Unit 118: Radiotherapy Physics in Practice

Level: 4

Unit type: Optional (Medical Physics)

Credit value: 20

Guided learning hours: 160

Unit summary

This unit will ensure that you have acquired the knowledge and skills to work as a Healthcare Science Associate within a medical physics department working in radiotherapy physics. You will be able to work safely in the radiotherapy physics environment, with the emphasis on health and safety, risk management, risk assessment and equipment management. You will be expected to build your professional practice and use critical reflection to review and improve your performance in the workplace and develop skills to promote continuous professional development.

All learners must complete all generic health and safety and mandatory training contextualised to own area of practice.

Unit assessment requirements

There are no specific assessment requirements for this unit. Please refer to the assessment strategy in *Annexe B*.

Additional information

All procedures must be undertaken in accordance with the departmental Standard Operating Procedures (SOPs).

AC1.3 includes:

- regulatory frameworks
- legislation
- policy
- quality management systems and good practice.

AC2.2 includes:

- megavoltage units and other radiotherapy treatment units (e.g. high dose rate brachytherapy, tomotherapy units)
- radiation dosemetry checks on linear accelerator (photons and electrons)
- MV and kV imaging systems associated with linacs
- CT and (if available) conventional simulators.

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- CT and (if available) conventional simulators
- treatment planning systems.

AC2.4 includes:

- sign-out of radioactive source (usually strontium) under the local rules
- connection and power-up of the dosemeter and electrometer combination(s) to be tested.

AC2.6 includes:

- orthovoltage – in air measurements
- megavoltage x-ray
- electron measurements.

AC3.1 includes:

- preparation of the clinic room for the individual procedure
- considering the needs of each individual
- positioning individual appropriate to the procedure and take relevant measurements and impressions
- manufacturing immobilisation devices to meet the specification required to deliver treatment
- selecting appropriate thickness of lead shielding
- producing a lead mask or cut-out that meets the department's quality standard
- producing a tissue equivalent substance (bolus) to meet the treatment specification requirements.

AC3.3 includes:

- preparing the individual according to the radiotherapy request form
- explaining the process and answering questions
- completing the necessary documentation for set-up reproduction.

AC4.1 includes:

- open patient files on the treatment planning system
- registering new individuals and importing images to begin the planning process.

AC4.4 – typical body sites and plan techniques would include selecting three common sites:

- treatment of breast cancer using opposed tangential fields

- treatment of prostate cancer using inverse-planned intensity-modulated radiation therapy (IMRT)
- treatment of lung cancer using inverse-planned Intensity-Modulated Radiation Therapy (IMRT).

AC4.6 includes:

- low dose rate (LDR) prostate
- high dose rate (HDR) gynaecological/ interstitial implant.

Learning outcomes and assessment criteria

To pass this unit, learners need to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria outline the requirements that the learner is expected to meet **in own area of work and in accordance with Standard Operating Procedures (SOPs)** to achieve the learning outcomes and the unit.

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
1	Understand the practice and principles of radiotherapy physics underpinning the role of a healthcare science associate	1.1	Explain the basic principle of radiotherapy – dose to tumour while minimising dose to healthy tissue			
		1.2	Explain the basic components of a linac and other treatment equipment			
		1.3	Explain the physics of high energy x-ray production			
		1.4	Explain the basis of treatment planning and the steps involved in generating and optimising a treatment plan			
		1.5	Explain the steps in order of the patient pathway through radiotherapy			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
2	Be able to assist in routine machine quality assurance	2.1	Demonstrate the ability to run up and operate the radiotherapy systems safely			
		2.2	Gather the relevant documentation and equipment necessary for performing the quality-assurance tests of key radiotherapy systems			
		2.3	Assist in the performance of quality-control procedures for radiotherapy systems			
		2.4	Gather the appropriate documentation and equipment for routine stability checks of radiotherapy dosemeters			
		2.5	Assist in the performance of measurements to deliver routine stability testing of therapy level dosemeters			
		2.6	Assist in making routine output measurements of treatment units			
3	Be able to assist in preparation of patient positioning devices	3.1	Assist in the production of safe and appropriate immobilisation devices for patients			
		3.2	Use hand and machine tools safely and effectively during procedures associated with the mould room			
		3.3	Assist in preparing the patient treating the patient with respect and compassion			

Learning outcomes		Assessment criteria		Evidence type	Portfolio reference	Date
4	Be able to assist in the preparation of radiotherapy treatment plans	4.1	Perform basic tasks associated with radiotherapy treatment planning			
		4.2	Use semi-automated tools of the planning systems to fuse images and generate contours of certain body regions			
		4.3	Explain the basics of dose assessment in treatment planning using dose-volume-histograms			
		4.4	Able to complete a set of standard training plans to meet the plan requirements			
		4.5	Evaluate the plans produced against the departmental criteria in terms of dose to tumour and dose to healthy tissues			
		4.6	Demonstrate knowledge of at least one type of brachytherapy technique			
5	Be able to assist in the preparation of and evaluation of in-vivo dosimetry measurements	5.1	Organise thermoluminescent dosemeter (TLD) or diode dosemeters ready for quality assurance (QA)/calibration			
		5.2	Demonstrate the ability to read out thermoluminescent dosemeter (TLD) or diode dosemeters			
		5.3	Demonstrate the ability to assist in evaluation of in-vivo dosemeter results versus expected doses			

Learner name: _____ Date: _____

Learner signature: _____ Date: _____

Assessor signature: _____ Date: _____

Internal verifier signature: _____ Date: _____
(*if sampled*)