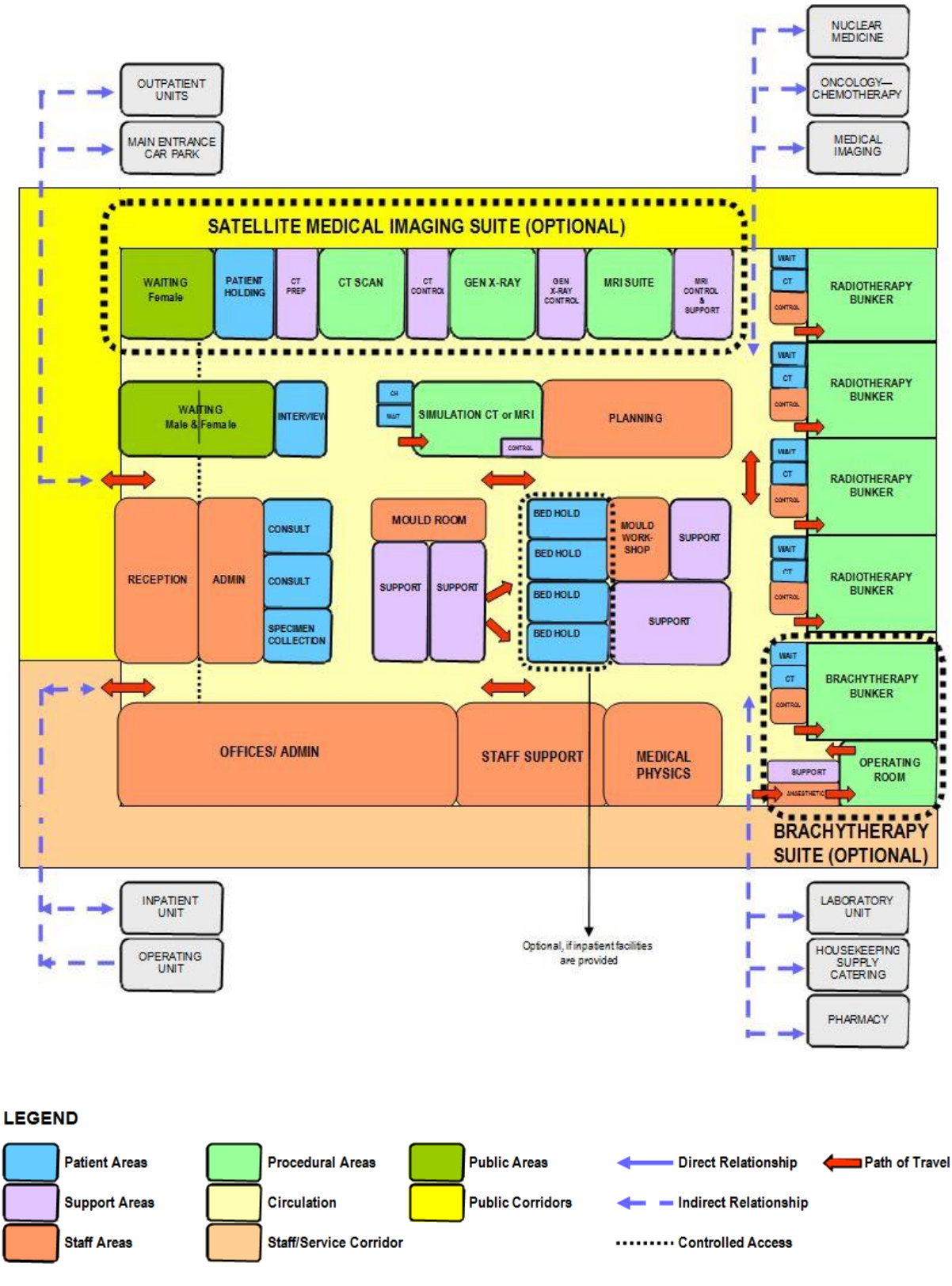
- Reception located with control of access for public and patients
- Waiting area at the Unit entry and sub-waiting within the Unit for patients
- Patient flow from Reception, to Consult, to Simulation and Planning then Radiotherapy Treatment areas
- Convenient access to Mould Fitting and Workshop from Planning areas
- Access to Medical Imaging from Consult, Planning and Radiotherapy Treatment stages
- Shared patient holding for both Simulation and Treatment stages
- Staff Station located with direct observation of patient bed holding
- Support areas decentralised, located close to treatment areas for staff convenience
- Staff Offices and Support areas located on a perimeter in a staff accessible zone

Functional Relationship Diagram

External relationships outlined in the diagram include:

- Clear staff, goods and service entrance:
  - Access to/from Housekeeping, Supply and Catering Units via service corridor
  - Access to Offices and staff areas via service corridor
  - Access to/ from key clinical units associated with patient arrivals and transfers via a service corridor
  - Entry for staff via the public or service corridor
- Separate public entrance
  - Access to/ from key public areas, such as the main entrance, Outpatients Units and parking from the public corridor
  - Entry for ambulant patients and visitors directly from public corridor
  - Access to/ from related treatment facilities via a public corridor
  - Optional separate and discrete entrance from a dedicated patient parking area

Functional Relationship Diagram



LEGEND

- Patient Areas
- Support Areas
- Staff Areas
- Procedural Areas
- Circulation
- Staff/Service Corridor
- Public Areas
- Public Corridors
- Direct Relationship
- Indirect Relationship
- Controlled Access
- Path of Travel

5 Design Considerations

Construction Standards

The flooring for a Radiation Oncology Unit shall be adequate to meet the load requirements for equipment, patients and personnel. Provision for cable ducts or conduits should be made in the floors and ceilings as required. Ceiling mounted equipment should have properly designed rigid support structures located above the finished ceiling. The minimum recommended ceiling height is 3 metres. A lay-in type of ceiling should be considered for ease of installation and service.

The linear accelerator installation may require an opening in a wall and co-ordination of the entry door size to also allow for future servicing of the equipment.

Patient Treatment Areas

Radiation Oncology Units should be designed to avoid exposing patients, staff and visitors to risks such as injury or radiation hazard.

Environmental Considerations

Acoustics

Acoustic privacy is required for many functions in the Unit including:

- Family/ case conference/ interview rooms
- Isolation of noisy areas such as waiting rooms from clinical areas, e.g. clean and dirty utilities
- Staff discussion regarding confidential matters in meeting rooms
- Noise sources arising both within and from outside the Unit such as:
  - Sanitary Facilities
  - Equipment
  - Patient/ Clients
  - Staff Activities
  - Traffic through the unit e.g. visitors, food, linen or other trolleys

Solutions to be considered include:

- Location of the Unit away from noisy hospital areas
- Use of sound isolating construction and selection of sound absorbing materials and finishes
- Planning to separate quiet areas from noisy areas
- Review of operational management and patient/ client flows, this may include separate areas for patients with special needs
- Provision of television systems with headphones to reduce ambient noise levels

Natural Lighting/ Lighting

Natural light and views are desirable but not required from the Unit for the benefit of staff and patients. Every effort should be made to provide a view to all treatment areas either by locating treatment bays/ cubicles/ bedrooms adjacent to a window or by locating chairs and beds to have an external view from each patient space.

Radiation bunkers and simulators will require dimmable lighting with adjustable lighting levels for patient comfort. Colour corrected lighting is also essential to ensure patient assessment can be conducted effectively.

High quality task lighting in essential to ensure complex medical and pharmacological tasks can be safely achieved. Refer also to Part C - Access, Mobility and OH&S of these Guidelines.

Privacy

The design of the Unit needs to consider the contradictory requirement for staff visibility of patients while maintaining patient privacy. Careful consideration of privacy and patient comfort is required to reduce discomfort and stress for patients and privacy screening will be required to all patient bed bays.

Confidentiality for patients receiving treatment is a highly important consideration to be addressed. The Unit should be designed to:

- Ensure confidentiality of personal discussions and medical records
- Provide an adequate number of rooms for discreet discussions and treatments to occur whenever required
- Enable sufficient within each Treatment Bay to permit curtains to be easily drawn whenever required

Interior Décor

Interior decor includes furnishings, style, colour, textures and ambience, influenced by perception and culture. The décor of the Unit should be of a standard that meets the expectations of people using the services and make every effort to reduce an institutional atmosphere

The design of the unit should create a pleasant, reassuring atmosphere for patients whilst retaining the necessary functional requirements associated with clinical spaces and radiation treatment areas.

Space Standards and Components

Accessibility

Design should provide ease of access for wheelchair bound patients in all patient areas including Reception desk, Consult, Interview, Mould fittings rooms and Radiation Treatment bunkers. Waiting areas should include spaces for wheelchairs and suitable seating for patients with disabilities or mobility aids.

Doors

All entry points, doors or openings requiring bed/ trolley access including Radiation Therapy and Procedure Rooms are recommended to be a minimum of 1400 mm wide, unobstructed. Larger openings may be required for special equipment, as determined by the Operational Policy, to allow the manoeuvring of equipment without manual handling risks and risk of damage.

Within workshop and appliance room areas, the number of doors should be kept to a minimum to facilitate the movement of equipment; double doors should be provided to all workshop areas.

Also refer to Part C – Access, Mobility, OH&S of these Guidelines.

Ergonomics/ OH&S

Heights and depths of benches and workstations in the radiation treatment area need to allow staff to efficiently work from standing and seated positions. The emergency stop button should be placed within easy reach of attending staff.

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

Size of the Unit

The size of the Radiation Oncology Unit will be determined by the Clinical Services Plan establishing the intended services scope and complexity. In a satellite facility, where cancer services are collocated, two Radiotherapy Treatment rooms (bunkers) is the minimum viable number.

Schedules of Accommodation have been provided for typical units with 2 and 4 Radiotherapy Bunkers.

Safety & Security

A high standard of safety and security can be achieved by careful configuration of spaces and zones to include:

- Controlled access/ egress to and from the unit.
- Optimal visual observation for staff to access points and patient/ visitor areas.
- Use of CCTV to entry and communication systems to enable contact after normal work hours.

- Colocation of similar functions for ease of staff management.
- Access to public areas shall be considered with care so that the safety and security of staff areas within the Unit are not compromised.

Refer also to Part C of these Guidelines for additional information.

Finishes

Internal finishes including floor, walls, joinery, and ceilings should be suitable for the function of the unit while promoting a pleasant environment for patients, family, carers, visitors and staff.

The following factors shall be considered:

- Aesthetic appearance
- Acoustic properties
- Durability
- Ease of cleaning and compliant with infection control standards
- Suitable floor finishes with respect to slip resistance and movements of equipment

Refer also to Part C of these Guidelines for additional information.

Fixtures, Fittings & Equipment

Equipment such as the linear accelerator and control equipment must be installed to the manufacturer's specifications and recommendations, in particular:

- Space requirements may vary according to equipment selection
- Doors will need to be sized to allow passage of equipment
- Structural assessment will be required for equipment weight loads
- Adequate space will be required for maintenance of major equipment ensuring adequate access to cabinets and control units

Equipment, furniture, fittings and the facility itself shall be designed and constructed to be safe, robust and meet the needs of a range of users. All furniture, fittings and equipment selections for the Unit should be made with consideration to ergonomic and Occupational Health and Safety (OH& S) aspects.

Refer to Part C of these Guidelines, the Room Layout Sheets (RLS) and Room Data Sheets (RDS) for more information.

Curtains / Blinds

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

If blinds are to be used instead of curtains, the following applies:

Vertical blinds and Holland blinds are preferred over horizontal blinds as they do not provide numerous surfaces for collecting dust.

Horizontal blinds may be used within a double-glazed window assembly with a knob control on the bedroom side.

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

Building Service Requirements

Information and Communication Technology

Communications and information systems installed in the unit may include:

- Voice/ data outlets and wireless networks
- Telephone and video conferencing capacity for meeting rooms

- PACS imaging system, electronic records and radiotherapy information management systems
- CCTV for patient viewing, treatment delivery computers and intercoms to allow the radiation therapist to monitor and communicate with the patient from the control area during treatment

Staff Call/ Duress Alarm

Patient and Emergency Call facilities shall be provided in all patient areas (e.g. Consult Room/s, Holding/ Recovery bays, Change Cubicles and Toilets) 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 Staff Stations and audible in Staff Rooms, and Meeting Rooms, and should be of the “non-scrolling” type, allowing all calls to be displayed at the same time.

Heating, Ventilation and Air conditioning

General air conditioning needs to cool equipment but outlets should not be placed directly over partially undressed patients on beds or trolleys. The temperature of the unit should be maintained within a comfortable range not exceeding 25 degrees Celsius for optimal operating efficiency and patient comfort.

Air conditioning systems should be designed with consideration to the following:

- Appropriate air exchanges and exhaust for chemicals and dust in the appliance workshop
- Sufficient cooling for heat generating equipment in radiotherapy treatment and computer equipment rooms

Smoke detectors in radiation treatment and simulator rooms must be of the type not sensitive to radiation (i.e. photoelectric) and require special consideration.

All HVAC units and systems are to comply with services identified in standard components and part E – Engineering Services.

Hydraulics

Warm water shall be supplied to all areas accessed by patients within the Unit. This requirement includes all staff handwash basins and sinks located within patient accessible areas. Sinks in staff areas shall be provided with hot and cold water services.

For cold, warm & hot water technical details, refer to Part E – Engineering Services in these Guidelines.

Medical Gases

The Unit will require:

- Oxygen and suction in all patient bays and procedure rooms
- Provision of medical air to patient recovery bays is optional

Full anaesthetic capability is required within the Brachytherapy Room or adjacent Operating Room, including provisions for administration of nitrous oxide (N_2O) and provisions for the discharging 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 of these guidelines and to the Standard Components, RDS and RLS.

Radiation Shielding and Radiation Safety

Linear accelerator bunkers require radiation protection that may include lead shielding and concrete walls, floors and ceilings to specified thicknesses. Design of the bunker rooms may incorporate a maze entry to assist with radiation protection; a neutron door may also be required depending on the type of linear accelerator used.

The radiation protection needs of the unit shall be assessed by a certified physicist and approved by the MOH. This assessment is to specify the type, location, and amount of protection to be installed in accordance with final approved department layout and equipment selection. The radiation protection requirements shall be incorporated into the final plans and specifications. Early consultation with the manufacturers of radiotherapy equipment is recommended.

The lifespan of the facility and the need to upgrade technology should be considered when specifying the radiation shielding required. It is likely that the machines will be upgraded and newer machines may or may not emit stronger radiation. Therefore, it is sensible to allow for the highest energy machine and widest beam that is likely to be used in the future.

Infection Control

Infectious and immune-suppressed patients may be sharing the same treatment space at the different times of the same day. The design of all aspects for the Unit should take into consideration the need to ensure a high level of infection control in all aspects of clinical and non-clinical practice.

Hand Basins

Hand washing facilities for staff within the Unit will be required in all patient treatment areas including bed bays for holding and recovery, Consult Rooms, Procedure Rooms and Radiation Therapy Bunkers, Imaging rooms, and located conveniently to Simulator Rooms and Staff Stations. Where a hand wash basin is provided, there shall also be liquid soap and disposable paper towels provided and PPE equipment.

Hand hygiene is important and it is recommended that in addition to hand basins, medicated hand gel dispensers be located strategically in staff circulation corridors.

For further information refer to Part D – Infection Control in these Guidelines.

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.

6 Standard Components of the Unit

Standard Components

The Radiation Oncology Unit will contain 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.

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; identified 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 items accordingly 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

- Fixture 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), staff 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
- Clearance and accessibility around various objects shown or implied
- Inclusion of all mandatory items identified in the RDS

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

7 Schedule of Equipment and Furniture

The 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
Radiotherapy Bunker Room	rad-bunk-i	Air flowmeter	1	
		Oxygen flowmeter	1	
		Suction adapter	1	with bracket & suction bottle
		Radiotherapy system: LINAC	1	with patient table, control console, laser positioning lights and CCTV camera (as applicable)
Radiotherapy Simulator Room CT Scanner	rad-sim-i	Air flowmeter	1	
		Injector: contrast media, CT	1	
		Monitor: cardiac	1	optional mobile vital signs monitor
		Oxygen flowmeter	1	
		Rack: lead apron	1	
		Scanning unit: CT	1	with patient table, control console, laser positioning lights and CCTV camera (as applicable)
		Suction adapter	1	with bracket & suction bottle

8 Schedule of Accommodation

The Schedule of Accommodation (SOA) provided below represents generic requirements for this Unit. It identifies the rooms required along with the room quantities and the recommended room areas. The simple sum of the room areas is shown as the Sub Total. The Total area is the Sub Total plus the circulation percentage. The circulation percentage represents the minimum recommended target area for internal corridors in an efficient and appropriate design.

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

The table below shows the SOA for a typical Oncology – Radiation Unit at RDL levels 2 to 6 with 2 bunkers and 4 bunkers respectively. 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.

For stand-alone facilities, designers may add any other FPU's required such as Main Entrance Unit, Medical Imaging Unit etc. based on the business model.

Oncology Unit – Radiation (with 2 & 4 bunkers)

ROOM/ SPACE	Standard Component	RDL 2-6			RDL 2-6			Remarks
	Room Codes	Qty x m²			Qty x m²			
		2 Bunkers			4 Bunkers			
Entry/ Reception								
Airlock	airl-6-i airle-10-i	1	x	6	1	x	10	For standalone facilities or units with direct access from outside
Bay - Beverage, Open Plan	bbev-ip-i	1	x	5	1	x	5	Optional. May be shared with a collocated unit
Bay - Mobile Equipment	bmeq-4-i similar	1	x	4	1	x	10	Optional. May be shared with a collocated unit
Bay - Vending Machines	bvm-3-i similar	1	x	3	1	x	5	Optional. May be shared with a collocated unit
Reception/ Clerical	recl-10-i recl-15-i similar	1	x	10	1	x	20	
Store - Files	stfs-10-i similar	1	x	8	1	x	10	
Store - Photocopy/ Stationery	stps-8-i	1	x	8	1	x	8	
Toilet - Public	wcpu-3-i similar	2	x	3	2	x	3	Separate Male/ Female. May be shared
Toilet - Accessible	wcac-i	1	x	6	1	x	6	May be shared
Waiting	wait-15-i wait-20-i	2	x	15	2	x	20	1.2m² per person. 1.5m² for wheelchairs; Gender segregated.
Consult Area								
Consult/ Exam Room	cons-i	2	x	14	4	x	14	Quantity according to service plan
Interview Room - Family/ Large	intf-i	1	x	12	1	x	12	For up to 8 persons
Procedure Room	proc-20-i	1	x	20	1	x	20	
Specimen Collection Bay	specc-i	1	x	9	1	x	9	As required
Toilet - Accessible		shared			shared			Access to patient toilets

Waiting		Shared			shared			Shared with Entry/Reception
Treatment Planning, Appliance Areas								
Bay - Resuscitation Trolley	bres-i	1	x	1.5	1	x	1.5	
Change Cubicle - Accessible	chpt-d-i	1	x	4	2	x	4	1 per simulation room
Clean-up Room	clup-7-i	1	x	7	1	x	7	Mould fitting/workshop clean up
Computer Equipment Room	coeq-i	1	x	8	1	x	8	To simulator room. Size & requirements as per manufacturers specifications
Mould Room – Fitting	mld-ft-i	1	x	10	1	x	10	
Mould Room – Workshop	mld-ws-i	1	x	20	1	x	20	Noise reduction required
Radiotherapy Simulator CT Room	rad-sim-i	1	x	40	1	x	40	Sized to suit equipment
Radiotherapy Simulator Control Room	rad-bctr-i	1	x	15	1	x	15	1 control room can be shared between 2 simulation rooms
Radiotherapy Treatment Planning	rad-trp-i similar	1	x	35	1	x	55	Workstations for 6 & 10 staff respectively
Patient Bay – Holding	pbtr-h-10-i	1	x	10	2	x	10	1 per simulation room
Store – Equipment	steq-20-i similar	1	x	20	1	x	30	
Store – General	stgn-8-i similar stgn-14-i similar	1	x	9	1	x	12	Patient mould storage during treatment program
Toilet - Accessible	wcac-i	1	x	6	1	x	6	
Waiting – Sub	wait-sub-i	1	x	5	1	x	5	May be shared between 2 simulation rooms
Medical Physics								
Office - Single Person	off-s12-i	1	x	12	1	x	12	Chief Physicist.
Office - Workstation	off-ws-i	1	x	5.5	2	x	5.5	Physicists. Quantity as per service plan
Office - Workstation	off-ws-i	1	x	5.5	1	x	5.5	Biomedical Engineer
Physics Laboratory	phlab-i similar	1	x	24	1	x	40	
Store - Equipment	steq-10-i steq-20-i	1	x	10	1	x	20	Physics equipment
Workshop - Biomedical	ws-bm-i similar	1	x	40	1	x	50	
Radiation Therapy Treatment Areas								

Change Cubicle - Accessible	chpt-d-i similar	2	x	4	4	x	4	1 per bunker
Clean up Room	clup-p-i similar	1	x	15	2	x	15	1 per 2 bunkers
Interview Room – Family / Large	intf-i	2	x	12	2	x	12	Optional. May be shared with adjacent zones
Patient Bay – Holding / Recovery	pbtr-h-10-i	2	x	10	4	x	10	1 per bunker. May be grouped and located centrally. If de-centralised a staff station or reporting bay will be required.
Property Bay	prop-3-i similar	1	x	2	2	x	2	Optional; Patient property. 1 per 2 bunkers
Radiotherapy Bunker Room	rad-bunk-i	2	x	150	4	x	150	See Note 1. Size and requirements as per manufacturers specifications. This size is regarded as optimum for a generic bunker for the maximum flexibility for equipment selection.
Radiotherapy Bunker Control Room	rad-bctr-i	2	x	15	4	x	15	Size and requirements as per manufacturers specifications.
Toilet - Patient	wcpt-i	2	x	4	2	x	4	Separate male / female
Waiting - Sub	wait-sub-i	2	x	5	4	x	5	1 per bunker
Support Areas								
Bay - Handwashing, PPE, Type B	bhws-ppe-i	1	x	1.5	2	x	1.5	To patient holding bays at the ratio of no less than 1 per 4 bays (or part)
Bay - Linen	blin-i	1	x	2	2	x	2	1 per 2 bunkers
Bay - Mobile Equipment	bmeq-4-i	1	x	4	2	x	4	1 per 2 bunkers, mobile equipment & wheelchairs
Bay - Resuscitation Trolley	bres-i	1	x	1.5	2	x	1.5	1 per 2 bunkers
Clean Utility/ Medication	clum-14-i similar	1	x	12	1	x	14	
Cleaner's Room	clrm-6-i	1	x	6	1	x	6	
Dirty Utility	dtur-12-i dtur-14-i	1	x	12	1	x	14	
Disposal Room	disp-8-i	1	x	8	1	x	8	
Staff Station	sstn-5-i sstn-14-i similar	1	x	5	1	x	10	

Store - Equipment	steq-10-i steq-14-i	1	x	10	1	x	14	
Administration / Offices								
Office - Single Person	off-s12-i	1	x	12	1	x	12	Clinical Director
Office - Single Person	off-s9-i off-s12-i	1	x	9	1	x	12	Radiation Oncologist.
Office - Single Person	off-s9-i off-s12-i	1	x	9	1	x	12	Manager - Radiation Therapy.
Office - Single Person	off-s9-i	1	x	9	2	x	9	Radiation Therapist - Head of Planning
Office - Single Person	off-s9-i	1	x	9	1	x	9	Radiation Therapist - Head of Planning
Office - Single Person	off-s9-i	2	x	9	4	x	9	Educator, Teaching Fellow, Quality Assurance manager, IT manager, etc.
Office - Single Person	off-s9-i	1	x	9	1	x	9	Nurse Manager. Located close to patient areas
Office – Medical Physicist	off-s9-i	1	x	9	1	x	9	Manager, Medical Physicist
Office - 2 Person Shared	off-2p-i	1	x	12	1	x	12	Clinical trials monitor, nurse coordinator.
Office - 2 Person Shared	off-2p-i	1	x	12	1	x	12	Biostatistician, data manager
Office - 3 Person Shared	off-3p-i	1	x	16	1	x	16	Allied health
Office - Workstation	off-ws-i	1	x	5.5	1	x	5.5	Nurse coordinator
Office - Workstation	off-ws-i	2	x	5.5	4	x	5.5	Cancer care coordinators, specialist cancer nurses and palliative care nurses.
Office - Workstation	off-ws-i	2	x	5.5	4	x	5.5	Administration staff
Office - Write up (Shared)	off-ws-i similar	1	x	12	2	x	12	Clinical reviews. Located close to patient areas.
Meeting Room - Medium / Large	meet-l-15-i meet-l-30-i similar	1	x	15	1	x	20	
Staff Areas								
Property Bay - Staff	prop-3-i similar	1	x	3	1	x	6	
Staff Lounge	srm-15-i similar	2	x	15	2	x	20	
Shower - Staff	shst-3-i	2	x	3	4	x	3	Separate Male / Female
Toilet - Staff	wcst-i	2	x	3	4	x	3	Separate Male / Female
Sub Total		**1098**			**1782.5**			

Circulation %		**40**	**40**	
Total Areas		**1537.2**	**2495.5**	

Note 1: Spatial allocation for one Linear Accelerator Bunker includes maze and radiation shielding wall. Bunker size depends on equipment selected and radiation shielding recommendation from radiation safety specialist

Note 2: Offices to be provided according to the number of approved full time positions within the Unit

Note 3: The actual allocation of the offices and workstations will be flexible and depend on each facility's service plan

Brachytherapy Suite (Optional)

ROOM/ SPACE	Standard Component	RDL 5/6			Remarks
	Room Codes	Qty x m2			
Anaesthetic Induction Room	anin-i	1	x	15	Optional. Induction may also take place in the Procedure Room.
Brachytherapy Bunker	rad-bunk-i similar	1	x	66	Size and requirements as per manufacturers specifications
Brachytherapy Bunker Control Room	rad-bctr-i similar	1	x	12	Size and requirements as per manufacturers specifications
Change Cubicle – Accessible	chpt-d-i similar	1	x	4	
Clean up Room	clup-7-i similar	1	x	10	
Procedure Room	proc-20-i	1	x	20	Optional. Provide if Brachytherapy Bunker is not equipped for surgery
Patient Bay – Holding/ Recovery	pbtr-h-10-i	2	x	10	
Scrub up / Gowning	scrb-6-i	1	x	6	
Store / Prep - Seed and Loading	htlb-i similar	1	x	9	Radiation shielding as per specialist advice
Toilet – Accessible, Patient	wcac-i	1	x	6	
Waiting - Sub	wait-sub-i	2	x	5	Separate Male/ Female
Brachytherapy Support					
Bay - Handwashing, PPE	bhws-ppe-i	1	x	1.5	Patient holding bay, combined with PPE storage
Bay - Linen	blin-i	1	x	2	
Bay - Resuscitation Trolley	bres-i	1	x	1.5	
Clean Utility	clur-8-i	shared			Shared with main treatment/planning support
Cleaner's Room	clrm-6-i	shared			Shared with main treatment/planning support
Dirty Utility	dtur-s-i	shared			Shared with main treatment/planning support

Disposal Room	disp-8-i	shared			Shared with main treatment/planning support
Property Bay	prop-3-i similar	1	x	2	Optional, Patient property
Store - Equipment	steq-14-i similar	1	x	15	Sterile stock and consumables
Sub Total		**168**			
Circulation %		**40**			
Total Area		**235.2**			

Attached Imaging Suite (Optional)

This is for a Medical Imaging Suite collocated with a stand-alone Radiation Oncology Unit

For SOA refer to the separate Medical Imaging Unit FPU.

9 Future Trends

- Developing international trends for cancer services to be concentrated in centres that treat high volumes of patients and offer a full range of cancer services including surgery, oncology, radiotherapy, and specialised nursing and allied health services.
- Improved survivals (both long-term & short-term palliative) leading to increased care demands.
- Ongoing technological developments e.g. the robotic 'cyberknife' which combines a linear accelerator with a computerized tomography (CT) scanner, delivering radiotherapy from six different angles.
- Biologically targeted radiation e.g. boron neutron capture which delivers radiation from within a tumour.
- Ground-breaking new evidence that adrenaline, produced by muscles during exercise actives Interleukin 6 which seeks out tumour cells directly, inhibiting further development while informing the body's natural killer cells what to target. In future, this may lead to gymnasiums being an integral part of oncology units.
- Precision oncology: This involves studying the genetic makeup and molecular characteristics of cancer tumours in individual patients. The precision oncology approach identifies changes in cells that might be causing the cancer to grow and spread. Personalized treatments can then be developed.
- Regional satellite centres may be provided to serve a wide geographical region with links to a central hub.

10 Further Reading

- American Institute of Architects, The Facility Guidelines Institute, Guidelines for Design and Construction of Hospitals and Outpatient Facilities; Available from: http://www.fgiguidelines.org/
- Australasian Health Facility Guidelines Part B-Health Facility Briefing and Planning 600 – Radiation Oncology (2016)

  https://aushfg-prod-com-au.s3.amazonaws.com/HPU_B.0600_6_0.pdf
- Gov.UK Health Building Note 02-01: Cancer Treatment Facilities (2013) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/147860/HBN_02-01_Final.pdf
- International Atomic Energy Agency (IAEA) Radiotherapy Facilities: Master planning & Concept Design Consideration (2014)

  http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1645web-46536742.pdf
- The Kings Fund; 'Future Trends and Challenges for Cancer Services in England, a Review of Literature & Policy'.

  https://www.kingsfund.org.uk/publications/future-trends-and-challenges-cancer-services-england
- The Royal Australian and New Zealand College of Radiologists. http://www.ranzcr.edu.au/
- Exercise Medicine Research Institute. Edith Cowan University, WA, Australia https://www.exercisemedicine.org.au/
- The medical futurist: 13 Technologies that will shape the future of the cancer

  https://medicalfuturist.com/technologies-that-will-shape-the-future-of-cancer-care/