480 MEDICAL IMAGING - PET

INDEX

INTRODUCTION

Description

480 .2.00 The Positron Emission Tomography (PET) Unit may be provided as a section of a Medical Imaging Unit or as a separate unit for PET imaging procedures using radiopharmaceutical agents.

PLANNING

Functional Areas

480 .3.00 The PET Unit may consist of the following Functional Areas:
- PET Camera Room and Control Room
- Cyclotron Room and Control Room (optional)
- Laboratory areas including hot lab/ radiochemistry and quality control laboratory
- Anaesthetic Room (optional)
- Patient Holding area and Toilet
- Support Areas including Clean Utility, Dirty Utility, Stores, Cleaner's Room
- Staff Areas including Staff Station, Offices and Reporting areas, Change areas and Toilets.

480 .4.00 TOILET - INJECTED PATIENTS

A Patient Toilet is required for injected patients. Radiation shielding requirements will need to be assessed by a Radiation Consultant. Patient toilet provisions are to comply with Standard Components - Toilet - Patient.

480 .5.00 WAITING AREAS

BED WAITING (INJECTED PATIENTS)
A Patient Bay Area is required for patients on beds or trolleys who have received an injection of imaging agent and are awaiting the scanning procedure.

As the imaging agents emit a low level radiation, the Patient Bed Waiting Area may require radiation protection screening, the extent to be determined by a Radiation Consultant.

480 .6.00 SUB-WAITING (INJECTED PATIENTS)
A Sub-waiting Area with chairs and provisions for wheelchairs is required for patients who have received an injection of imaging agent and are awaiting the scanning procedure.

As the imaging agents emit a low level radiation, the waiting area may require radiation protection screening, the extent to be determined by a Radiation Consultant.

Functional Relationships

480 .7.00 The PET Unit ideally will be located with close access to:
- Nuclear Medicine Unit
- Medical Imaging Unit
- Emergency Unit (direct, non-public access is preferred)
- Intensive Care Unit (direct, non-public, vertical or horizontal access is preferred)
- Operating Unit (direct, non-public, vertical or horizontal access is preferred)
- Outpatient Consulting Unit.

480 .8.00 The PET Unit will require a ground level location due to the weight of the nuclear medical and PET equipment and for ease of installation and replacement.

COMPONENTS OF THE UNIT

Introduction

480 .9.00 The Medical Imaging - PET Unit will consist of a combination of Standard Components and Non-Standard Components.

Standard Components must comply with details in Standard Components described in these Guidelines. Refer also to Standard Components Room Data Sheets.

Standard Components

480 .10.00 Provide the Standard Components as identified in the Schedule of Accommodation.

Non-Standard Components

480 .11.00 Provide the Non-Standard Components as identified in this section and in the Schedule of Accommodation, according to the Operational Policy and Functional Brief.

480 .12.00 CYCLOTRON

DESCRIPTION AND FUNCTION

The Cyclotron is a device that is used to produce beams of charged particles that can be directed at a specific target. Cyclotrons are used for cancer treatment (proton therapy) and radioisotope production (FDG primarily for cancer diagnosis and Palladium 103 for prostate cancer implants).

Hospitals may prefer to install a Cyclotron to produce their own supplies of FDG or other radioisotopes; these agents however, may be outsourced.

The room size will be dependent on the equipment to be installed. The minimum room size will be 47 m2 based on the smallest available machine.

480 .13.00 LOCATION AND RELATIONSHIPS

The Cyclotron, if installed should be located with ready access to the PET Camera Room, Hot Laboratory/ Radiochemistry and Quality Control Laboratory.

480 .14.00 CONSIDERATIONS

The Cyclotron equipment has specialised requirements and installation will be according to manufacturer's recommendations based on model and size. The following is an overview of room requirements:

- Weight loading of cyclotron and ancillary equipment exceeds 36000 kg and structural assessment may be required
- Air-conditioning:
    - room climate control is essential for equipment functioning
    - air pressure in the Cyclotron Room should be negative pressure relative to the surrounding areas
    - the cyclotron will have a filtered exhaust system
- Radiation protection requirements will need to be assessed by a Radiation Consultant
    - some Cyclotron machines are self shielding
    - the non-shielded machines will require concrete bunker walls to a thickness specified by the Radiation Consultant
- A dedicated, three phase power supply will be required
- Floor drains and a sink
- A chilled water supply
- Gas bottle storage
- Compressed air supply or cylinder.

480 .15.00 CYCLOTRON CONTROL ROOM

DESCRIPTION AND FUNCTION

The Cyclotron Control Room consists of terminals and printers from which the user controls the operation of the Cyclotron.

The Control Room shall be a minimum of 10 m2.

480 .16.00 LOCATION AND RELATIONSHIPS

The Cyclotron Control Room should have direct access to the Cyclotron Room and may be co-located with the PET Camera Control Room.

480 .17.00 CONSIDERATIONS

Room requirements will be according to manufacturer's specifications and will include:
- Uninterrupted power supply to computer equipment
- Voice/data connections.

480 .18.00 HOT LABORATORY/ RADIOCHEMISTRY

DESCRIPTION AND FUNCTION

The Hot Laboratory will be used for preparation and storage of radiopharmaceuticals used in procedures.

Non-Standard Components

480 .19.00 LOCATION AND RELATIONSHIPS

The Hot Laboratory/ Radiochemistry should be located with ready access to the Quality Control Laboratory, the Preparation Room and the PET Camera Room.

480 .20.00 CONSIDERATIONS

The Hot Laboratory room will require:
- Smooth impervious laboratory benches with cupboards and sink
- Radiation protection assessment by a Radiation Consultant and may include radiopharmaceuticals storage areas within the room such as cupboards.

480 .21.00 LABORATORY - QUALITY CONTROL/ BLOOD COUNTING

DESCRIPTION AND FUNCTION

The Quality Control Laboratory will be required for preparation of radionuclides, quality control procedures involved in the production process and performance of blood testing procedures.

480 .22.00 LOCATION AND RELATIONSHIPS

The Quality Control Laboratory should be located with ready access to the Hot Laboratory and Preparation Room.

480 .23.00 CONSIDERATIONS

The Quality Control Laboratory will require:
- Smooth impervious laboratory benching
- Cupboards and shelving
- Sink
- Radiation protection assessment by a Radiation Consultant and may include radiopharmaceuticals storage areas within the room such as cupboards.

480 .24.00 PET CAMERA ROOM

DESCRIPTION AND FUNCTION

The PET Camera Room provides an area and equipment for PET Camera Scanning procedures.

The minimum room size will be 38 m2 based on the smallest available scanner.

480 .25.00 LOCATION AND RELATIONSHIPS

The PET Camera Room should be located with ready access to patient waiting areas, Holding and Anaesthetic Room if provided, as well as Preparation Room and Laboratories. The Camera Room will require direct access to the Control Room.

480 .26.00 CONSIDERATIONS

The PET scanning equipment has specialised requirements and installation will be according to manufacturer's recommendations based on model and size. The following is an overview of room requirements:

- Floor covering to be antistatic
- Weight loading of scanner and ancillary equipment exceeds 3000 kg and structural assessment may be required
- Room lighting should be controllable and glare free
- Air-conditioning:
    - room climate control is essential for equipment functioning
    - air pressure in the scanning area should be negative pressure relative to the surrounding areas
- Radiation protection requirements will need to be assessed by a Radiation Consultant
- Ancillary equipment includes water/air chillers and transformers
- A dedicated, noise free, uninterrupted power supply will be required.

Additional room requirements will include:
- Access for beds/trolleys
- Medical gases, oxygen, medical air and suction
- Patient call, staff assist and emergency call system
- Visibility between Camera Room and Control Area
- Handsfree intercom facility between Camera Room and Control Area.

480 .27.00 PET CONTROL ROOM

DESCRIPTION AND FUNCTION

The PET Control Room provides for the computer and control for the PET equipment. The Control Room will require direct visibility of the Camera Room with intercom and microphone facilities. The PET Control Room shall be a minimum of 10 m2.

480 .28.00 LOCATION AND RELATIONSHIPS

The Control Room will require direct access to the PET Camera Scanning Room and may serve more than one PET scanning room if co-located.

480 .29.00 CONSIDERATIONS

Room fittings will include:
- Workbench
- Camera control module and imaging screens
- PET camera computer and generator modules
- Computer, printer and telephone for staff use.

480 .30.00 PREPARATION ROOM

DESCRIPTION AND FUNCTION

A Preparation room is required for preparing radiopharmaceuticals and injecting patients.

The Preparation Room shall be a minimum of 12 m2.

480 .31.00 LOCATION AND RELATIONSHIPS

The Preparation Room may be co-located with the Clean Utility and should have ready access to Patient Waiting areas and Laboratories.

480 .32.00 CONSIDERATIONS

The Preparation Room will require:
- Laboratory type bench, impervious to moisture and spills, with cupboards and sink
- Handbasin with paper towel and soap dispenser fittings
- Examination couch and footstool
- Patient chair
- A minimum of six body protected GPOs
- Patient call, staff assist and emergency call points
- Radiation protection to be assessed by a Radiation Consultant and may include radiopharmaceutical storage areas within the room such as cupboards.

APPENDICES

PET Generic Schedule of Accommodation

480 .33.00 Schedule of Accommodation for a PET Unit at level 6:

ROOM / SPACE	Standard Component					Level 6 Qty x m2	Remarks
ANAESTHETIC INDUCTION ROOM	yes					1 x 15 optional	
BAY - HANDWASHING	yes					2 x 1	
CONTROL ROOM						2 x 10	PET Camera Room Control and Cyclotron Control Rooms may be co-located
CYCLOTRON						1 x 50	
HOT LABORATORY/ RADIOCHEMISTRY						1 x 20	
LABORATORY - QC/ BLOOD COUNTING						1 x 10	
PATIENT BAY	yes					3 x 9	Waiting - injected patients; may require radiation shielding
PET CAMERA ROOM						1 x 50	
PET COMPUTER ROOM						1 x 10	
TOILET - PATIENT	yes					1 x 4	May require radiation shielding
WAITING	yes					1 x 12	Injected patients; may require radiation shielding
CIRCULATION %						35	

480 .34.00 STAFF AREAS
Note: Staff Offices are dependent on the Operational Policy and management structure, additional Offices may be required:

ROOM / SPACE	Standard Component					Level 6 Qty x m2	Remarks
OFFICE - SINGLE PERSON 9 M2	yes					1 x 9 optional	Chief Operator
OFFICE - SINGLE PERSON 9 M2	yes					1 x 9 optional	Radiochemist

480 .35.00 SHARED AREAS

ROOM / SPACE	Standard Component					Level 6 Qty x m2	Remarks
BAY - LINEN	yes					1 x 2	
BAY - MOBILE EQUIPMENT	yes					1 x 4	
BAY - RESUS TROLLEY	yes					1 x 2	
CLEANER'S ROOM	yes					1 x 4	
CLEAN UTILITY	yes					1 x 12	May be co-located with Preparation Room
DIRTY UTILITY	yes					1 x 10	
PREPARATION ROOM						1 x 12	
PROPERTY BAY - STAFF	yes					1 x 6	
RECEPTION	yes					1 x 10	
STAFF STATION	yes					1 x 14	
STORE - GENERAL	yes					1 x 9	
TOILET- STAFF	yes					1 x 2	
WAITING	yes					1 x 15	Non-injected patients and visitors
XRAY VIEWING AND REPORTING	yes					1 x 12	

References and Further Reading

480 .36.00

- American Institute of Architects, Guidelines for Design & Construction of Hospital & Healthcare Facilities, 1997.

- NSW Health, Design Standard 15 Health Building Guidelines - Medical Imaging Unit, 1992.

FUNCTIONAL RELATIONSHIPS DIAGRAM - MEDICAL IMAGING (PET)