www.rcr.ac.uk

Clinical Radiology
The Royal College of Radiologists

Undergraduate radiology curriculum, second edition

January 2017

Faculty of Clinical Radiology

Introduction

The key aim of the undergraduate radiology curriculum is to promote the teaching and learning of relevant aspects of clinical radiology at the undergraduate level. It provides a succinct framework that can be used by all medical schools in the UK to integrate clinical radiology into the undergraduate curriculum. This curriculum is not expected to be restrictive and local expertise and interests may allow expanded subspecialist training to undergraduates.

The curriculum refers to the relevant outcomes and capabilities outlined in *Outcomes for graduates (tomorrow's doctors) 2015* and in the latest iteration of the Foundation Programme curriculum (*The Foundation Programme Curriculum 2016*). It is intended to prepare foundation doctors with the necessary knowledge and skills to routinely arrange and correctly interpret basic radiological investigations in the context of the individual patient, with understanding of applicability, limitations and impact on patient safety. It has deliberately concentrated on common, important clinical topics to address these objectives.

The curriculum is divided into three sections:

1. Fundamental principles
2. Common emergency conditions
3. Imaging in other common presentations.

The RCR considers the whole curriculum to be appropriate learning for medical students to prepare them for life as a foundation doctor, but sections 1 and 2 should be prioritised.

Assessment forms an integral part of any curriculum. In the tables that follow, the assessment methods shown are those that are considered appropriate for that topic and which could be used to assess each competency. These may vary according to the structure of course and timing of learning events, but the following are suggested as core assessment methods:

- Objective structured clinical examination (OSCE)
- Computer-based clinical examination (for example short-answer slide show)
- Single best answer questions (SBA)
- Extended matching questions (EMQ)

The RCR is aware of the expanding role of ultrasound training in some UK medical schools for use both as a clinical assessment tool for pathological conditions and also to teach normal anatomy. The RCR would encourage an expanded role for the appropriate use of ultrasound in undergraduate teaching programmes, but recognises that this is currently dependent on early adoption, provision of adequate resources and local priorities in undergraduate education.

The RCR recognises that access to teaching and learning opportunities in interventional radiology (IR) within the undergraduate curriculum would be beneficial to medical students in gaining a holistic understanding of the therapeutic options that IR can increasingly offer to patients in acute and chronic pathological conditions.

Simulation training may also present opportunities for learning, teaching and assessment in all sections of the curriculum.

Fundamental principles

The learning outcomes are characterised by understanding of the knowledge, insights and attitudes which are common to the doctor's use of imaging services in their practice.

Anatomy and function

The doctor as scientist and scholar	Assessment methods
Recognition of normal structures as they appear on imaging	OSCE
Understanding of normal functional processes related to imaging investigations	SBA, EMQ

The doctor as practitioner	
Ability to interpret basic imaging studies	OSCE
Ability to relate radiological reports to structures on images	OSCE

Patient safety

The doctor as scientist and scholar	Assessment methods
Basic principles of radiation protection	SBA, EMQ
Risks of magnetic resonance imaging	SBA, EMQ
Risks of interventional procedures	SBA, EMQ
Risks of contrast media	SBA, EMQ

The doctor as practitioner	
Ability to refer patients safely	SBA, EMQ

The doctor as professional	
Understanding of the doctor's role in limiting risk to the patient	SBA, EMQ

Nature of imaging investigations

The doctor as scientist and scholar	Assessment methods
Indications and preparatory requirements for imaging studies, how frequently requested studies are conducted, their effects on the patient, and follow-up care (where required)	SBA, EMQ

The doctor as practitioner	
Ability to refer patients effectively and appropriately	SBA, EMQ
Ability to understand limitations of imaging techniques	SBA, EMQ

The doctor as professional	
Understanding of the requirements of the patient undergoing imaging investigation	SBA, EMQ

The patient awareness and experience

The doctor as scientist and scholar	Assessment methods
The knowledge of what an imaging investigation entails from the point of view of the patient	OSCE,SBA, EMQ
The doctor as practitioner	
Ability to inform patients accurately prior to imaging, to prepare adequately and to limit anxiety	SBA, EMQ
The doctor as professional	
Understanding the psychological issues raised by investigation and by the invasive nature of some investigations.	SBA, EMQ

Informed consent

The doctor as scientist and scholar	Assessment methods
Principles and practice of informed consent	SBA, EMQ
The doctor as practitioner	
Ability to inform patients accurately and obtain consent where relevant	SBA, EMQ
The doctor as professional	
Understanding of the importance of patient involvement in consent decisions	SBA, EMQ

Interacting with the radiology department

The doctor as scientist and scholar	Assessment methods
Roles of different staff groups in radiology	SBA, EMQ
Requirements of radiology departments for accurate referral information	SBA, EMQ
Referral and reporting mechanisms	SBA, EMQ
The doctor as practitioner	
Ability to practise effective, timely and appropriate patient referral	SBA, EMQ
The doctor as professional	
Understanding of the importance of good communication in effective clinical management	SBA, EMQ

Relevant links to foundation programme outcomes and competences in appendix

Common emergency conditions

The learning outcomes are characterised by the ability to request and perform basic interpretation of the following imaging studies in situations in where the foundation doctor may be providing firstline clinical management or referral for assistance, including under emergency circumstances.

Investigation	Conditions	Knowledge	Skills	Attitudes
Chest radiograph (CXR)	Misplaced nasogastric tube Misplaced endotracheal (E-T) tube Misplaced central venous catheter Simple/tension pneumothorax Pleural effusion Lung/lobar collapse Lung consolidation Heart failure Foreign body Pneumoperitoneum (on erect CXR)	SBA, EMQ	OSCE	OSCE, SBA, EMQ
Abdominal radiograph (AXR)	Small bowel obstruction Large bowel obstruction Toxic megacolon Pneumoperitoneum Foreign body Common causes of normal and abnormal calcification	SBA, EMQ	OSCE	OSCE, SBA, EMQ
Skeletal radiograph	Bone fractures Pelvis Femoral neck Wrist/carpus/scaphoid Long bones Fractures involving joint/epiphyseal plate Joint dislocation Joint effusion Lipohaemarthrosis Fracture/dislocation of spine	SBA, EMQ	OSCE	OSCE, SBA, EMQ
Major trauma computed tomography (CT)	Head injury Bone and soft tissue trauma Spinal injury Thoracic injury Abdomino-pelvic trauma Acute vascular injury	SBA, EMQ	OSCE	OSCE, SBA, EMA

Relevant links to foundation programme outcomes and competences in appendix

Imaging in common clinical presentations

The learning outcomes are characterised by the ability to understand the role of diagnostic imaging and interventional radiology in the investigation and management of common clinical scenarios (especially those listed below).

Knowledge

Able to describe the role of multi-technique imaging in the investigation of common clinical conditions (including common emergencies) and justify the choice of imaging technique.

Skills

Able to recognise and describe common pathological conditions on basic imaging. Adequately appraise a radiological report and take the appropriate action, including in the acute setting. Simulation of clinical scenarios may assist with developing appropriate skills and knowledge.

Attitude/behaviour

Develops an understanding of how radiological and imaging investigation integrates into the patient care pathway. Communicate effectively with patients, fellow healthcare professionals and radiological teams in the investigation of diseases including common emergencies.

Assessment

These are best assessed with OSCE type assessment.

List of common clinical scenarios:	
Chest and cardiovascular disease	Chest pain Thoracic trauma Breathlessness Cough Haemoptysis
Gastrointestinal disease	Abdominal pain Abdominal masses Abdominal trauma Swallowing disorders Bowel obstruction Bowel perforation Change in bowel habit Jaundice Investigation of gastrointestinal haemorrhage
Renal and urological disease	Urinary colic Haematuria Acute kidney injury Urinary obstruction Acute presentation of testicular disease
Breast disease	Masses Abscess

Neurological disease	Head injury Stroke Severe headache Seizures Altered consciousness Spinal cord compression
Musculoskeletal disease	Bone pain Joint pain Bone and soft tissue trauma Bone and soft tissue infection Spinal injury Neck and back pain
Obstetric and gynaecological disease	Suspected or abnormal pregnancy Abnormal vaginal bleeding; pelvic pain Pelvic mass Use of ultrasound in normal pregnancy
Multisystem disease	Principles of oncological disease staging by imaging Anaemia Pyrexia of unknown origin
Disease in childhood	Trauma Non-accidental injury basics The limping child The painful limb Principles of imaging specific to children Urinary tract infections

Relevant links to foundation programme outcomes and competences in appendix

Appendix

1 FUNDAMENTAL PRINCIPLES

Relevant links in Outcomes for Graduates (2015):

Outcome 1 – The doctor as a scholar and scientist
- Justify the selection of appropriate investigations for common clinical cases (8c).

Outcome 2 – The doctor as a practitioner
- Formulate a plan of investigation in partnership with the patient, obtaining informed consent as an essential part of this process (14c).
- Interpret the results of investigations, including x-rays (14d).

Outcome 3 – The doctor as a professional
- Learn and work effectively within a multi-professional team (22).

Relevant links in the Foundation Programme Curriculum (2016):

Section 1
- Considers the patient as a whole, e.g. respecting their personal circumstances, dignity, autonomy, individual healthcare decisions, and right of privacy (FPC 2, F1)
- Works with patients and colleagues to develop individual care plans (FPC 2, F2)
- Discusses management options with patients and responds to their ideas, concerns and expectations (FPC 2, F2)
- Obtains consent for an increasing range of procedures (FPC 2, F2)

Section 2
- Describes the structure and importance of the wider healthcare team (FPC 6, F1)
- Works effectively within the healthcare team for the benefit of patient care (FPC 6, F1)
- Makes clear, concise and timely written and oral referrals to other healthcare professionals within the hospital (FPC 6, F1)

Section 3
- Requests and interprets necessary investigations to confirm diagnosis (FPC 11, F1)
- Reviews initial diagnoses and plans appropriate strategies for further investigation (FPC 11, F2)
- Refines problem lists and management plans and develops appropriate strategies for further investigation and management (FPC 11, F2)
- Undertakes regular reviews, amends differential diagnosis and expedites patient investigation and management (FPC 11, F1)
- Requests/ arranges investigations which are necessary to assist diagnosis and monitor treatment and are appropriate for patient's needs in accordance with local and national guidance (FPC 12, F1)
- Ensures correct identification of patients when reviewing results and planning consequent management (FPC 12, F1)
- Minimises risk of exposing a pregnant woman to ionising radiation (FPC 12, F1)
- Minimises wasteful or inappropriate use of resources by helping and directing colleagues to order appropriate tests and investigations (FPC 12, F2)
- Explains to patients the risks, possible outcomes and implications of investigation results and obtains informed consent (FPC 12, F2)
- Seeks, interprets, records and relays/acts on results of ECG, laboratory tests, basic radiographs and other investigations and explains these effectively to patients (FPC 12, F1)

2 COMMON EMERGENCY CONDITIONS

Relevant links in Outcomes for Graduates (2015):

Outcome 1 – The doctor as a scholar and scientist

- Justify the selection of appropriate investigations for common clinical cases (8c).

Outcome 2 – The doctor as a practitioner

- Formulate a plan of investigation in partnership with the patient, obtaining informed consent as an essential part of this process (14c).
- Interpret the results of investigations, including x-rays (14d).

Outcome 3 – The doctor as a professional

- Learn and work effectively within a multi-professional team (22).

Relevant links in the Foundation Programme Curriculum (2016):

Section 2

- Makes clear, concise and timely written and oral referrals to other healthcare professionals within the hospital (FPC 6, F1)

Section 3

- Requests and interprets necessary investigations to confirm diagnosis (FPC 11, F1)
- Requests/arranges investigations which are necessary to assist diagnosis and monitor treatment and are appropriate for patient's needs in accordance with local and national guidance (FPC 12, F1)
- Seeks, interprets, records and relays/acts on results of ECG, laboratory tests, basic radiographs and other investigations and explains these effectively to patients (FPC 12, F1)
- Initiates prompt appropriate management to stabilise/prevent further deterioration in patients with common acute presentations and seeks timely senior help with the further management (FPC 9, F1)
- Reassesses acutely ill patients to monitor efficacy of interventions and maintaining patient safety (FPC 9, F2)

3 IMAGING IN COMMON CLINICAL PRESENTATIONS

Relevant links in Outcomes for Graduates (2015):

Outcome 1 – The doctor as a scholar and scientist
- Justify the selection of appropriate investigations for common clinical cases (8c).

Outcome 2 – The doctor as a practitioner
- Formulate a plan of investigation in partnership with the patient, obtaining informed consent as an essential part of this process (14c).
- Interpret the results of investigations, including x-rays (14d).

Outcome 3 – The doctor as a professional
- Learn and work effectively within a multi-professional team (22).

Relevant links in the Foundation Programme Curriculum (2016):

Section 1
- Considers the patient as a whole, e.g. respecting their personal circumstances, dignity, autonomy, individual healthcare decisions, and right of privacy (FPC 2, F1)
- Works with patients and colleagues to develop individual care plans (FPC 2, F2)

Section 2
- Describes the structure and importance of the wider healthcare team (FPC 6, F1)
- Works effectively within the healthcare team for the benefit of patient care (FPC 6, F1)
- Makes clear, concise and timely written and oral referrals to other healthcare professionals within the hospital (FPC 6, F1)

Section 3
- Requests and interprets necessary investigations to confirm diagnosis (FPC 11, F1)
- Reviews initial diagnoses and plans appropriate strategies for further investigation (FPC 11, F2)
- Refines problem lists and management plans and develops appropriate strategies for further investigation and management (FPC 11, F2)
- Undertakes regular reviews, amends differential diagnosis and expedites patient investigation and management (FPC 11, F1)
- Requests/arranges investigations which are necessary to assist diagnosis and monitor treatment and are appropriate for patient's needs in accordance with local and national guidance (FPC 12, F1)
- Minimises wasteful or inappropriate use of resources by helping and directing colleagues to order appropriate tests and investigations (FPC 12, F2)
- Seeks, interprets, records and relays/acts on results of ECG, laboratory tests, basic radiographs and other investigations and explains these effectively to patients (FPC 12, F1)

www.rcr.ac.uk

Citation details

The Royal College of Radiologists.
Undergraduate radiology curriculum second edition.

London: The Royal College of Radiologists, 2017.

Ref No. BFCR(17)1

The Royal College of Radiologists
63 Lincoln's Inn Fields, London WC2A 3JW
Tel: +44 (0)20 7405 1282
Email: enquiries@rcr.ac.uk **www.rcr.ac.uk**

A Charity registered with the Charity Commission No. 211540

Clinical Radiology
The Royal College of Radiologists

Faculty of Clinical Radiology