Higher National Unit specification: general information

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

Unit code: FN6J 35

Superclass: PB

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Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This Unit develops knowledge and skills required to undertake Radiography: Routine, Non-Contrast Enhanced Computerised Tomography (CT) Head Scans.

It is aimed at those currently working under the direct supervision of Health Professions Council registered Radiographers as Assistant Practitioners within departments, providing diagnostic imaging services. An example would be clinical departments providing an imaging service.

On completion of the Unit the candidate will be able to:

1 Relate basic anatomy and understanding of common pathology of the brain and skull to cross sectional images produced by CT.
2 Demonstrate knowledge and understanding of computerised tomography (CT) scanning equipment to the required standard.
3 Arrange a CT room for a routine head scan plus prepare and inform the patient of the examination procedure.
4 Demonstrate the ability to perform, to diagnostic standards, CT scans.
5 Perform post examination procedure.

Recommended prior knowledge and skills

It is recommended that candidates should hold a HNC (SCQF level 7) or equivalent in Diagnostic Imaging and be able to demonstrate at least one year post qualification clinical practice as an Assistant Practitioner in a diagnostic imaging centre.

General information (cont)

Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

This Unit will be delivered as a stand-alone Unit or part of a Group Award (Professional Development Award). This Unit will be delivered by a registered clinical radiographer currently practicing in the appropriate clinical area with experience of clinical assessment.

Assessment

It is recommended that the Outcomes within this Unit are assessed holistically through formative and summative Clinical Assessment. All Outcomes of the Unit will be assessed through observation of clinical practice with appropriate questions used by the Assessing Radiographer and recorded in a log book. The log book will also include reflection on practice by the candidate and feedback from the observer. A minimum of five marked assessments must be completed successfully and the candidate must demonstrate that they can work unassisted through a range of increasingly complex examinations, this will culminate in a detailed pathway to competence by the candidate.

The evidence from the clinical assessments must demonstrate that all Evidence Requirements are met from the individual Outcomes.

Higher National Unit specification: statement of standards

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Please refer to Evidence Requirements for the Unit after the Outcomes.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Relate basic anatomy and understanding of common pathology of the brain and skull to cross sectional images produced by CT.

Knowledge and/or Skills

- Normal CT brain anatomy
- Normal skull base anatomy
- Common pathologies

Outcome 2

Demonstrate knowledge and understanding of computerised tomography (CT) scanning equipment.

Knowledge and/or Skills

- Basic principles of CT scanning
- CT gantry, x-ray tube and detectors
- Collimators and filters

Outcome 3

Arrange a CT room for a routine head scan plus prepare and inform the patient of the examination procedure.

Knowledge and/or Skills

- Preparing the patient and positioning on the scanner
- Gain the patients confidence and allay patient concerns with regards to the CT examination ensuring cooperation is achieved to undertake the head scan
- Utilisation of equipment and accessories used to undertake a CT head scan
- Familiarization of the moving parts of the CT table and the use of the egocentric positioning devices

Outcome 4

Demonstrate the ability to perform, to diagnostic standards, CT scans.

Knowledge and/or Skills

- Dose and dose parameters
- tube rotation time and pitch
- obtaining a scout image
- Prescribing the start, stop locations and gantry angulation on the scout image
- Image quality and resolution
- Image techniques

Outcome 5

Perform post examination procedures.

Knowledge and/or Skills

- Hounsfield Units
- Pixels and Voxels
- CT image display and windowing
- Archiving options and process

Higher National Unit specification: statement of standards (cont)

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

Evidence Requirements for the Unit

The assessment for this Unit is holistic and candidates should show evidence of integrating the knowledge and skills developed across all Outcomes showing that they can:

- interpret cross sectional CT images by identifying anatomical landmarks, including vascular markings and bony prominences
- evidence knowledge common pathologies observed on head CT scans and often used as referral indications
- understand the basic components of a CT scanner and their role with regards to producing a cross sectional image
- demonstrate skills of communication by showing they are able to provide the patient and carers with information and instruction as to what is required by the patient to successfully complete the CT head examination
- demonstrate their ability tomanage a situation where the psychological impact of having a CT scan from the patient's perspective potentially leads to the scan not being done
- navigate around the scanning room in a timely fashion preparing the equipment prior to the exam plus position the patient within the scanner including setting the scanner in readiness for the examination to start
- demonstrate their Knowledge and/or Skills by showing that they can undertake a non-contrast head CT scan. This will include obtaining a scout image followed by selection from an imaging protocol menu, the correct protocol/imaging sequence
- describe where to set the start, stop locations of the protocol on to the scout image and relate the angles of the imaging sequence to the required angulation of the scanner gantry. The impact of image quality following manipulation of the scan parameters 'Pitch' and table speed etc should be discussed with the candidate to demonstrate understanding of Image quality and resolution. Further discussion should explore the candidates understanding of Image techniques
- demonstrate their Knowledge and/or Skills by showing that they can relate how "image settings" are utilized to allow a consistent review process. The importance of relating windowing to demonstrate brain and skull anatomy plus equating these anatomical tissues to the Unit of Hounsfield must be discussed. How pixels and voxels are used to create 3dimensional imaging must also be described by the candidate
- describe the processes required to archive appropriate images to Patient Archive Communication System (PACS) and other sources
- five marked assessments must be completed successfully and cover all of the Evidence Requirements. The candidate must demonstrate that they can work unassisted through a range of increasingly complex examinations; this will culminate in a detailed pathway to competence by the candidate.

Assessment Guidelines for the Unit

All Outcomes of the Unit will be assessed through observation of clinical practice with appropriate questions used by the Assessing Radiographer and recorded in a log book. The log book will also include reflection on practice by the candidate and feedback from the assessor.

Higher National Unit specification: support notes

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

The Unit is designed to prepare and support candidates for the types of roles they may adopt or progress to by giving them the essential underpinning knowledge and skills. As a result, candidates are likely to work predominately with live case studies, using this experience to work as an Assistant Practitioner in CT and to evaluate their effectiveness.

Although the Unit is expressed in generic terms it should be related to a context that is familiar to the candidates and local to the CT Unit in which the candidate is training. The terminology used in this Unit can be adapted to suit the local workplace.

The delivery of the Unit will be through the Departmental staff (this may include Radiographers, Radiologists, Radiology Nursing Staff and other staff as appropriate) and will encompass practical in-house training and formative and summative clinical assessments by Radiographers registered with the Health Professions Council who are currently practicing clinically with patients requiring antero-posterior chest X-ray examinations and who have current experience of undertaking Clinical Assessments. All Outcomes of the Unit will be assessed through Clinical Practice with appropriate questions used by the Assessing Radiographer and recorded in a log book. The log book will also include reflection on practice by the candidate and feedback from the observer will culminate in a detailed pathway to competence by the candidate.

Whilst practical clinical training is essential, simulation and scenario examples can be used to widen the practical experience in a safe and stress-free environment. Additionally, knowledge can be enhanced through tutorials, discussions, guided reading and reflective practice.

The principles of safe practice with respect to Manual Handling, Health and Safety, Radiation Safety and Protection, and Infection Control must be revisited and refreshed with specific reference to the patient attending for a CT head scan. Additionally, the key principles of effective communication must be reinforced with specific reflection to the scenarios that the candidate experiences throughout their Formative Clinical Assessments to enable functional communication for the Summative Clinical Assessments.

Higher National Unit specification: support notes (cont)

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

Outcome 1 aims to ensure that candidates hold an understanding of the normal anatomy of the brain and skull base including:

- The meninges
- Forebrain
- Midbrain
- Hind brain
- Ventricular system
- Blood supply and drainage
- Anterior cranial fossa
- Posterior cranial fossa
- Petrous ridges
- Sella turcica

The anatomy will be identifiable on Cross sectional CT images. Discussion between the supervisor and the candidate should include the normal variants of anatomy seen on CT images.

Common pathologies/indications experienced within the CT Unit should be discussed examples would include:

- Stroke (haemorrhagic and ischemic)
- Subarachnoid haemorrhage
- Aneurysm
- Hydrocephalus
- Metastatic disease
- Primary brain tumors
- Alzhiemers/dementia
- Meningitis

When discussing pathologies the mentor should ensure they relate pathology to age gender plus differential diagnosis and long term clinical Outcomes.

Outcome 2 focuses on the technology employed in a CT scanner enabling the generation of images consistent with a modern healthcare setting. The principle of tube rotation around a moving patient within the aperture of the scanner gantry must be understood by the candidates. This will include conventional and continuous exposure principles.

To allow understanding of the production of raw data from creating an analogue (electrical) signal (sampling) and how it is processed and practically managed within a Unit should be discussed this includes processor capabilities and how data is stored such as PACS and Magneto Optical Discs (MOD).

Details of the moving parts of the gantry including the tube and how it differs to conventional x-ray tubes should be discussed. The collimation of the x-ray beam and filters adopted within a modern scanner should be understood.

Outcome 3 concentrates on the practical element of preparing the scanning room and the patient prior to the scan being undertaken. The candidates should be aware of the need to practice communication skills with patients to ensure delivery instructions to the patient with regards to the examination and gain the patient's confidence. The candidate should be familiar with common patient concerns and anxieties associated to the scanning experience and be able alleviate the situation thus enabling the patient to proceed and undertake the scan. An example would be claustrophobia, Navigation around the room and the scanner including the movement of the gantry and table should be familiar to the candidates on completion of this Outcome.

The patients positioning element of this Outcome should include table positioning including:

- Patient orientation (supine/prone head/feet first)
- Angulation of head to achieve desired base line position
- Laser light usage
- Patient immobilisation

Common used baselines including:

- Supra-orbital base line
- Infra-orbital base line
- Radiographic base line

Outcome 4 focus on the practical element of undertaking the head scan whilst considering the radiation dose and how the dose is managed to optimise image quality and kept to a minimum. The scan parameter which relate to image quality and dose include:

- KVp
- mAs
- Acquired slice thickness
- Reconstruction slice thickness
- Field of View
- Matrix

The scan set up will be discussed in relation to scannogram start stop range and appropriate imaging protocols. The implications of how manipulation of pitch and tube rotation time influence scan length should be discussed. The reconstruction process of a raw data set should also be covered and related to pixel size and image resolution.

Higher National Unit specification: support notes (cont)

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

Outcome 5 addresses the knowledge and skills required to undertake the post examination processing of the image data. It is essential for each image; the contrast is optimized by understanding the windowing of the images in terms of correct 'width' and 'level' for each algorithm setting (brain and bone). The Hounsfield Units should be used to relate the image attenuation value to the linear coefficient value of water. In practical terms the candidate should know that on a CT image structures and components of the human body can be identified by their Hounsfield Unit.

The candidate should understand the principles of the segmentation of a two dimensional data set in to elements called 'Pixels' (picture element) and three dimensional sets called 'Voxels' and how they are influenced by filed of view, matrix and the reconstructed slice thickness. The understanding of pixels and voxels will enable the candidate to appreciate how to reconstruct images into other anatomical planes (coronal and sagital) plus identify technical artifacts commonly seen on images.

Once image reconstruction and optimisation is achieved the candidates must be able to send the data sets to predetermined archives this would include Patient Archive Communication System (PACS), DVD, Magneto Optical Discs (MOD) or a work station.

Guidance on the delivery and assessment of this Unit

This Unit is aimed at those currently working under the supervision of health Professions Council registered Radiographers as Assistant Practitioners within a diagnostic service Initially previous knowledge will need to be refreshed, particularly in the following areas:

- Ionising Radiation (Medical Exposure) Regulations (IR(ME)R)
- Control of Infection
- Moving and Handling
- Communication skills, verbal, non verbal and written

Practice in the clinical setting, as directed by an HPC registered radiographer, will be formatively assessed. A log book will be used to scribe and reflect clinical experiences. It is expected that various degrees of clinical complexity will be documented within the log book to demonstrate a diverse learning experience. All Outcomes of the Unit will be assessed through Clinical Practice with appropriate questions used by the Assessing Radiographer and recorded in a log book. The log book will also include reflection on practice by the candidate and feedback from the observer. A minimum of 5 marked assessments must be completed successfully and the candidate must demonstrate that they feel confident in performing these examinations. This will culminate in a detailed pathway to competence by the candidate.

Open learning

Not applicable.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Opportunities for developing Core Skills

There are no opportunities to develop Core Skills in this Unit.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

History of changes to Unit

Version	Description of change	Date

General information for candidates

Unit title: Radiography: Routine Non-Contrast Enhanced Computerised Tomography Head Scan

This Unit is designed to train and support Assistant Practitioners, working clinically in a diagnostic service, to undertake routine non contrast CT head scanning.

CT scanners use ionising radiation to produce images, therefore, an understanding of the responsibilities of using radiation is important to protect you, your patients and colleagues is required. This Unit will study how to use radiation safely by applying clinical protocols and ionising radiation regulations.

The candidate is required to gain competencies in undertaking CT head scans on a range of patients with various degrees of mobility and clinical conditions.

CT scanners, accessories and computing software, will be covered to ensure the candidate has a thorough knowledge and understanding of the equipment they may be expected to utilise in clinical practice.

The principles of safe practice with respect to Manual Handling, Health and Safety, Radiation Safety and Protection, and Infection Control must be revisited and refreshed with specific reference to the patient attending for a CT head scan. Additionally, the key principles of effective communication must be reinforced with specific reflection to the scenarios that the candidate experiences throughout their Formative Clinical Assessments to enable functional communication for the Summative Clinical Assessments.

The candidate will be assessed through a series of clinical assessments. The number of Clinical Assessments completed is not critical but, following formative assessment, a minimum of 5 marked assessments must be completed successfully and the candidate must demonstrate that they can work unassisted through a range of increasingly complex examinations. Additionally, the candidate, themselves, must indicate that they feel confident in performing these examinations: if they require further summative Clinical Assessments, these will be continued until such time as the Candidate is satisfied with their own performance.

Useful information to help with this Unit can be found at the following web-sites:

www.sor.org (Society and College of Radiographers)

www.BIR.ac.uk (British Institute of Radiology)

and in the following professional journals:

Synergy, Imaging and Therapy Radiography
Radiography
Clinical Radiology