



**SUB-SPECIALTY TRAINING  
CURRICULUM**

**FOR**

**INTERVENTIONAL RADIOLOGY**

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**The Faculty of Clinical Radiology  
The Royal College of Radiologists**

**38 Portland Place  
London W1B 1LQ**

**Telephone: (020) 7636 4432**

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# 1 INTRODUCTION

**Interventional radiology (IR) is the sub-specialty encompassing the diagnosis, investigation and image guided therapeutic management of vascular and non-vascular disease.**

From the training point of view, Interventional Radiology should be seen as a discipline that synthesises the many complex invasive therapeutic skills, which have developed within all branches of radiology. The essential skills that are necessary to practice these techniques safely and effectively overlap with each other. Both comprise clinical and technical ability. These are allied to the understanding of core radiology as defined in the Royal College of Radiologists clinical radiology training curriculum.

Currently Clinical Radiology departments rarely if ever have the infrastructure to support clinical care of patients other than on a day case basis. Interventional Radiology procedures, which have developed within Diagnostic Radiology departments, have been supported through collaboration with clinical teams. However, as the complexity and scope of IR procedures has increased, this model has become unsustainable. Interventional radiology is not a mere technical sub-specialty but a sub-specialty of clinical radiological and medical practice concerned with diagnosing and treating patients. Therefore it is good clinical practice and a medico-legal requirement for interventional radiologists (IRs) to take primary clinical responsibility for the patients they treat. This requires the provision of appropriate training, enabling them to fulfil this part of their role safely and effectively. This will allow interventional radiologists to develop sound judgement, which will add value to patient management. IRs with these appropriate clinical skills will be able to support the practice of their colleagues in Diagnostic Radiology, who will wish to continue to undertake IR procedures within specific organ-systems. In this way Interventional Radiology will flourish as a dynamic medical sub-specialty and interventional radiologists will work in a multidisciplinary professional team in conjunction with other medical and surgical specialties to respond to the needs of patients.

The Interventional Radiology Curriculum sets out the framework for educational progression that will support professional development throughout sub-specialty training in Interventional Radiology. Sub-specialty training in Interventional Radiology consists of training in core Clinical Radiology and higher sub-specialty training in IR. This higher training will focus on either (i) Vascular (ii) Non-vascular Interventional Radiology or (iii) Diagnostic and Interventional Neuroradiology.”

The curriculum defines the process of training and the competences needed for the successful completion of training in Interventional Radiology. The aim is to ensure that trainees are fully competent to provide a high quality service at consultant level in the NHS. The curriculum has been designed in line with the GMC Standards for Curricula and Assessment Systems (July 2008). There are sections detailing the planning, content, delivery, outcomes and review of the curriculum. With respect to the content, both generic, professional and speciality specific areas are included.

**Good Medical Practice:** The Generic Curriculum is based on Good Medical Practice (GMP) 2006, as outlined by the General Medical Council (GMC). IR Trainees will have a chance to show both the confidence and competences necessary to develop increasing levels of expertise in their subsequent clinical and professional practice. Interventional Radiologists will work with other healthcare professionals and put the needs of the patient first.

## **Outcomes of radiology training**

This programme will allow interventional radiologists in training to apply their knowledge and skills in the workplace and demonstrate improving performance to the level that will satisfy the needs of the GMC for completion of training and fulfill the requirements for a Certificate of Completion of Training in Clinical Radiology (Interventional Radiology), making them eligible to apply for consultant posts.

## **How to use this Curriculum**

This curriculum is intended to be used by interventional radiologists in training, those delivering their education and those responsible for quality assurance (national), quality management (deanery) and quality control (local education provider).

**It is strongly recommended that the section How to use this Curriculum is read thoroughly by all.**

## **Key messages of the Curriculum**

### **Patient Safety**

- Must be placed at the centre of healthcare
- High quality patient care depends, among other aspects of practice, on effective multi-disciplinary teams
- Learning in, and from, practice is the most effective way for professionals to develop much of their expertise.

### **Personal development**

- All Radiologists are committed to lifelong learning in, and from, the practice of radiology in the clinical environment and through repeated clinical experience. IR trainees will be expected to develop critical thinking and professional judgement, especially where there is clinical uncertainty
- Every clinical experience is a learning opportunity and should be reflected upon from the perspective of developing skills, understanding clinical/radiological acumen and performance. Failure to recognise this calls into question an individual's commitment to lifelong learning and continuing professional development
- Doctors must continuously work to improve performance i.e. improve what they actually do as distinct from what they are capable of doing.

### **Assessment**

The emphasis of Interventional Radiology training is to produce interventional radiologists, who are safe in their judgements, patient focused and accountable to the public for delivering evidence-based, effective and safe medical care. The concept of 'competent' requires the integration of different types of knowledge, skills and attitude in a pressurised, but supervised, clinical environment.

### **Objective assessments**

Work place based assessments (WpBA) will take place at regular intervals throughout training. The assessment tools are designed to help doctors develop and improve their performance. Feedback is a key factor to enable this to happen.

Throughout their careers doctors should strive to improve their performance to ensure their progression from competence, through proficiency, to expertise. The vast majority of IR trainees will have no difficulty with their assessments. When problems are identified the trainee will be encouraged to work to find solutions with the support of their clinical and educational supervisors.

### **ePortfolio**

The ePortfolio will be a record of a trainee's progress and development through IR training. It will provide a record of evidence of competence to work in a range of clinical settings and a record of satisfactory performance. This means that ePortfolio completion will contribute to the end of year report, annual review of competence progression (ARCP) and may also be used in interviews. Successful completion of the curriculum requires the achievement of competence in a variety of domains relating to generic medical practice, radiological and clinical practice. The assessments of these competences will be recorded in the ePortfolio.

This new curriculum incorporates the ethos and values of Clinical Radiology, whilst bringing to the fore the attributes required of an interventional radiologist. It emphasises the importance of supervised, practice-based learning.

## **2 AIMS AND VALUES**

### **Aims**

The over-arching aims of the curriculum are a distillation of the values and attributes attainable by interventional radiologists passing through training programmes implementing and embracing the educational potential of Interventional Radiology. These can be summarised as follows:

- Sufficient knowledge and skills to undertake the practice of Interventional Radiology at consultant level.
- A professional attitude to all aspects of clinical practice which places good conduct at its centre.
- Sound judgment through intelligent application of knowledge.
- A sense of team-working within all spheres of practice.
- An insightful approach: knowing individual/collective strengths and limitations, when to be decisive and when to seek help.
- An enthusiasm for knowledge and understanding to support lifelong learning.
- A reflective attitude allowing accurate self-assessment and learning from practice.
- The abilities necessary to provide added value to patient care.

### **Values**

Set out below are the values considered to be of importance in the teaching, learning and practice of Interventional Radiology. In clinical practice there is little or no distinction between the sub-headings of practical, educational and professional values. The reasoning behind this partition is for emphasis and clarity.

#### **Practice Values for Interventional Radiology:**

- The practice of Interventional Radiology requires interventional radiologists to have all the attributes of a good doctor and places the principles of Good Medical Practice at its core.
- Practice is based on provision of high quality patient care based on the needs of patients' above all other concerns.

#### **Educational Values for Interventional Radiology:**

- Recognition of the importance of nurturing a Professional attitude (see below) to complement the knowledge and skills required for good practice.
- Teaching that recognises the importance of understanding in the creation of knowledge.

- Knowledge should not be assumed.
- The need and desire to establish educational partnerships.
- Flexibility to tailor teaching to the needs of the learner as agreed between both teacher and learner.
- Recognition of the need for a variety of educational methods to suit the learner and the context of learning.
- Wherever practical, set teaching in the practice setting and teach theory within practice.
- Establish early learner motivation towards an attitude of self-sufficient life-long learning and development.
- Encourage reflective practice with self, peers and teachers as a means to constructive self-criticality.
- Recognition of the multi-faceted nature of Interventional Radiological practice so exposing learners to the many sub-specialties within Interventional Radiology as well as those which support it such as research, audit, management and teaching.
- Understanding and recognition that knowledge is not acquired for perpetuity but is a developmental process of increasing sophistication.
- A commitment to the dynamic nature of IR practice and its teaching thereof so seeing the curriculum as an evolutionary document.
- Recognition that hierarchy can be detrimental to education.

### **Professional Values for Interventional Radiology:**

- To be accountable for individual/collective actions.
- Develop a clear understanding of individual abilities and limitations.
- Be honest in all aspects of Interventional Radiological practice even and especially in times of adversity.
- To strive to develop and practice sound judgment.
- Show respect towards patients and colleagues.
- Maintain individual skills, knowledge and values throughout one's career

## 3 RATIONALE

### 3.1 Purpose of the curriculum

The purpose of this curriculum is to define the framework of training, the competences needed for the award of a certificate of completion of training (CCT) in clinical radiology with IR sub-specialisation as well as the assessment methodologies, which will be used throughout to inform progress. This curriculum covers the period of training once entering an interventional radiology training programme following successful completion of a two year Foundation Programme and any further basic training. This curriculum includes the indicative five year training in Clinical Radiology required to obtain a CCT in Clinical Radiology supplemented by an additional sixth year to fulfill the training requirements of the sub-specialty of Interventional Radiology. As with the Clinical Radiology curriculum, focused individual training (FIT) in Interventional Radiology can be utilised. After satisfactory progression through the indicative training period of six years trainees will be eligible for consideration for a CCT in Clinical Radiology (Interventional Radiology). The essential entry requirements for interventional radiology are the same as for clinical radiology) as core radiology training forms the first three years of this six year training programme.

### 3.2 Training Pathway

Sub-specialty training in Interventional Radiology consists of training in Clinical Radiology and higher sub-specialty training in IR. This higher training will focus on **either** Vascular and Non-vascular Interventional Radiology **or** Diagnostic and then Interventional Neuroradiology. Core training provides interventional radiologists with the ability to investigate, diagnose and treat patients with common and important acute presentations required for out of hours cover. Higher sub-specialty training then builds on the core knowledge, skills and behaviours to develop the specific competences required to practise independently as a consultant interventional radiologist.

Trainees entering the IR sub-specialty and following the Interventional Neuroradiology path will be identified from the outset. It is expected that this will be a formal continuation of previous de facto arrangements, funding streams and training posts for INR training and not a dilution of Vascular / Non-Vascular opportunities.

Core IR training forms part of core clinical radiology training. The full curriculum for sub-specialty training in Interventional Radiology consists of the core curriculum for Clinical Radiology plus the sub-specialty training curriculum for Interventional Radiology (Radiology Procedural Skills, Vascular and Interventional Neuroradiology).

Higher specialty training in IR will be delivered by collaboration in and between training programmes. Some aspects of level 1 and 2 training will only be available in specialist centres. It is envisaged that IR trainees will need to be supported by their educational supervisors and training programme directors to allow them the opportunity to be trained in areas of the IR curriculum that are not available in their local schemes. In some circumstances this may necessitate out of programme training.

### **3.3 Enrolment with the Royal College of Radiologists**

Trainees are required to enrol with the RCR, and become trainee members of the College, prior to the commencement of their training. Trainees are required to maintain College membership, including the full payment of all applicable fees, through training for the RCR to be able to recommend them as being eligible for award of a CCT.

### **3.4 Duration of Training**

Although this curriculum is competency based, the duration of training must meet the European minimum of four years for full-time specialty training plus an additional year of sub-specialty training, adjusted accordingly for flexible training (EU directive 2005/36/EC). However, the RCR has advised that the indicative duration of training from entry into the specialty (ST1) to completion will be six years in full time training (Five years of specialty training as approved by the GMC and one additional year of sub-specialty training). This is because the RCR believes that it will take six years of full time specialty training for trainees to achieve all the competences set out in this curriculum, particularly in light of changes in training opportunities as the result of the European Working Time Regulation.

### **3.5 Flexible Training**

Trainees who are unable to work full-time are entitled to opt for flexible training programmes at the discretion of their local deanery.

- Less than full time training (LTFT) shall meet the same requirements as full-time training, from which it will differ only in the possibility of limiting participation in medical activities.
- The competent authorities shall ensure that the total duration and quality of part-time training of specialists are not less than those of full-time trainees.

The above provisions must be adhered to. Less than full time trainees should undertake a pro rata share of the out-of-hours duties (including on-call and other out-of-hours commitments) required of their full-time colleagues in the same programme and at the equivalent stage.

LTFT Training should comply with current guidance from the GMC, extracts of which are reproduced below:

- Under normal circumstances the minimum percentage for LTFT should be 50%.
- In exceptional individual circumstances, trainees may be allowed to undertake training at less than 50% of full time. These circumstances should be considered by the trainee's deanery and should have the support of the postgraduate dean or their deputy. A placement at less than 50% of full time should be for a maximum of 12 months and should be subject to regular review to ensure appropriate career progression during the time.
- No trainee should undertake a placement at less than 20% of full time.

Funding for flexible trainees is from deaneries and these posts are not supernumerary.

To date, LTFT training has inevitably been prolonged. With competency based training, proof of completion of competencies may enable these trainees to finish their training in a shorter time. This will be the decision of the trainers in discussion with the RCR.



## 4 HOW TO USE THE CURRICULUM

### 4.1 Trainee radiologist

To make the most of the opportunities available in IR training you need to have an appreciation of how the curriculum works. The curriculum assumes that all doctors will be proactive and organised in managing their continuing education. The first steps are to understand:

- **The purpose of radiology training**  
Please read the *Introduction* and *Aims and Values* sections.
- **How you will be supported educationally**  
Read the sections on *Support for Learning, Assessment and Appraisal*. Understand the system of workplace based learning and other educational opportunities which should be made available to you.
- **Radiology training**  
Most training schemes offer a variety of training opportunities badged according to imaging modality and/or body systems. Not every IR trainee is expected to rotate through every attachment. Trainees, educational supervisors and training programme directors should compile rotations that cover the core and wherever possible reflect the trainees' special interests. For example every trainee will have the opportunity to cover many aspects of the neurology and oncology curriculum during other attachments such as CT, MR and Ultrasound or vice versa.
- **Focused individual training (FIT)**  
Trainees entering training in radiology with an interest in IR, should be offered FIT where possible. This will ensure that they can sample aspects of interventional radiology early in training to confirm/affirm their interest and ability. In addition they can, where possible, spend additional time in IR during each rotation (eg one or two sessions a week). Placements which feature interventional procedures are to be encouraged, this could include modality based attachments eg computed tomography and ultrasound, or, topic based attachments such as gastrointestinal, chest or neuroradiology.
- **What you are expected to achieve**  
Review the *Syllabus and Competences* section, looking at the main domains/headings applied to groups of competences in relation to the relevant presentations and diagnoses. Get an idea of what you should be aiming to achieve over the programme. You should distinguish between **core, level 1 and level 2 competence**.
- **How your competence will be assessed in the workplace**  
Competency assessment in Interventional Radiology Training is outlined in the *Support for Learning and Assessment* sections. You should familiarise yourself with this especially the ethos of reflective learning and feedback.
- **Workplace based assessments (WpBA)**  
Participation in workplace based assessment is mandatory. A minimum number of WpBA is specified in order to progress. It is expected that most trainees will undergo many more assessments demonstrating their engagement with reflective learning in practice. Workplace based assessments will be undertaken by all those individuals involved in the delivery of training. This includes consultants, senior trainees and advanced radiographic/sonographic practitioners. It would be

expected that at least 50% of WpBAs to be undertaken during consultant/trainer interactions. Every WpBA should also be considered developmental and an opportunity for learning and feedback

- **How to record your progress in the ePortfolio**

You should enrol with the Royal College of Radiologists prior to the commencement of your training. This will, amongst other things, allow you access to your ePortfolio. You need to become familiar with the ePortfolio as a record of learning.

- **Reflective Practice**

Doctors should learn from both their positive and negative experiences, demonstrate consistent good performance and record their achievements and concerns in their ePortfolio. Reflective practice has the potential to demonstrate evidence of on-going self appraisal of aspects of clinical practice, not currently assessed in the syllabus.

### **Educational Supervision**

At the start of your training, and of every rotation to a new education provider, there should be a local induction, which further introduces the programme and how it is delivered and assessed by the education provider. There should be further induction sessions at the start of each placement.

Educational supervision is provided at several different levels, two terms are particularly important.

#### Clinical supervisor

There should be a lead clinical supervisor on each attachment who will help you set the objectives at the start of the attachment and indicate how your progress will be assessed. During any attachment you may have multiple healthcare professionals providing supervision. They will inform the lead supervisor of your progress. At the end of each attachment the lead clinical supervisor will complete an assessment of your progress.

#### Educational supervisor

You will have a long-term relationship with your educational supervisor. At your first meeting with your Educational Supervisor you may wish to discuss aspects of the curriculum, your personal development plan and any specific career intentions. These might include:

- known strengths from undergraduate and early clinical training
- particular areas of interest to you
- any potential weaknesses which you feel may need addressing.
- The type of job you imagine performing in 5-10 years time eg teaching hospital, acute hospital, academic etc.
- Milestones you are likely to need to achieve.

You should also agree a system and timeline for ongoing educational supervision and undertaking the required assessments in the form of an educational agreement. The educational supervisor will provide an annual report on your progress which will inform the Annual Review of Competence Progression (ARCP) process

## Core, Level 1 and Level 2 competences

The curriculum recognises **core, level 1 and level 2** competences. It is expected that you will acquire more competences as you progress through training. It is important to monitor the progression and the achievement of competences from the outset of training. Each trainee should strive to achieve as highly as possible but it is recognised that learning occurs at different rates in each individual. Many trainees are expected to achieve level 1 or 2 in some areas during core training. ***It is not expected that every trainee acquire every competence or cover every area.***

- **Core training (indicative years 1-3)**  
All trainees are expected to reach core competence as this reflects what is likely to be required by any radiologist performing acute imaging.
- **Higher training (indicative years 4-5)**  
Levels 1 and 2 competence indicates a greater degree of expertise to be achieved by those intending to practice IR.

### **Level 1**

An IR radiologist (not specialising in INR) would probably hold level 1 in areas of both non-vascular (procedural skills) and vascular radiology. They would be able to practice as an IR consultant with an ability to practice across a wide range of IR. Radiologists with other specialist interests would be expected to consult them for IR advice within their disciplines.

An IR radiologist training in interventional neuroradiology would be expected to achieve a minimum of Level 1 in diagnostic neuroradiology. Achievement of Level 1 in interventional neuroradiology is a staging post in training and not sufficient for independent practice in this field.

### **Level 2**

An IR radiologist (not specialising in INR) with level 2 competence would be likely to be an expert in a specific field of IR – either vascular, non-vascular or potentially systems- based (eg oncology). He/she is likely to be consulted by other interventional radiologists.

An IR radiologist training in interventional neuroradiology with level 2 competence would be an expert in INR. There are specific areas of practice such as paediatric interventional neuroradiology which will require focused training in specific centres in order to achieve level 2 INR competence. An IR radiologist training in interventional neuroradiology may also achieve Level 2 in diagnostic neuroradiology

When engaged in reflection, formal assessment or self assessment, it is recommended that you again refer to the framework of competences to check your progress against the range of competences you are expected to achieve.

If you experience any difficulties with this your educational and clinical supervisors are there to help you.

## 4.2 Trainer

Please read the *Introduction* and *How to use the curriculum: Trainee Radiologist* sections above.

The definition of roles can be found at:

<http://www.rcr.ac.uk/docs/radiology/pdf/SAC%20Definition%20of%20Roles.pdf>

Your roles will vary and may involve teaching and making available other learning opportunities in the workplace, contributing to other forms of learning, providing workplace-based assessments and clinical supervision, providing educational supervision and ensuring patient safety within the learning environment.

You should be supported in your role by your Local Education Provider (LEP) and your Radiology School and should have received training for all your different roles which contribute to postgraduate education. There should be adequate time within your job plan to carry out your agreed postgraduate training roles to a high quality standard.

Learning in the radiology department

### **Overview**

The main themes of the Curriculum are core competency (Years 1-3), and development of interventional radiology higher level training (Years 4-6). Satisfactory performance in professional practice will be expected throughout. Formative workplace based assessments will enable overall competency and performance to be judged and will be the basis of much of the assessment of generic skills and competences such as good medical practice, clinical care, professionalism and leadership. Other learning environments, such as e-learning, textbooks, journals, short courses and simulation activities should also be used.

During a radiological attachment, the trainee radiologist should select topics on which to be assessed from the relevant list of presentations/diagnoses contained within the syllabus. A range of assessment tools will be used. The trainee radiologist and clinical or educational supervisor should ensure that a wide selection of core problems is formally assessed over the course of each attachment. The workplace based assessments are intended to be formative and should be regarded as assessment and learning exercises. More details about the assessment methodology appear in *Support for Learning and Assessment & ARCP* sections.

### **Practical procedures**

Interventional radiologists perform many practical procedures during their day to day work. Throughout the curriculum interventions are included as part of the core training in the clinical radiology. The knowledge, skills and behaviours in relation to practical procedures are further highlighted and developed within the Interventional Radiology section. Thus trainees and trainers should refer to both these sections to find details of core and levels 1 and 2 procedural competences.

## 5 CONTENT OF LEARNING

### 5.1 Programme Content and Objectives

The interventional radiology syllabus below sets out the general and professional content, as well as sub-specialty specific content that needs to be mastered. Demonstration of completion of widespread coverage of the syllabus competences is required to achieve a CCT in Clinical Radiology (Interventional radiology).

### 5.2 Good Medical Practice

In preparation for the introduction of licensing and revalidation, the General Medical Council has translated Good Medical Practice into a Framework for Appraisal and Assessment which provides a foundation for the development of the appraisal and assessment system for revalidation. The Framework can be accessed at [http://www.gmc-uk.org/about/reform/Framework\\_4\\_3.pdf](http://www.gmc-uk.org/about/reform/Framework_4_3.pdf)

The Framework for Appraisal and Assessment covers the following domains:

<i>Domain 1</i>	Knowledge, Skills and Performance
<i>Domain 2</i>	Safety and Quality
<i>Domain 3</i>	Communication, Partnership and Teamwork
<i>Domain 4</i>	Maintaining Trust

The “GMP” column in the syllabus defines which of the 4 domains of the Good Medical Practice Framework for Appraisal and Assessment are addressed by each competency. Most parts of the syllabus relate to “Knowledge, Skills and Performance” but some parts will also relate to other domains.

## **5.3 Syllabus and Competences - Content**

### **PHYSICS**

### **ANATOMY**

### **GENERIC CONTENT**

#### **1.0 Behaviours in the Workplace**

- 1.1 Professionalism
- 1.2 Working with Colleagues
- 1.3 Relations with Patients
- 1.4 Personal Qualities

#### **2.0 Good clinical care**

- 2.1 History taking
- 2.2 Written records
- 2.3 Overall Clinical Judgement
- 2.4 Time management and decision-making
- 2.5 Therapeutics and safe prescribing
- 2.6 The Use of Sedation and Analgesia
- 2.7 Breaking Bad News

#### **3.0 Managing Long-term Conditions**

#### **4.0 Infection control**

#### **5.0 Patient safety within clinical governance**

- 5.1 Risk Management
- 5.2 Quality improvement and Patient Safety

#### **6.0 Leadership/Management development**

- 6.1 Leadership
- 6.2 NHS Structure
- 6.3 Media Awareness

#### **7.0 Ethical and legal issues**

- 7.1 Medical ethics and confidentiality
- 7.2 Valid consent
- 7.3 Legal framework of medical practice
- 7.4 Equality and Diversity

8.0 Maintaining good medical practice

- 8.1 Insight
- 8.2 Lifelong learning
- 8.3 Ethical Research
- 8.4 Evidence Based Practice
- 8.5 Clinical Governance and Audit
- 8.6 Information Technology

9.0 Teaching and training

**CORE CLINICAL RADIOLOGY**

- A. Breast
- B. Cardiac
- C. Emergency
- D. Gastro-intestinal
- E. Head and Neck
- F. Musculoskeletal
- G. Neurological
- H. Oncological
- I. Paediatric
- J. Radionuclide
- K. Thoracic
- L. Urogynaecological

**INTERVENTIONAL RADIOLOGY SPECIFIC – CORE & HIGHER TRAINING**

- M Radiology Procedural Skills
- N Vascular
- O Interventional Neuroradiology

## **5.4 The Syllabus in Practice**

The syllabus sets out what interventional radiologists need to learn in order to be able to manage a wide and varied caseload and to work adaptively in healthcare teams. These competences may be acquired in a variety of radiological settings. Interventional radiology trainees should emerge with the professional qualities, understanding, critical perspective and ability to reflect on and in practice.

Throughout their training, it is important that interventional radiology trainees should be encouraged to reflect on decisions, management plans and actions taken. In discussion with their supervisors, they will be expected to discuss the thinking and reasoning behind them.

At all times interventional radiology trainees will:

- practise within their competence level
- practise in accordance with the standards expected of them in the unit in which they are placed
- refer to more experienced interventional radiology colleagues/teachers/mentors when they are uncertain as to the best management of a particular patient
- practise according to prevailing professional standards and requirements.

### **Outcomes**

The outcomes and competences described for core training in both diagnostic and interventional radiology should be achieved by the end of the third year. The appropriate level 1 and 2 IR outcomes and competences should be achieved by the end of the sixth year. A key feature of the interventional radiology curriculum is that all radiology trainees must develop competences at an ever increasingly higher level during the course of their training. IR trainees will need to find out about the specific IR learning opportunities offered by the various placements.

Evidence of the IR trainee's learning, development and achievements will be recorded in the Royal College of Radiologists ePortfolio. Further information and declaration forms for probity, professional behaviour and personal health can be found in the ePortfolio.

The following section outlines what needs to be learnt in the Interventional Radiology Training Programme. Throughout this section the term 'patient' or 'carer' should be understood to mean 'patient', 'patient and parent', 'guardian', 'carer', and/or 'supporter' or 'advocate' as appropriate in the context.

## **6 SYLLABUS AND COMPETENCES**

### **6.1 Physics**

#### **1 INTRODUCTION**

- 1.1 The purpose of the curriculum is to provide those undertaking training in interventional radiology with appropriate knowledge of the physical principles that underpin diagnostic medical imaging. When linked with other training in clinical radiology, this should lead to the safe and effective application of diagnostic imaging for the benefit of patients.
- 1.2 It is intended that the curriculum should be delivered during the first year of training. This is expected to take about 40-45 hours of formal physics teaching, during the early months of training, supplemented by practical training and private study of material recommended by trainers. Basic knowledge of physics and mathematics is assumed.
- 1.3 Assessment is in the form of a written multiple choice question (MCQ) paper, which is a component of the First FRCR Examination in Clinical Radiology. Further detail is available on the College's website: [www.rcr.ac.uk/content.aspx?PageID=175](http://www.rcr.ac.uk/content.aspx?PageID=175).

#### **2 AIMS OF THE CURRICULUM**

- 2.1 Provide appropriate knowledge of the physical principles that underpin the following diagnostic medical imaging modalities: planar (projection) x-radiography, x-ray fluoroscopy, x-ray computed tomography (CT), ultrasound imaging, magnetic resonance imaging (MRI), planar (projection) radionuclide imaging, single photon emission computed tomography (SPECT) and positron emission tomography (PET).
- 2.2 Describe how the concepts of risk, safety and quality apply in these imaging modalities including the responsibilities of individuals and organisations.
- 2.3 Provide sufficient understanding of the principles underlying each imaging modality to enable selection of the most appropriate modality for a particular clinical situation, to select the optimal operating factors, to interpret the images produced, to communicate the results and to discuss the complete imaging process with professional colleagues.
- 2.4 Assist trainees to satisfy the requirements for adequate training in order to carry out professional roles in medical diagnostic imaging as specified by UK legislation and guidance.

### 3 **LEARNING OBJECTIVES**

Those who have followed the curriculum should be able to:

- 3.1 Describe the structure and properties of matter, the phenomena of radioactivity and magnetism, the nature of ionising radiation, radiofrequency radiation and ultrasound and how they interact with matter.
- 3.2 Distinguish between different types of diagnostic medical image and understand how such images are created, reconstructed, processed, transmitted, stored and displayed.
- 3.3 Describe the construction and function of medical imaging equipment including the radiation or ultrasound source, image-forming components and image or signal receptor.
- 3.4 Indicate how imaging equipment is operated and describe the imaging techniques that are performed with such equipment.
- 3.5 Identify the type of information contained in images from different modalities.
- 3.6 Distinguish between different indices of image quality, explain how they are inter-related and indicate how they are affected by changing the operating factors of imaging equipment.
- 3.7 Identify agents that are used to enhance image contrast and explain their action.
- 3.8 Explain how the performance of imaging equipment is measured and expressed.
- 3.9 Describe the principles of quality assurance and outline how quality control tests of imaging equipment are performed and interpreted.
- 3.10 Recognise artefacts in medical images and identify how they are removed or their impact is reduced.
- 3.11 Recognise the hazards and risks to patients, members of staff and members of the public associated with medical imaging and describe how their impact is reduced without compromising diagnostic image quality.
- 3.12 Identify the major pieces of UK legislation and guidance that affect the practice of medical imaging and interpret their requirements.

### 4 **SYLLABUS CONTENT**

The syllabus is intended as a guide and general indication to the breadth of the topics that may appear in the examination questions. It is not a teaching plan and the bullet points do not relate to equal amounts of study time. The syllabus should be studied to a depth sufficient to allow the learning objectives in Section 3 above to be achieved.

- 4.1 **Principles of medical diagnostic imaging**
  - Projection (planar) and tomographic images
  - Analogue and digital images
  - Structure of digital images
  - Digital image processing, fusion, transmission and storage
  - Display and viewing of analogue and digital images
  - Picture Archiving and Communications Systems (PACS)
  - Quality assurance
  
- 4.2 **Common themes for all imaging modalities**
  - Image formation
  - Image quality - contrast, noise, contrast resolution and spatial resolution
  - Contrast agents
  - Image processing and analysis
  - Equipment performance measurement, test objects and quality control
  - Image artefacts
  - Hazards, risks and safety
  
- 4.3 **Matter and radiation**
  - Structure of matter, the atom and the nucleus
  - Nature and properties of charged particle and electromagnetic radiation
  - Interaction of electrons with matter
  - Production of x-rays
  - Interaction of high energy photons with matter
  - Filtration of x-ray beams
  - Electron energy in solids
  - Luminescence
  
- 4.4 **Ionising radiation dose**
  - Absorbed dose and kinetic energy released to matter
  - Effects of ionising radiation on living tissue
  - Equivalent dose and effective dose
  - Radiation risk
  - Population dose from natural and artificial sources
  
- 4.5 **Radiography with x-rays**
  - Construction, function and operation of computed and digital radiographic systems
  - X-ray tube and x-ray beam
  - Image receptors for computed and digital radiography
  - Scatter rejection
  - Contrast media – iodine, barium and air
  - Dual energy radiography
  - Film-screen radiography
  - Mammography
  - Radiographic tomography and tomosynthesis
  
- 4.6 **Fluoroscopy with x-rays**
  - Construction, function and operation of a fluoroscopy system
  - Image receptor – image intensifier and flat panel detector
  - Scatter rejection
  - Automatic brightness control

- Image digitisation
- Angiography with contrast media, including digital subtraction techniques

#### 4.7 **Safety in radiography and fluoroscopy with x-rays**

- Radiation detectors and dose meters
- Measurement of absorbed dose and dose rate in air
- Estimation of patient absorbed dose
- Typical dose-area products, entrance surface doses and effective doses in radiography and fluoroscopy
- Detector dose indicators
- Factors affecting radiation dose
- Time, distance and shielding for dose reduction
- Children and pregnant patients
- Estimation and control of radiation dose to staff and members of the public
- Operational dose quantities
- Personal dosimetry
- Pregnant staff

#### 4.8 **Radioactivity**

- Nuclear stability
- Mechanisms of radioactive transformation
- Nuclear energy states and gamma emission
- Activity and radioactive decay
- Natural radioactivity
- Artificial radionuclides and their production
- Radiopharmaceuticals and their production

#### 4.9 **Planar radionuclide imaging**

- Construction, function and operation of a digital gamma camera
- Imaging collimators
- Image receptor – scintillation detector
- Scatter rejection
- Mechanisms and quantification of radiopharmaceutical localisation
- Static, whole-body, dynamic and gated imaging

#### 4.10 **Safety in planar radionuclide imaging**

- Activity measurement with radionuclide calibrator
- Estimation of patient absorbed dose
- Typical activities and effective doses
- Factors affecting radiation dose
- Time, distance and shielding for dose reduction
- Children and conception, pregnancy and breast-feeding in patients
- Estimation and control of radiation dose to staff and members of the public
- Pregnant staff
- Contamination and environmental dose rate monitoring
- Storage, handling and transportation of radioactive substances
- Storage and disposal of radioactive waste

#### 4.11 **UK framework for ionising radiation protection**

- Hierarchy of recommendations, legislation and guidance
- Justification, optimisation and dose limitation
- Ionising Radiations Regulations 1999 and Approved Code of Practice
- Risk assessment, restriction of exposure and dose monitoring
- Radiation Protection Adviser and Radiation Protection Supervisor
- Local Rules and work procedures
- Designation of working areas and classification of workers
- Dose limits and dose constraints
- Comforters and carers
- Ionising Radiation (Medical Exposure) Regulations 2000, Notes on Good Practice and 2006 amendment
- Duty holders and their training and responsibilities
- Employer's procedures
- Diagnostic reference levels
- Exposures for research, health screening and medico-legal purposes
- Medicines (Administration of Radioactive Substances) Regulations 1978 and 1995 and 2006 amendments
- Administration of Radioactive Substances Advisory Committee and Notes for Guidance
- Radioactive Substances Act 1993
- Registration to hold radioactive substances
- Authorisation to store and dispose of radioactive waste
- Medical and Dental Guidance Notes
- Notification and reporting of radiation incidents

#### 4.12 **Tomographic reconstruction**

- Angular and linear sampling of projection data
- Filtered back-projection and reconstruction filters
- Iterative reconstruction

#### 4.13 **X-ray computed tomography**

- Construction, function and operation of a CT scanner
- Helical and multi-slice scanners
- Image reconstruction
- CT angiography, CT fluoroscopy and gated imaging
- CT perfusion
- Radiation dose to patients, staff and the public
- Radiation safety and factors affecting radiation dose

#### 4.14 **Single photon emission computed tomography**

- Construction, function and operation of a rotating multi-head gamma camera
- Image reconstruction
- SPECT/CT
- Radiation safety and factors affecting radiation dose
- Typical activities and effective doses to patients, staff and the public

#### 4.15 **Positron emission tomography**

- Construction, function and operation of a multi-detector ring system
- 2D and 3D acquisition
- Image reconstruction

- Standardised uptake value (SUV)
- PET/CT
- Radiation safety and factors affecting radiation dose
- Typical activities and effective doses to patients, staff and the public

#### 4.16 Nuclear magnetic resonance

- Nuclear spin angular momentum and nuclear magnetic moment
- Bulk magnetisation and the effect of magnetic field strength
- Precession in a magnetic field and the Larmor equation
- Resonance with radiofrequency pulses
- Relaxation mechanisms and relaxation times
- Free induction decay signal

#### 4.17 Magnetic resonance imaging

- Construction, function and operation of a superconducting MRI scanner
- Permanent and resistive magnets
- Radiofrequency receiver coils
- Spin-echo pulse sequence
- Spatial localisation of the signal
- K-space, image acquisition and image reconstruction
- Multi-echo, fast spin-echo and single shot techniques
- Gradient echo imaging – basic spoiled and non-spoiled techniques
- Tissue suppression methods – short TI inversion recovery (STIR), fluid attenuated inversion recovery (FLAIR) and fat saturation
- Standard gadolinium extracellular space contrast agents
- Magnetic resonance angiography (MRA)
- Basic principles of diffusion techniques and diffusion weighted imaging
- Dynamic contrast enhancement and perfusion imaging
- Principles of magnetic resonance spectroscopy (MRS)
- Spatial misregistration, chemical shift, susceptibility, motion, flow and other artefacts

#### 4.18 Safety in magnetic resonance imaging

- Static magnetic field – projectiles, induced voltage, implants
- Fringe field and controlled area
- Time-varying gradient fields – eddy currents, stimulation, implanted devices, acoustic noise
- Radiofrequency fields – specific absorption rate, heating
- Safety of patients, staff and members of the public
- Pregnant patients
- Shielding and imaging room design
- Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use

#### 4.19 Physics of ultrasound

- Nature and properties of ultrasound
- Propagation and interaction of ultrasound in matter
- Scattering of ultrasound waves
- Piezoelectric effect
- Design and construction of ultrasound transducers
- Continuous and pulsed wave ultrasound
- Beam shape from a single transducer and an annular array

- The Doppler effect

#### 4.20 **Ultrasound imaging**

- A-mode and B-mode imaging
- Time-gain compensation
- Construction, function and operation of a real-time B-mode scanner
- Image acquisition and reconstruction
- M-mode
- Microbubble and particle suspension contrast agents
- Harmonic imaging
- Measurement of flow with continuous and pulsed Doppler ultrasound
- Duplex scanners
- Colour-flow and power Doppler imaging

#### 4.21 **Safety in ultrasound imaging**

- Physical effects - heating, streaming, cavitation and mechanical damage
- Intensity and energy limits
- Thermal and mechanical indices
- Measurement of power output
- Safety of patients, staff and members of the public
- Safety guidance

#### 4.22 **Functional and molecular imaging (FMI)**

- Meaning and principles of functional imaging and molecular imaging
- Biological and physiological processes – flow, perfusion, diffusion, uptake, excretion etc
- Comparison of imaging modalities for FMI – sensitivity, spatial resolution etc

## **6.2 *Anatomy***

### **1 INTRODUCTION**

- 1.1 The purpose of the curriculum is to provide those undertaking sub-specialty training in interventional radiology with appropriate knowledge of the anatomy needed to perform and interpret radiological studies. When linked to other training in clinical radiology, this will lead to the safe and effective application of diagnostic imaging for the benefit of patients.
- 1.2 It is intended that the curriculum should be delivered during the first year of training. This is expected to take about 30 hours of focused anatomy teaching, over a period of about six months, supplemented by practical training and private study of material recommended by teachers. Basic knowledge of anatomy is assumed.
- 1.3 Assessment is in the form of an electronic image viewing session, which is a component of the First FRCR Examination in Clinical Radiology. Further detail is available on the College's website: [www.rcr.ac.uk/content.aspx?PageID=175](http://www.rcr.ac.uk/content.aspx?PageID=175).

- 1.4 A knowledge of radiological anatomy is fundamental to the study of radiology. The standard and level of anatomical knowledge tested and expected reflect the time available for training. The assessment is of knowledge of radiological anatomy – not surgical anatomy, surface anatomy or cadaveric anatomy – but applied anatomy that is relevant to clinical radiology.

## 2 **AIMS OF THE CURRICULUM**

- 2.1 Provide appropriate knowledge of the anatomy that underpins all radiological imaging including radiography, fluoroscopy, computed tomography (CT), ultrasound imaging and magnetic resonance imaging (MRI).
- 2.2 Provide sufficient understanding of the radiological anatomy that is visible on each imaging modality to perform and interpret studies including communicating the results and discussion with clinical colleagues.

## 3 **LEARNING OBJECTIVES**

Those who have followed the curriculum should be able to:

- 3.1 Describe and recognise the bony and soft tissue anatomy visible on radiographs, including common normal variants. This will include children of all ages.
- 3.2 Describe and recognise the radiological anatomy visible on CT, including multiplanar reformats. This will include solid organs such as the heart and lungs, bones, vessels and muscles.
- 3.3 Describe and recognise the radiological anatomy visible on ultrasound imaging, including first trimester antenatal ultrasound. This will include solid viscera such as the liver and spleen, bones, vessels, major ligaments and tendons. Endocavity ultrasound, such as transvaginal, transrectal and endoscopic ultrasound will be excluded.
- 3.4 Describe and recognise the radiological anatomy of MRI, including solid viscera such as the brain and abdominal organs, bones, joints, muscles and vessels.
- 3.5 Describe and recognise the radiological anatomy of fluoroscopic studies of the gastro-intestinal, biliary, genito-urinary and vascular systems.

NB: Nuclear medicine, including positron emission tomography, is excluded from the anatomy curriculum.

## 4 **SYLLABUS CONTENT**

This syllabus is intended as a guide and general indication to the breadth of the topics that may appear in the examination questions. It is not a teaching plan and the bullet points do not relate to equal amounts of study time. The syllabus should be read in conjunction with the learning objectives in Section 3 above.

## 1 Head & Neck

### 1.1 *Brain*

- Ventricles and CSF spaces
- Arteries and venous sinuses
- Basal nuclei and major white matter tracts
- Cerebrum and cerebellum
- Cranial nerves
- Pituitary and juxtaseellar structures

### 1.2 *Skull*

- Calvaria and base of skull

### 1.3 *Face and neck*

- Arteries and veins
- Sinuses
- Orbit and contents
- Facial skeleton
- Tongue and oral cavity
- Lymph node groups
- Larynx and pharynx
- Thyroid and parathyroid
- Salivary glands

## 2 Thorax

### 2.1 *Cardiac*

- Mediastinum, pericardium and lymph node groups
- Cardiac chambers, valves, arteries and veins
- Great vessels and azygos/hemi-azygos system

### 2.2 *Bronchopulmonary*

- Trachea and major bronchi
- Pulmonary vasculature
- Pleura and fissures

### 2.3 *Chest wall and diaphragm*

### 2.4 *Breast and axilla*

## 3 Abdomen and Pelvis

### 3.1 *Bowel*

- Oesophagus and stomach
- Duodenum, small bowel and appendix
- Colon, rectum and anus

### 3.2 *Upper Abdominal Viscera*

- Liver segments and blood vessels
- Biliary tree and gall bladder
- Pancreas, adrenals and spleen

### 3.3 **Abdominal wall**

### 3.4 **Spaces and planes**

- Perirenal and pararenal spaces and fasciae
- Peritoneal reflections and spaces

### 3.5 **Genitourinary tract**

- Kidneys and pelvicalyceal systems
- Ureters and bladder
- Prostate, seminal vesicles and urethra
- Testes and epididymides

### 3.6 **Gynaecology**

- Ovaries and fallopian tubes
- Uterus and cervix
- Vagina

### 3.7 **Vascular supply**

- Portal venous system
- Aorta and major branches
- IVC and tributaries

### 3.8 **Lymph node groups**

## 4 **Musculoskeletal system**

### 4.1 **Spine**

- Vertebrae, sacrum and joints
- Paraspinal muscles and ligaments
- Spinal cord, cauda equina and nerve roots

### 4.2 **Upper Limb**

- Bones and joints, including shoulder
- Muscles and nerves
- Blood vessels

### 4.3 **Lower Limb**

- Bones and joints, including pelvis
- Muscles and nerves
- Blood vessels

**Note:** The understanding of anatomy is central to the interpretation of diagnostic imaging. The depth and breadth of anatomy knowledge will increase over an individual's training. The importance and central nature of anatomy to radiology is reflected by its appearance and integration throughout the radiology specific syllabus.

### 6.3 Syllabus

In the tables that follow, the “assessment methods” shown are those that are appropriate as **currently possible** that could be used to assess each competency. It is not expected that all competences will be assessed and that where they are assessed not every method will be used. See Assessment and ARCP.

The assessments that are marked with () brackets within the syllabus currently lack validity but do offer opportunities for utilisation with those competences they are placed against.

“GMP” defines which of the 4 domains of the Good Medical Practice Framework for Appraisal and Assessment are addressed by each competency. See section 0 for more details.

The following is a key for both the (summative and formative) assessment methods and GMP domains as they are mapped to the competences within the syllabus.

#### Assessment Methods Key

1	First FRCR Examination	7	Rad-DOPS
2	Final FRCR Part A Examination	8	MSF
3	Final FRCR Part B Examination: rapid reporting session component	9	Audit Assessment
4	Final FRCR Part B Examination: reporting session component	10	Teaching Observation
5	Final FRCR Part B Examination: oral examinations		
6	Mini-IPX		

#### Domains of Good Medical Practice (GMP) Key

1	Knowledge, Skills and Performance	3	Communication, Partnership and Teamwork
2	Quality, Improvement and Safety	4	Maintaining Trust

## 6.4 Generic Content

### 1.0 Behaviours in the Workplace

#### 1.1 Professionalism

##### Objective

To practise radiology employing values, behaviours and relationships that underpin the trust the public has in doctors		
Knowledge	Assessment Methods	GMP
Outline the concepts of modern medical professionalism	(6),(7)	1
Outline the relevance of professional bodies		1
Know when to seek support	(6),(7),8	1
Skills		
Practise with:	(6),(7),8	1,2,3
<ul style="list-style-type: none"> <li>• Integrity</li> <li>• Compassion</li> <li>• Altruism</li> <li>• Continuous improvement</li> <li>• Humility</li> <li>• Excellence</li> <li>• Respect for cultural and ethnic diversity</li> <li>• Regard for the principles of equity</li> <li>• Insight</li> </ul>		
Adopt a reflective approach to radiological practice	(6),(7),8	1,2,3
Demonstrate insight regarding competence and limitations	(6),(7),8,	1,2,3,4
Behaviours		
Demonstrate patient-centred practice	(6),(7),8	1,2,3,4
Use healthcare resources prudently and equitably	(6),(7),8,9	1,2,3,4
Act with honesty and sensitivity in a non-confrontational and non-discriminatory manner	(6),(7),8	1,2,4
Recognise situations when it is appropriate to involve professional bodies	(6),(7),8	1,2,3,4
Show willingness to act as a mentor and educator	8,10	1,3
Participate in professional regulation	8,9	1,4
Demonstrate ability to cope with uncertainty	6,7,8	1,2,3
Descriptors		
Core	Level 1	Level 2
Demonstrate awareness of the importance of professionalism in radiological practice	Fully incorporate the principles of professionalism in radiological practice	

## 1.2 Working with Colleagues

### Objective

To demonstrate good working relationships with colleagues and other healthcare professionals.

To acquire and develop appropriate and effective inter-personal skills, being able to resolve conflicts and develop good working relationships within the team

To support team development, bringing together different professions, disciplines and agencies, to provide high quality health care

Knowledge	Assessment Methods	GMP
Clinical Teams: Understand how a team works. Understand the roles & responsibilities of team members within the department and MDT. Know the roles of other clinical specialties and their limitations	7,8	1,2,3
Communication with Colleagues: Describe the principles of good communication and conflict resolution techniques. Describe local procedures and policies for expressing valid concerns about performance of any colleague (Risk Management)	8	1,2,3,4
Complaints: Define local and independent complaints procedures	8	1,2,3
Skills		
Clinical Teams: Communicate effectively. Seek advice if unsure. Recognise when to delegate. Show leadership and supervise safely	(6),(7),8	1,3
Communication with Colleagues: Use appropriate language. Select appropriate communication methods. Reduce or eliminate tension in difficult situations	7,8	1,2,3
Complaints: Anticipate potential problems. Manage dissatisfied colleagues	8	1,2,3,4
Behaviours		
Clinical Teams: Show respect for others' opinions. Work conscientiously and co-operatively. Recognise own limitations. Supervise less experienced colleagues	8	1,2,3,4
Communication with Colleagues: Show willingness to participate in MDMs. Treat colleagues fairly. Show willingness to question colleagues' opinions in the interest of patient care	(6),7,8	1,2,3,4
Complaints: Act promptly, with honesty and sensitivity. Accept responsibility when appropriate	8	1,2,4
Descriptors		
Core	Level 1	Level 2
Awareness that positive relationships with colleagues and team working are essential	Be able to articulate points of view and lead in issues of professional debate	
Maintain personal portfolio	Engage in and contribute to MDTs and open departmental discussions Demonstrate personal development in communication skills	
	Mentor/support junior staff and allied healthcare professionals guiding them towards improved team-work and communication skills	

### 1.3 Relations and Communications with Patients

#### Objective

To maintain good professional relationships with all patients. Conduct professional interactions with vulnerable adults, children and their carers according to legislation.

Knowledge	Assessment Methods	GMP
Patient relationships: GMC - Guide to Good Medical Practice	7,8	1
Vulnerable Adults: Knowledge of the definition and assessment of competence in the vulnerable adult. Understand the relevant legislation.	7,8	1
Children: Child protection legislation	7,8	1
Skills		
Patient relationships: Treat patients with dignity and as individuals. Recognise the boundaries of the doctor/patient relationship	7,8	1,2,3,4
Vulnerable Adults: Be able to assess the mental /physical capacity of the patient	7,8	1,2,3
Vulnerable Adults: Be able to explain consent procedures in a way that is clearly understood	7,8	1,2,3,4
Children: Practise within the recognised legislative framework	7,8	1,2,3
Behaviours		
Patient relationships: Approach and listen to patients with an open caring mind	7,8	1,2,3,4
Patient relationships: Development of a caring nature and empathy	7,8	1,2,3,4
Patient relationships: Recognise challenging professional relationships and seek support	7,8	1,2,3,4
Vulnerable Adults: Respect patients' and carers' views	7,8	1,2,3,4
Children: Respect patients' and carers' views	7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Understand the importance of good professional relationships with patients	Achieve good professional, sympathetic and independent relationships with patients	
Be aware of issues relating to doctor patient relationships involving vulnerable adults and children	Develop independent doctor patient relationships with vulnerable adults and children	
Achieve good professional relationships with patients		

## 1.4 Personal Qualities

### Objective

To develop personal qualities and behaviours necessary to become a leader dealing with complex clinical situations and difficult attitudes

Knowledge	Assessment Methods	GMP
Develop abilities to deal with inappropriate patient and family behaviour	(6),(7),8	1,2,4
Respect the rights of all patients including children, vulnerable adults and the elderly	(6),(7),8	1,2,4
Understand the need to eliminate all forms of discrimination against patients (age, gender, race, culture, disability, spirituality and sexuality)	(6),(7),8	1,2,4
Show awareness of the need to put patient need ahead of self- convenience	(6),(7),8	1,2,4
Define the concept of medical professionalism		1
Understand the relevance and interactions of professional bodies (Royal Colleges, GMC, BMA, medical defence organisations, specialist societies)		1
Skills		
Assume a leadership role	(6),(7),8	1,2,3,4
Practise with :	(6),(7),8	1,2,3,4
<ul style="list-style-type: none"> <li>• integrity</li> <li>• compassion</li> <li>• altruism</li> <li>• continuous improvement</li> <li>• excellence</li> <li>• respect of cultural and ethnic diversity</li> </ul>		
Work in partnership with the allied healthcare professionals	7,8	3
Recognise and respond appropriately to unprofessional behaviour in others	(6),(7),8	3,4
Behaviours		
Recognise personal beliefs and biases and how they impact on service delivery	(6),(7),8	1,3
Recognise the need to use all healthcare resources prudently and appropriately	(6),(7),8,9	1,2
Recognise the need to improve clinical leadership and management skills	(6),(7),8	1,2,3,4
Recognise the situations when it is appropriate to involve professional and regulatory bodies	(6),(7),8	1,2,3,4
Be willing to act as a mentor, educator and role model	(6),(7),8,10	1,2,3,4
Participate in professional regulation and development	8	1,2,4
Take part in 360° feedback as part of appraisal	8	1,2,4
Recognise the need for equal access to healthcare	(6),(7),8,9	1,3,4
Recognise the need for reliability and accessibility throughout the healthcare team	(6),(7),8	1,2,3,4

## Descriptors

Core	Level 1	Level 2
Work well in the context of multi-professional teams	Respond positively to criticism and work to improve	
Listen well to others and be considerate to other points of view	Involve patients in decision making Demonstrate ability to deliver feedback to members of the clinical team  Be able to manage difficult patient interactions and negotiate successful outcomes for patients and team members  Create positive open professional environment that is supportive of patients and staff	

## 2.0 Good clinical care

### 2.1 History taking

#### Objective

To elicit a relevant focused history from patients with increasingly complex issues and in increasingly challenging circumstances. To establish a problem list increasingly based on pattern recognition including differential diagnosis(es) and formulate a management plan and imaging strategy

Knowledge	Assessment Methods	GMP
Comprehends importance of different elements of history	6,7	1
Knows likely causes and risk factors for conditions relevant to mode of presentation	6,7	1
Recognise that the patient's wishes and beliefs and the history should inform examination, investigation and management	6,7	1
Skills		
Identifies and overcomes possible barriers to effective communication	7	1
Manages time and draws consultation to a close appropriately	7	1
Manages alternative and conflicting views from family, carers, friends and members of the multi-professional team and maintains focus	7	1,3
Assimilates history from the available information from patient and other sources including members of the multi-professional team.	7	1,3
Recognises and interprets appropriately the use of non verbal communication from patients and carers	7,8	1,3
Behaviours		
Shows respect and behaves in accordance with Good Medical Practice	7,8	3,4
Descriptors		
<b>Core</b>	<b>Level 1</b>	<b>Level 2</b>
Obtains, records and presents accurate clinical history relevant to the clinical presentation.	Is able accurately to summarise the details of patient notes.	Quickly focuses questioning to establish working diagnosis and relate to relevant examination, investigation and management plan in most acute and common chronic conditions in almost any environment.
Elicits most important positive and negative indicators of diagnosis Includes an indication of patient's views	Demonstrates an awareness that effective history taking needs to take due account of patients beliefs and understanding	In the context of non-urgent cases demonstrates an ability to use time effectively as part of the information collection process
Starts to screen out irrelevant information. Is able to format notes in a logical way and writes legibly Records regular follow up notes	Demonstrates ability to rapidly obtain relevant history in context of severely ill patients and/or in an emergency situation  Demonstrates ability to keep interview focused on most important clinical issues.  Writes timely, comprehensive, informative letters to patients and to GPs	Write succinct notes and is able to summarise accurately complex cases

## 2.2 Written records

### Objective

To recognise the fundamental importance of accurate and timely communications and the maintenance of confidentiality		
Knowledge	Assessment Methods	GMP
Demonstrate appropriate content of reports	5,6,7	1
Understand the relevance of data protection pertaining to patient confidentiality	5,6,7,8	1
Skills		
Produce concise and accurate reports with clear conclusions and other written correspondence tailored to the referrer	5,6,7,	1
Behaviours		
Appreciate the importance of timely dictation, cost-effective use of medical secretaries and the use of electronic communication	3,4,5,6,7,8	1,2,3,4
Contacts clinical colleagues appropriately dependent upon clinical scenarios	3,4,5,6,7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Recognise importance of clear, concise and timely written communications and reports	Increase production of clear, concise and timely written communications and reports under supervision	Independent Production of clear, concise and timely written communications and reports
Start to produce clear, concise and timely written communications and reports under supervision	Independent production of simple/straightforward reports	Effective independent communicator
	Communication of important results directly to the clinical teams	

## 2.3 Overall Clinical Judgement

### Objective

To recognise the fundamental importance of integration of clinical information together with radiological features		
Knowledge	Assessment Methods	GMP
Possess sufficient clinical knowledge to enable integration of clinical data and radiological features	2,3,4,5,6,7,8	1
Skills		
Correct interpretation of radiological features in the context of available clinical information	2,3,4,5,6,7,8,	1
Behaviours		
Recognise the quality and quantity of clinical information required for accurate diagnosis or treatment decisions.	3,4,5,6,7,8	1,2,3,4
To add value to patient management	3,4,5,6,7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of the importance of clinical knowledge in the interpretation of imaging and the need to identify any deficiencies in knowledge	Recognises the need and displays the ability to increase clinical knowledge relevant to imaging	Achieves sound clinical knowledge relevant to special interest areas of imaging

## 2.4 Time management and decision-making

### Objective

To become increasingly able to prioritise and organise radiological and clerical duties in order to optimise patient care. To become increasingly able to make appropriate radiological and clerical decisions in order to optimise the effectiveness of the radiological team resources

Knowledge	Assessment Methods	GMP
Understand that organisation is key to time management	6,7,8	1
Understand that some tasks are more urgent or more important than others	6,7,8	1
Understand the need to prioritise work according to urgency and importance	6,7,8	1
Understand that some tasks may have to wait or be delegated to others	6,7,8	1,3
Outline techniques for improving time management		1
Understand the importance of prompt investigation, diagnosis and treatment in disease management	6,7	1
Skills		
Identify radiological and clerical tasks requiring attention or predicted to arise	6,7,8	1
Estimate the time likely to be required for essential tasks and plan accordingly	6,7,8	1
Group together tasks when this will be the most effective way of working	6,7,8	1,2
Recognise the most urgent / important tasks and ensure that they are managed expediently	6,7,8	1,2
Regularly review and re-prioritise personal and team work load	6,7,8	1,2,3
Organise and manage workload effectively	6,7,8	1,2,3
Behaviours		
Ability to work flexibly and deal with tasks in an effective fashion	6,7,8	1,2
Recognise when you or others are falling behind and take steps to rectify the situation	6,7,8	1,2,3
Communicate changes in priority to others	7,8	1,2,3
Remain calm in stressful or high pressure situations and adopt a timely, rational approach	7,8	1,2,3
Descriptors		
Core	Level 1	Level 2
Recognises the need to identify work and compiles a list of tasks.	Recognises the most important tasks and responds appropriately	Automatically prioritises and manages workload in most effective fashion
Works systematically through tasks, recognising which are most urgent	Anticipates when priorities should be changed	Communicates and delegates rapidly and clearly
Utilises other radiological team members	Leading and directing the radiological team in an effective manner	Automatically responsible for organising the radiological team
Requires some direction to ensure that all tasks managed efficiently	Supports others who are falling behind	Calm leadership in stressful situations
	Requires minimal organisational supervision	

## 2.5 Therapeutics and safe prescribing

### Objective

To prescribe, review and monitor appropriate therapeutic interventions relevant to clinical practice including non – medication based therapeutic and preventative indications.		
Knowledge	Assessment Methods	GMP
Indications, contraindications, side effects, drug interactions and dosage of commonly used drugs	2,4,5,7	1
Recall range of adverse drug reactions to commonly used drugs, including complementary medicines	2,4,5,7	1
Recall drugs requiring therapeutic drug monitoring and interpret results	2,4,5,7	1,4
Outline tools to promote patient safety and prescribing, including electronic clinical record systems and other IT systems	2,4,5,7	1,4
Understand the roles of regulatory agencies involved in drug use, monitoring and licensing (e.g. National Institute for Clinical Excellence (NICE), Committee on Safety of Medicines (CSM), and Healthcare Products Regulatory Agency and hospital formulary committees	2,4,5,7	1,4
Understanding of the importance of non-medication based therapeutic interventions including the legitimate role of placebos	2,4,5,7	1,4
Skills		
Review the continuing need for, effect of and adverse effects of long term medications relevant to the trainees clinical practice	7	1
Anticipate and avoid defined drug interactions, including complementary medicines	7	1,2,3
Advise patients (and carers) about important interactions and adverse drug effects	7,8	1,2,4
Prescribe appropriately in pregnancy, and during breast feeding	7	1,2
Make appropriate dose adjustments following therapeutic drug monitoring, or physiological change (e.g. deteriorating renal function)	7	1,2
Recognise the importance of resources when prescribing, including the role of a Drug Formulary and electronic prescribing systems	7	1,2
Behaviours		
Minimises the number of medications taken by a patient to a level compatible with best care	7	1,2,4
Remain open to advice from other health professionals on medication issues	(6),7,8	1,2,3,4
Ensure prescribing information is shared promptly and accurately between a patient's health providers, including between primary and secondary care	(6),7,8	1,2,3,4
Participate in adverse drug event reporting mechanisms		
Remain up to date with therapeutic alerts, and respond appropriately	(6),7	1,2

## Descriptors

Core	Level 1	Level 2
Understands the importance of patient compliance with prescribed medication	Modifies patients prescriptions to ensure the most appropriate medicines are used for any specific condition	Aware of the regulatory bodies relevant to prescribed medicines both locally and nationally
Outlines the adverse effects of commonly prescribed medicines	Maximises patient compliance by minimising the number of medicines required that is compatible with optimal patient care	Ensures that resources are used in the most effective way for patient benefit
Uses reference works to ensure accurate, precise prescribing		
Takes advice on the most appropriate medicine in all but the most common situations	Maximises patient compliance by providing full explanations of the need for the medicines prescribed	
Makes sure an accurate record of prescribed medication is transmitted promptly to relevant others involved in an individual's care	Knows how to report adverse effects and take part in this mechanism	
Knows indications for commonly used drugs that require monitoring to avoid adverse effects		

## 2.6 The Use of Sedation and Analgesia

### Objective

To prescribe, administer and monitor the use of sedation and analgesia within clinical radiological practice.		
Knowledge	Assessment Methods	GMP
Indications, contraindications, side effects, drug interactions, reversal and dosage of commonly used sedative and analgesic agents	2,4,5,7	1
Recall range of adverse drug reactions to commonly used sedative and analgesic agents	2,4,5,7	1
Recall drugs requiring therapeutic drug monitoring and interpret results	2,4,5,7	1,4
Skills		
Access information to promote patient safety and prescribing, including electronic clinical record systems and prescribing references	2,4,5,(6),7	1,4
Anticipate and avoid defined drug interactions, including appropriate use of reversal agents	(6),7	1,2,3
Advise patients (and carers) about important interactions and adverse drug effects	(6),(7),8	1,2,4
Prescribe appropriately	(6),7	1,2
Make appropriate dose adjustments in relation to administration of sedatives or analgesics following physiological change (e.g. BMI, age, liver/renal function, respiratory/cardiac disease)	(6),7	1,2
Understand the requirements for and principles of monitoring patients during and post sedation/analgesia administration	7	1,2
Obtain appropriate consent in relation to the use of sedation/analgesia	7	1,2,
Formal appropriate level of resuscitation training	certification	1,2
Behaviours		
Remain up to date with therapeutic alerts, and respond appropriately	(6),7	1,2
Develop open team approach in relation to the delivery of sedation/analgesia services including close links with the anaesthetic department	7	1.2.3
Descriptors		
Core	Level 1	Level 2
Understand the importance of patient compliance with prescribed medication	Maximise patient compliance by utilising sedatives/analgesics in an individually tailored fashion that is compatible with optimal patient care	Be aware of the regulatory bodies relevant to prescription of sedation/analgesia both locally and nationally
Use reference works to ensure accurate, precise prescribing	Maximise patient compliance by providing full explanations of the need for sedation/analgesia	Ensure that resources are used in the most effective way for patient benefit
Take advice on the most appropriate sedation/analgesia in all but the most common situations	Know how to report adverse effects and take part in this mechanism	
Make sure an accurate record of prescribed medication is transmitted promptly to relevant others involved in patient care		
Know indications/adverse effects for commonly used sedative/analgesic drugs in radiology		

## 2.7 Breaking Bad News

### Objective

To Recognise the fundamental importance of breaking bad news. To develop strategies for skilled delivery of bad news according to the needs of individual patients and their relatives / carers

Knowledge	Assessment Methods	GMP
Understand that how bad news is delivered irretrievably affects the subsequent relationship with the patient	7,8	1
Understand that sensitive communication of bad news is an essential part of professional practice	7,8	1,4
Understand that "bad news" has different connotations depending on the context, individual, social and cultural circumstances.	7,8	1,4
Understand that "bad news" may be expected or unexpected	7,8	1,4
Understand that every patient may desire different levels of explanation and have different responses to bad news	7,8	1,4
Understand that bad news is confidential but the patient may wish to be accompanied	7,8	1,4
Understand that breaking bad news can be extremely stressful for the doctor or professional involved	7,8	1,3,4
Understand that the interview may be an educational opportunity	7,8	1
Understand that it is important to:	7,8	1
<ul style="list-style-type: none"> <li>• Prepare for breaking bad news</li> <li>• Set aside sufficient uninterrupted time</li> <li>• Choose an appropriate private environment</li> <li>• Have sufficient information regarding prognosis and treatment</li> <li>• Structure the interview</li> <li>• Be honest, factual, realistic and empathic</li> <li>• Be aware of relevant guidance documents</li> </ul>		
Skills		
Structure the interview eg:	8,	1
<ul style="list-style-type: none"> <li>• Set the scene</li> <li>• Establish understanding</li> <li>• Discuss diagnosis, implications, treatment, prognosis and subsequent care</li> </ul>		
Demonstrate to others good practice in breaking bad news	8,	1,3,4
Involve patients and carers in decisions regarding their future management	8	1,2,3,4
Encourage questioning and ensure comprehension	8	1,2,3,4
Respond to verbal and visual cues from patients and relatives	8	1,2,3,4
Act with empathy, honesty and sensitivity avoiding undue optimism or pessimism	8	1,2,3,4
Behaviours		
Take leadership in breaking bad news	8	1,2,4
Respect the different ways people react to bad news	8	1,2,4

**Descriptors**

Core	Level 1	Level 2
Recognises when bad news must be imparted	Able to break bad news in planned and unexpected settings	Skilfully delivers bad news in any circumstances including adverse events
Recognises the need to develop specific skills	Prepares well for interview. Interview has clear structure.	Arranges follow up as appropriate
Requires guidance to deal with most cases	Prepares patient to receive bad news. Establishes what patient wants to know and ensures understanding  Responsive to patient reactions.  Able to conclude interview	Able to teach others how to break bad news

### 3.0 Managing Long-term Conditions

#### Objective

To pursue a holistic and long term approach to the planning and implementation of patient care, in particular to identify and facilitate the patient's role in their own care

Knowledge	Assessment Methods	GMP
Describe the natural history of diseases and illnesses that run a chronic course	2,6	1
Define the role of rehabilitation services and the multi-disciplinary team to facilitate long-term care	2,6	1
Outline the concept of quality of life and how this can be measured whilst understanding the limitations of such measures for individual patients	2,(6)	1
Outline the concept of patient self-care and the role of the expert patient		1
Know, understand and be able to compare and contrast the medical and social models of disability		1
Knows about the key provisions of disability discrimination legislation		1
Understand the relationship between local health, educational and social service provision including the voluntary sector.		1
Develop and sustain supportive relationships with patients with whom care will be prolonged and potentially life long	7,8	1,3,4
Provide relevant evidenced based information and where appropriate effective patient education, with support of the multi-disciplinary team	6,7,10	1,4
Skills		
Develop and agree a management plan with the patient (and carers), ensuring awareness of alternatives to maximise self-care within care pathways where relevant	7	1,3
Develop and sustain supportive relationships with patients with whom care will be prolonged and potentially life long	7	1,4
Provide relevant evidenced based information and where appropriate effective patient education, with support of the multi-disciplinary team	7,8	1,3,4
Provide the relevant and evidence based information in an appropriate medium to enable sufficient choice, when possible	7,9	1,3
Behaviours		
Show willingness and support for patient in his/her own advocacy, within the constraints of available resources and taking into account the best interests of the wider community	8,9	3,4
Recognise the potential impact of long term conditions on the patient, family and friends	(6),7,8	1,2,4
Show willingness to maintain a close working relationship with other members of the multi-disciplinary team, primary and community care	7,8	3
Shows a willingness to engage with expert patients and representatives of charities or networks that focus on diseases and Comprehends their role in supporting patients and their families/carers		3

Descriptors		
Core	Level 1	Level 2
Describes relevant long term conditions	Demonstrates awareness of management of long term conditions relevant to the trainees practice	Provides leadership within the multidisciplinary team that is responsible for management of patients with long term conditions
Understands that "quality of life" is an important goal of care and that this may have different meanings for each patient	Provides the patient with evidence based information and assists the patient in understanding this material and utilises the team to promote excellent patient care	Helps the patient networks develop and strengthen
Is aware of the need for promotion of patient self care and independence	Develops management plans in partnership with the patient and clinical teams that are pertinent to the patients long term condition	

## 4.0 Infection control

### Objective

To manage and control infection in patients attending a clinical radiology department. This includes controlling the risk of cross-infection, appropriately managing infection in individual patients, and working appropriately within the wider community to manage the risk posed by communicable diseases.

Knowledge	Assessment Methods	GMP
Know the importance of hand hygiene, equipment cleaning and Aseptic Non-Touch Technique in reducing Health Care Associated Infection (HCAI)	1,7	1
Know when to use personal protective equipment (PPE)	1,7	1
Know when to use and the principals of an Aseptic Non-Touch Technique (ANTT)	1,7	1
Know the action required in a needle stick injury	1,7	1
Know the responsibilities of the individual and employer in reducing HCAI	1,7	1
Relevant Literature: Trust Infection Control Policy / epic2 / DoH saving lives document / NPSA guidelines	2,7	1
Skills		
Good practice in hand washing and equipment cleaning	7,9	1
Appropriate use of PPE	7,9	1
Aseptic Non-Touch Technique	7,9	1
Safe disposal of sharps	7,9	1
Behaviours		
To adhere to Trust infection control policies	8,9	1,2,3,4
To attend mandatory training	ePortfolio review	1,2,4
To partake in and learn from relevant audit	9	1,2
Encourage all staff, patients and relatives to observe infection control principles	8	1,2,3
Recognise the risk of personal ill-health as a risk to patients and colleagues in addition to its effect on performance.	8	1,2,3,4

Descriptors		
Core	Level 1	Level 2
Always follows local infection control protocols. Including washing hands before and after seeing all patients. Is able to explain infection control protocols to students and to patients and their relatives	Demonstrate an ability to perform more complex clinical procedures whilst maintaining aseptic technique throughout	Demonstrates an ability to perform most complex clinical procedures whilst maintaining full aseptic precautions, including those procedures which require multiple staff in order to perform the procedure satisfactorily.
Understands the links between antibiotic prescription and the development of noscomial infections	Identify potential for infection amongst high risk patients obtaining appropriate investigations and considering the use of second line therapies	Identify the possibility of unusual and uncommon infections and the potential for atypical presentation of more frequent infections
Discusses antibiotic use with a more senior colleague	Communicate effectively to patients and their relatives with regard to the infection, the need for treatment and any associated risks of therapy.	Work in collaboration with diagnostic departments to investigate and manage the most complex types of infection including those potentially requiring isolation facilities
	Working in collaboration with external agencies in relation to reporting common notifiable diseases, and collaborating over any appropriate investigation or management	Work in collaboration with external agencies to manage the potential for infection control within the wider community including communicating effectively with the general public and liaising with regional and national bodies where appropriate

## 5.0 Patient safety within clinical governance

### 5.1 Risk Management

#### Objective

To be fully aware of risk management issues as applicable to the practice of radiology		
Knowledge	Assessment Methods	GMP
Possess knowledge of risk management issues pertinent to an imaging department	1,7,8	1
Know the complications, risks and side effects of imaging investigations and treatments	1,7,8	1
Skills		
Discuss relevant risks with patients and obtain informed consent	1,7,8	1,2,4
Be able to balance risks and benefits with patients	1,7,8	1,2,4
Behaviours		
Respect individual patient choice	6,7,8	1,2,3,4
Be truthful and admit error	6,7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of risk management issues in relation to the practice of radiology	Increasing incorporation of risk management issues in relation to the practice of radiology	Full incorporation of risk management issues in relation to the practice of radiology

## 5.2 Quality improvement and Patient Safety

### Objective

To recognise the desirability of monitoring performance, learning from mistakes and openness in order to ensure high standards of care and to optimise patient safety		
Knowledge	Assessment Methods	GMP
Understand the elements of clinical governance	8	1
Recognise that governance safeguards high standards of care and facilitates the development of improved clinical services	8	1
Define local and national significant event reporting systems relevant to specialty	8	1
Recognise importance of evidence-based practice in relation to clinical effectiveness	2, 5	1
Outline local health and safety protocols (fire, manual handling etc)	8	1
Understand risk associated with the radiology including ionising radiation and other biohazards. Understand the mechanisms to reduce risk	1, 2,6,7,8,9	1
Understand the use of patient early warning systems to detect clinical deterioration where relevant to outcomes	6,7,8,9	1,2
Keep abreast of national patient safety initiatives including National Patient Safety Agency, NCEPOD reports, NICE guidelines etc	8, 9	1,2
Skills		
Adopt strategies to reduce risk e.g. evidence based practice, reference to previous examinations	6,7,8,9	1
Contribute to quality improvement processes e.g. <ul style="list-style-type: none"> <li>• Audit of personal and departmental performance</li> <li>• Errors / discrepancy meetings</li> <li>• Critical incident reporting</li> <li>• Unit morbidity and mortality meetings</li> <li>• Local and national databases</li> </ul>	8,9	1,2,3
Maintain a folder of information and evidence, drawn from individual medical/radiological practice		1
Reflect regularly on standards of medical practice in accordance with GMC guidance on licensing and revalidation	8	1
Behaviours		
Show willingness to participate in safety improvement strategies such as critical incident reporting	8,9.	1,2,3,4
Engage with an open no blame culture	6,7,8	1,2,3,4
Respond positively to outcomes of audit and quality improvement	6,9	1,2,4
Co-operate with changes necessary to improve service quality and safety	8,9	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness that clinical governance provides the over-arching framework to unite the range of quality improvement activities.	Able to define key elements of clinical governance	Leads in review of patient safety issues
	Engages in audit	Implements change to improve service
Maintains personal portfolio	Demonstrates personal and service performance	Engages and guides others to embrace governance
	Designs audit protocols and completes audit loop	

## 6.0 Leadership/Management development

### 6.1 Leadership

#### Objective

To recognise the desirability of involvement in medical leadership and assume increasing leadership roles		
Knowledge	Assessment Methods	GMP
Describe the principles of effective leadership	(6),(7),8	1
Skills		
Assume a leadership role	(6),(7),8	1
Ability to:		
<ul style="list-style-type: none"> <li>• Delegate</li> <li>• Manage time</li> <li>• Make decisions</li> <li>• Negotiate</li> <li>• Challenge</li> </ul>	(6),(7),8	1
Behaviours		
Act professionally	(6),(7),8	1,2,3,4
Be willing to ask for help	6,7, 8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of importance of leadership in radiology practice	Incorporation of leadership skills and qualities into day to day radiological practice	Independent practice with reference to leadership roles

## 6.2 NHS Structure

### Objective

To understand the structure of the NHS and the management of local healthcare systems in order to be able to participate fully in managing healthcare provision		
Knowledge	Assessment Methods	GMP
Understand the guidance given on management and doctors by the GMC	8	1
Understand the local structure of NHS systems in your locality recognising potential differences between the four countries of the UK	8	1
Understand the structure and function of the healthcare system as they apply to your speciality	(6),(7),8	1
Awareness and principles of: <ul style="list-style-type: none"> <li>• Clinical coding</li> <li>• European Working Time Regulations</li> <li>• National Service Frameworks</li> <li>• Health Regulatory Agencies (NICE)</li> <li>• NHS Structure and Finance</li> <li>• Consultant contract</li> <li>• Resource allocation</li> <li>• Role of Independent Sector Providers</li> </ul>	(6),(7),8	1
Describe the principles of Recruitment and Appointment procedures		1
Skills		
Participate in managerial meetings	8	1
Take an active role in promoting the best use of healthcare resources	(6),(7),8	1
Work with stakeholders to create a sustainable patient-centred service	8	1
Employ new technologies	6,7	1
Behaviours		
Recognise the importance of just allocation of healthcare resources	(6),(7),8	1,2,
Recognise the varying roles of doctors, patients and carers as active participants in healthcare systems	6,7, 8	1,2,3
Respond appropriately to healthcare targets and take part in service development	(6),(7),8	1,2
Show willingness to improve managerial skills	8	1
Engage in management activities (rota/audit lead, trainee representative on departmental/directorate management committee, interview panels)	8	1
Descriptors		
Core	Level 1	Level 2
Awareness of management roles in the NHS Describe the principles and application of effective management	Describe the relationship between commissioners, General Practice and secondary care providers	Discuss the most recent guidance from relevant health regulatory agencies in relation to speciality.
Describe the roles of primary and secondary care services	Participates in team and clinical directorate meetings including discussions around service development	Describe the funding and structure of health services and how they relate to regional or devolved administration structures.  Participate in collaborative discussions with directorate and other stake holders to ensure that all needs and views are considered in managing services.

### 6.3 Media Awareness

#### Objective

To recognise the importance of media awareness and public communications in healthcare delivery		
<b>Knowledge</b>	<b>Assessment Methods</b>	<b>GMP</b>
Know the importance of media awareness and public communications training and where to obtain it		1
<b>Skills</b>		
Recognise situations when media awareness and public communication skills are of value.	8	1,3
Recognise when it may be appropriate to implement such training and/or seek further advice from the Trust	8	1,3
Be able to handle enquires from press and other media effectively		1,3,4
<b>Behaviours</b>		
Act professionally	(6),(7),8,	1,2,3,4
Be willing to ask for help	6,7, 8	1,2,3,4
<b>Descriptors</b>		
Core	Level 1	Level 2
Awareness of importance of public communications and media interactions	Engages in communication opportunities that arise outside the medical community	Development of independent media skills  Confident with individual/collective media engagement

## 7.0 Ethical and legal issues

### 7.1 Medical ethics and confidentiality

#### Objective

To know, understand and apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality		
Knowledge	Assessment Methods	GMP
Demonstrate knowledge of the principles of medical ethics	6,8	1
Outline and follow the guidance given by the GMC on confidentiality. Define the provisions of the Data Protection Act and Freedom of Information Act	(6),(7),8	1
Define the role of the Caldicott Guardian within an institution and outline the process of attaining Caldicott approval for audit or research	(6),(7),8	1
Outline the procedures for seeking a patient's consent for disclosure of identifiable information	6,7	1,2
Outline situations where patient consent, while desirable, is not required for disclosure e.g. public interest	6,7,8	1,2,3,4
Recognise the problems posed by disclosure in the public interest, without patient's consent	(6),(7),8	1,2,3,4
Recognise the factors influencing ethical decision making: religion, moral beliefs, cultural practices	(6),(7),8	1
Outline the principles of the Mental Capacity Act	(6)	1,2,3,4
Skills		
Use and share information with the highest regard for confidentiality, and encourage such behaviour in other members of the team	6,7,8	1,2,3,4
Use and promote strategies to ensure confidentiality is maintained e.g. anonymisation	(6),(7),8	1,2,4
Counsel patients on the need for information distribution within members of the immediate healthcare team	7,8	1,2,3,4
Counsel patients, family, carers and advocates tactfully and effectively when making important decisions regarding treatment	8	1,2,3,4
Behaviours		
Encourage ethical reflection in others	(6),(7),8	1,2,3
Show willingness to seek advice of peers, legal bodies, and the GMC in the event of ethical dilemmas over disclosure and confidentiality	(6),(7),8	1,2,3,4
Respect patient's requests for information not to be shared, unless this puts the patient or others at risk of harm	7,8	1,2,3,4
Show willingness to share information about their care with patients, unless they have expressed a wish not to receive such information	7,8	1,2,3,4
Show willingness to seek the opinion of others when making important decisions regarding treatment	7,8	1,2,3

## Descriptors

Core	Level 1	Level 2
Use and share information with the highest regard for confidentiality adhering to the Data Protection Act and Freedom of Information Act in addition to guidance given by GMC	Counsel patients on the need for information distribution within members of the immediate healthcare team and seek patients' consent for disclosure of identifiable information	Able to assume a full role in making and implementing important decisions regarding treatment
Define the role of the Caldicott Guardian within an institution, and outline the process of attaining Caldicott approval for audit or research		
Familiarity with the principles of the Mental Capacity Act		
Participate in discussions concerning important decisions regarding treatment		

## 7.2 Valid consent

### Objective

To obtain valid consent from the patient		
Knowledge	Assessment Methods	GMP
Outline the guidance given by the GMC on consent, in particular <ul style="list-style-type: none"> <li>Understand the consent process may culminate in, but is not limited to, the completion of the consent form.</li> <li>Understand the particular importance of considering the patient's level of understanding and mental state (also that of the parents, relatives or carers when appropriate) and how this may impair their capacity for informed consent</li> </ul>	7,8	1
Skills		
Present all information to patient (and carers) in a format they understand allowing time for reflection on the decision to give consent	7, 8	1,3
Provide a balanced view of all care options	7,8	1,3,4
Behaviours		
Respect a patient's right of autonomy even in situations where their decision might put them at risk of harm	7,8	1
Avoid exceeding the authority given by a patient	7, 8	1
Avoid withholding information relevant to proposed care or treatment in a competent adult	7,8	1,3,4
Show willingness to seek advance directives	7,8	1,3
Show willingness to obtain a second/senior opinion and legal advice in difficult situations of consent or capacity	7,8	1,3
Inform a patient and seek alternative care where personal, moral or religious belief prevents a usual professional action	7,8	1,3,4
Descriptors		
Core	Level 1	Level 2
Obtains consent for straightforward treatments	Able to explain complex treatments meaningfully in layman's terms  Obtain consent in "grey-areas" where the best option for the patient is not clear	Obtains consent in all situations even when there are problems of communication and capacity

## 7.3 Legal framework of medical practice

### Objective

To know, understand and act appropriately within the legal framework for practice		
Knowledge	Assessment Methods	GMP
Awareness of the following legislative pathways and potential differences within the disparate nations of the UK:		
<ul style="list-style-type: none"> <li>• Child protection relevant to adolescent and adult practice</li> <li>• Mental health legislation: the powers to detain a patient and giving emergency treatment against patient's will under common law</li> <li>• Death certification and role of coroner / procurator fiscal</li> <li>• Advance directives and living wills</li> <li>• Withdrawing and withholding treatment</li> <li>• Decisions regarding resuscitation status of patients</li> <li>• Surrogate decision making such as Power of Attorney</li> <li>• Organ donation and retention and awareness of local procedures</li> <li>• Communicable disease notification</li> <li>• Medical risk and driving. Conditions to be reported by patients to the DVLA and responsibilities of doctors if patients do not</li> <li>• Data Protection and Freedom of Information Acts</li> <li>• Provision of continuing care and community nursing care by local authorities, including Section 47 National Assistance act</li> </ul>		1,2,3
Outline sources of medico-legal information		1
Outline the process of discipline in the event of medical malpractice		1,2,3
Outline the procedure to be followed when abuse is suspected		1,2,4
Skills		
Ability to prepare a medico-legal statement for submission to the Coroner's Court, Fatal Accident Inquiry and other legal proceedings and develop skills to present such material in court		1
Incorporate legal principles into day to day practice	(6),(7)	1
Practise and promote accurate documentation within clinical practice	6,7,8	1,2,3
Behaviours		
Show willingness to seek advice from the Healthcare Trust, legal bodies (including defence unions), and the GMC on medico-legal matters	8	1,2,3,4
Promote reflection on legal issues by members of the team	7,8	1,2,3
Descriptors		
Core	Level 1	Level 2
Awareness of sources of advice relating to medico-legal matters and understanding of situations in which such advice should be sought	<p>Awareness of the legislative pathways detailed under the knowledge section above</p> <p>Incorporate legal principles into day to day practice</p>	<p>Ability to prepare a medico-legal statement for submission to the coroner's court, fatal accident inquiry and other legal proceedings</p> <p>Present such material in court</p> <p>Readily seek advice from healthcare trust, legal bodies and the GMC on medico-legal matters</p>

## 7.4 Equality and Diversity

### Objective

To respect and have good interactions with patients and colleagues from diverse backgrounds		
Knowledge	Assessment Methods	GMP
Describe the equality and diversity framework	8, EQ certification	1,3,4
Understand the importance of equality and cultural diversity. Follow an open-minded approach to equality and diversity in all aspects of radiological practice	8, EQ certification	1
Be sensitive to and show consideration for the ways in which patients' cultural and religious beliefs may affect their approach to radiological procedures. Respond respectfully to the cultural and religious needs of the patient	8, EQ certification	1
Understand that patients' religious and cultural beliefs may conflict with best radiological practice. Know where to find legal and ethical guidelines to assist in resolving difficulties	8, EQ certification	1
Be aware of the ways in which trainees' personal experiences, values and attitudes might affect their professional practice and know when to refer a case to another colleague	8, EQ certification	1
Ensure that an equal, non-discriminatory approach is adopted in interactions with both patients and colleagues	8, EQ certification	1
Recognise the interaction between mental health and physical health, and that there cannot be good health without good mental health.	8, EQ certification	1
Be aware of the role that individuals and services can play in combating inequality and discrimination and contribute appropriately to this work	8, EQ certification	1
Ensure that all decisions and actions are in the best interests of the patient	8, EQ certification	1
Skills		
Communicate with patients and colleagues from diverse backgrounds	7,8, EQ certification	1,2
Respect diversity and recognise the benefits it may bring, as well as associated stigma	8, EQ certification	1,2
Be aware of the possible influence of, and sensitively deal with issues concerning socio-economic status during interactions with patients	7,8, EQ certification	1,2
Be able to communicate effectively with patients from diverse backgrounds and with special communication needs	7,8, EQ certification	1,2
Behaviours		
Respect diversity within clinical practice	7,8, EQ certification	1,2,3,4
Recognise issues of health that are related to social class	7,8, EQ certification	1,2,3,4
Adopt assessments and interventions that are inclusive, respectful of diversity and patient-centred	7,8, EQ certification	1,2,3,4
Respect diversity of status and values in patients and colleagues	7,8, EQ certification	1,2,3,4
Accept uncertainty arising from differences in values	7,8, EQ certification	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Aware of need to practice in accordance with guidance on equality and diversity	Increasing practice in accordance with guidance on equality and diversity	Independent practice in accordance with guidance on equality and diversity

## 8.0 Maintaining good medical practice

### 8.1 Insight

#### Objective

To recognise the fundamental importance of integration of clinical information together with radiological features		
Knowledge	Assessment Methods	GMP
Recognise one's own limitations and know when to ask for advice	5,6,7,8	1
Skills		
Use and share information with other members of the team to improve patient outcomes	5,6,7,8,	1,2,3
Reflects on own practice	8,	1,2,3,4
Able to negotiate and discuss personal and team limitations	8	1,2,3,4
Behaviours		
Be willing to consult and to admit mistakes	3,4,5,6,7,8	1,2,3,4
Show willingness to seek the opinion of others when making important decisions regarding treatment	3,4,5,6,7,8	1,2,3,4
Encourages a climate of openness and reflection	8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of the importance of knowing ones' own limitations and how to manage these	Recognises limitations and displays the ability to address any deficiencies in clinical/radiological knowledge or skills	Sound appreciation of limitations of self and others  Demonstrates well developed strategies to address personal or team member deficiencies

## 8.2 Lifelong learning

### Objective

Recognise the need for continued learning as a fundamental component of medical practice		
Knowledge	Assessment Methods	GMP
Recognise the importance of continuing professional development		1
Skills		
Recognise and use learning opportunities to keep up to date		1
Maintain a professional portfolio		1
Monitor own performance through audit and feedback	9	1
Behaviours		
Be self-motivated and eager to learn	6,7,8	1,2,3,4
Show willingness to learn from colleagues and to accept constructive feedback	6,7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Aware of need for continuing professional development and monitoring of own performance	Increasing involvement in continuing professional development and monitoring of own performance	Assumption of responsibility for personal life –long continuing professional development and monitoring of own performance

## 8.3 Ethical Research

### Objective

To Recognise the fundamental importance of research in medicine. To develop understand and apply the principles, guidance and laws regarding ethical research

Knowledge	Assessment Methods	GMP
Outline the GMC guidance on good practice in research	6	1
Outline the differences between audit and research	9	1
Describe how clinical guidelines are produced	6	1
Demonstrate a knowledge of research principles	6	1
Outline the principles of formulating a research question and designing a project	6	1
Comprehend principal qualitative, quantitative, bio-statistical and epidemiological research methods	6	1
Outline sources of research funding	6	1
Skills		
Develop critical appraisal skills and apply these when reading literature	6	1
Demonstrate the ability to write a scientific paper	6	1
Apply for appropriate ethical research approval	6	1,2
Demonstrate the use of literature databases	6	1
Demonstrate good verbal and written presentations skills	6	1
Understand the difference between population-based assessment and unit-based studies and be able to evaluate outcomes for epidemiological work	6	1
Behaviours		
Recognise the ethical responsibilities to conduct research with honesty and integrity, safeguarding the interests of the patient and obtaining ethical approval when appropriate	6	1,2,3,4
Follow guidelines on ethical conduct in research and consent for research	6	1,2,4
Show willingness to the promotion of involvement in research	6,8	1
Descriptors		
Core	Level 1	Level 2
Demonstrate critical appraisal skills in evaluating medical literature	Comprehend the principle qualitative, quantitative, bio-statistical and epidemiological research methods	Outline sources of research funding Able to evaluate outcomes from differing types of epidemiological work
Awareness of research principles	Demonstrate the ability to write a scientific paper	Understands how clinical guidelines are produced and their role in ethical research
Follow guidelines on ethical conduct in research and consent for research	Demonstrate the use of literature data-bases	Leads in department based research
	Good verbal and written presentation skills	

## 8.4 Evidence Based Practice

### Objective

To employ an evidence based approach in the practice of radiology		
<b>Knowledge</b>	<b>Assessment Methods</b>	<b>GMP</b>
Define the principles of evidence-based medicine	2,5,6,7, 9	1
Appreciate the role of guidelines	2,5,6,7, 9	1
<b>Skills</b>		
Be able to critically appraise evidence	2,5,6,7,9	1
Demonstrate the ability to utilise guidelines	2,5,6,7,9	1,3
Be able to contribute to the evolution of guidelines	6,7,9	1
<b>Behaviours</b>		
Respect individual patient choice	5,6,7,8,9	1,2,3,4
Be truthful and admit error	5,6,7,8,9	1,2,3,4
<b>Descriptors</b>		
Core	Level 1	Level 2
Awareness of importance of evidence based approach to the practice of radiology	Increasing use of evidence based approach in the practice of radiology	Full use of evidence based approach in the practice of radiology

## 8.5 Clinical Governance and Audit

### Objective

To fully incorporate the principles of clinical governance into day to day clinical practice		
Knowledge	Assessment Methods	GMP
Shows knowledge of: <ul style="list-style-type: none"> <li>• Medical and clinical audit</li> <li>• Research and development</li> <li>• Integrated care pathways</li> <li>• Evidence-based practice</li> <li>• Clinical effectiveness</li> <li>• Clinical risk systems</li> <li>• Medical error</li> <li>• Complaints procedures</li> <li>• Risk assessments</li> <li>• Knows the benefits that a patient might reasonably expect from clinical governance</li> </ul>	2,3,4,6,7,8,9	1
Skills		
Be an active participant in clinical governance and audit	8,9	1
Be able to handle and deal with complaints in a focused and constructive manner	8,9	1
Behaviours		
Make patient care your first concern	6,7,8	1,2,3,4
Respect patients' privacy, dignity and confidentiality	6,7,8	1,2,3,4
Be prepared to learn from mistakes, errors and complaints	6,7,8	1,2,3,4
Recognise the importance of teamwork	6,7,8	1,2,3,4
Share best practice with others	8	1,2,3,4
Practice evidence-based medicine	5,6,7,8	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of the importance of clinical governance principles in the practice of clinical radiology	Increasing incorporation of clinical governance principles in the practice of clinical radiology	Full incorporation of clinical governance principles in the practice of clinical radiology

## 8.6 Information Technology

### Objective

To recognise the fundamental importance of the acquisition of information technology skills to radiological practice		
Knowledge	Assessment Methods	GMP
Understand modern communication, search strategies, data storage and security	2,3,4,6,7	1
Skills		
Demonstrate competent use of relevant computer technology	2,3,4,6,7	1
Behaviours		
Engage with information technology relevant to clinical practice	2,3,4,6,7	1,2,3,4
Descriptors		
Core	Level 1	Level 2
Awareness of IT requirements for the practice of radiology	Increasing acquisition of IT requirements for the practice of radiology	Full acquisition of IT requirements for the practice of radiology

## 9.0 Teaching and training

### Objective

To recognise the fundamental importance of understanding the value of teaching and training in clinical practice. To develop strategies for delivering education and assessment in a wide variety of formal and informal settings

Knowledge	Assessment Methods	GMP
Acknowledgement of the multi-faceted nature of knowledge as it relates to medical practice.	8,10	1
Understand the importance of a positive & constructive approach to mentoring & educational supervision	8,10	1
Development an understanding of a range of adult learning principles: <ul style="list-style-type: none"> <li>Identify leaning styles</li> <li>Construct educational objectives</li> <li>Use appropriate questioning techniques</li> <li>Vary teaching formats &amp; stimuli</li> </ul>	10	1
Understand the structure and differences between appraisal and assessment	8,10	1
Skills		
Delivery of varying teaching formats and stimuli to suit subject and situation	10	1
Demonstrate effective presentation of information in a variety of ways: lecture, small group presentations, written hand-outs, power-point presentations	10	1
Provide effective feedback and help develop reflective practice	8,10	1
Conduct effective appraisal	8,10	1
Promote patient education	8,10	1
Undertake and deliver workplace based assessment	6,7,8,9,10	1
Behaviours		
Demonstrate a positive approach to both giving and receiving mentoring and educational supervision	8,10	1,3
Promote and encourage a constructive knowledge-sharing environment	8,10	1,2,3,4
Balances the needs of service delivery with educational imperative	8,10	1,4
Show willingness to participate in giving formal tuition in radiological/medical education	10	1
Recognise the importance of personal development as a teacher in relation to aspects of good professional behaviour	8,10	1,4
Maintain honesty and objectivity during appraisal and assessment	8,10	1,2,4
Descriptors		
	Core	Level 1
Demonstrate understanding and awareness of the different opportunities to deliver education in both clinical and non-clinical settings		Engages in teaching delivery to allied health professionals and clinical groups
Delivers small group teaching to medical students, nurses or colleagues		Partakes and encourages WpBA and reflective practice
Able to seek and interpret simple feedback		
		Level 2
		Leads teaching episodes
		Develops and delivers new opportunities to enhance learning and teaching with clear objectives and outcomes
		Able to act as a mentor/appraiser to medical students, nurse, radiographer or colleague
		Formalisation of interest in teaching – PgCert, Diploma

## **6.5 Radiology Specific**

All aspects of the radiology specific syllabus are referenced to illustrative examples of presentations and diagnoses. These examples are a guide to help both the trainer and trainee ensure sufficient curriculum coverage is obtained.

In delivery of core clinical radiology training the syllabus content is referenced to common presentations. These reflect the need for trainees to show competences across the breadth of the curriculum with particular emphasis on the most important/common topics within the curriculum. It is expected that trainees will produce evidence of at least one satisfactory assessment from all the common presentation topics by the completion of core training.

The syllabus for core training for trainees appointed to IR at ST1 will follow much of the core training undertaken by those trainees within clinical radiology, with the exception of some diagnostic skill areas, not deemed essential to IR. This is, however, offset by the inclusion of additional core procedural and vascular skills specific to IR trainees, from which clinical radiology trainees are exempt.

In allowing for the modifications of core training syllabus, IR trainees need to be aware of the fact that they will still need to demonstrate the necessary diagnostic radiology knowledge and skills to allow them to undertake the summative assessment of the FRCR Examination as part of the completion of core training.

During higher training, the syllabus is linked to a range of common and uncommon diagnoses. These lists are neither exhaustive/complete as higher training is an integral part of lifelong learning with no upper limits. These lists are recommended topic areas from within which the trainee should produce evidence of assessments for the attainment of CCT in clinical radiology with sub-specialty endorsement in interventional radiology.

## A Breast

### Core Breast Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of breast disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Anatomy of breast, changes with age and patterns of disease spread	1	1
Understand the physics of image production and how it affects image quality	1	1
Understand the principles of differentiation between normal breast, benign and malignant disease	2,3,4	1
Understand clinical presentation, pathogenesis and treatment of breast disease	2,5,6	1
Determine optimal imaging examination	6,7	1
Understand basic principles underlying population screening	2,6	1,2
Local/regional guidelines	2,7	1
Skills		
Breast ultrasound to discriminate cystic vs solid mass; recognise typical features of benign and malignant masses; identify and discriminate between clearly normal and abnormal axillary lymph nodes.	3,4,5,6,7	1
Interpretation of mammogram to recognize normal anatomy and discriminate between benign and malignant imaging findings	3,4,5,6,7	1
<b>Intervention</b> : Observe stereotactic biopsy, vacuum assisted biopsy (VAB), localisation under ultrasound and x ray guidance		1
<b>Intervention</b> : Perform cyst aspiration and image guided core biopsy under supervision	7	1
Behaviour		
Apply/adhere to local/regional guidelines	6,7	1
Prioritise workload to respond to most urgent cases first	6,7	1,2
Communicate appropriately with patients	6,7,8	1,2,3
Appropriate involvement of seniors	6,7,8	1,3

### Appendix 1 – Breast Radiology Presentations

Common Presentations (Core)
<p><b>Symptomatic Presentations</b></p> <ul style="list-style-type: none"> <li>• Breast lump</li> <li>• Recent nipple inversion</li> <li>• Paget's disease of the nipple</li> <li>• Generalised lumpiness</li> <li>• Pain or tenderness</li> <li>• Longstanding nipple retraction</li> <li>• Cyclical mastalgia</li> <li>• Breast inflammation</li> <li>• Assessment of integrity of silicone breast implants</li> </ul>

## B Cardiac

### Core Cardiology Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of cardiovascular disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Recall relevant basic anatomy and physiology, in clinical practice	1,6	1
Understand clinical significance of pathology associated with presentation and link with likely primary and differential diagnoses	2,3,4,5,6,7	1
Determine optimal imaging examination	3,4,5,6	1
Local/regional guidelines in relation to presentations	3,4,5,6,8	1
Skills		
Construct appropriate imaging pathway considering different pathologies and management options and according to available resource and case complexity.	3,4,5,6	1,3
Plain x-ray interpretation and reporting with awareness of limitations	3,4,5,6	1
Basic CT interpretation and reports for common presentations and incidental findings	3,4,5,6	1
Decision making	3,4,5,6,8	1
<b>Intervention</b> – No specific requirement		
Behaviour		
Apply/adhere to local/regional guidelines	5,6,7	1
Prioritise workload to respond to most urgent cases first	5,6,7,8	1,4
Rapid communication of results	5,6,7,8	1,2
Appropriate involvement of seniors	5,6,7,8	1,2,3
Communicate with patients and obtain informed consent where appropriate	6,7	1,2,3
Attend MDTs	8	1,2,3

### Appendix 1 – Cardiac Radiology Presentations

Common Presentations (Core)
<ul style="list-style-type: none"> <li>• Chest pain – cardiovascular origin</li> <li>• Chest trauma</li> <li>• Exertional dyspnoea</li> <li>• Stroke / Paradoxical embolism</li> <li>• Cyanosis</li> <li>• Sudden collapse</li> <li>• Syncope</li> <li>• Arrhythmia</li> <li>• Coronary syndrome</li> <li>• Stable angina</li> <li>• Unstable angina</li> <li>• MI</li> <li>• Pleural effusion</li> <li>• Heart failure syndrome</li> <li>• Pericarditis</li> <li>• Congenital heart disease</li> <li>• Endocarditis</li> </ul>

## C Emergency

### Core Emergency Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of emergency disease with reference to common presentations and diagnoses (Appendix 1)		
Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with emergency presentation and link with likely diagnoses	2,4,5,6	1
Applied anatomy to interpret emergency imaging	1,6	1
Understand the role of radiology in the acute setting	2,5,6	1
Local/regional guidelines in relation to presentations	2,6	1
Skills		
Determine optimal imaging examination	4,5,6	1
Plain x-ray interpretation and limitations	4,5,6	1
Perform and interpret contrast studies – swallows, single contrast enemas	6,7	1
Basic abdominal ultrasound	7	1
Basic CT/MRI interpretation and report presentations	6,7	1
<b>Intervention</b> – see procedural skills	7	1
Behaviour		
Applies / adheres to local/regional guidelines	2,7	1,2
Prioritise workload to respond to most urgent cases first	6,7	1,2
Rapid communication of results	6,7	1,3
Appropriate involvement of seniors	8	1,3

## Appendix 1 – Emergency Radiology Presentations

### Common Presentations (Core)

#### Neurology

- Head / spinal injury
- Severe headache
- Reduced conscious level seizures Stroke / ischaemic syndromes
- Acute spinal / cauda equina / nerve root syndromes

#### Cardiac/ Chest

- Chest pain
- Breathlessness
- Massive haemoptysis

#### Vascular

- Haemorrhage from any source.
- Aortic rupture, dissection, intramural haematoma.
- Deep vein thrombosis
- Vena caval obstruction
- Acute ischaemic syndromes

#### Gastrointestinal

- Acute abdomen
- Abdominal pain
- Diarrhoea
- Vomiting
- Gastrointestinal bleeding

#### Genitourinary

- Haematuria
- Loin pain
- Difficulty in micturition

#### Musculoskeletal

- Bone pain
- Joint pain
- Trauma

#### Paediatric

- See sections above plus
- Non accidental injury

#### General

- See sections above plus
- Non accidental injury

## D Gastro-intestinal

### Core Gastrointestinal Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of gastrointestinal disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Recall basic anatomy and physiology, in clinical practice relevant to imaging examinations of the: <ul style="list-style-type: none"> <li>• <b>Gastrointestinal tract</b></li> <li>• <b>Hepatobiliary tract</b></li> <li>• <b>Pancreas</b></li> </ul>	1,6	1
Imaging changes of anatomically relevant surgical techniques and their complications	2,4,5,6	1
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2,3,4,5,6,7	1
Understand indications, contraindications and limitations of relevant specialised barium/contrast imaging examinations of the: <ul style="list-style-type: none"> <li>• <b>Gastrointestinal tract</b></li> <li>• <b>Hepatobiliary tract</b></li> </ul>	3,4,5,6,7	1
Recall relevant indications and limitations of Ultrasound, CT and MR	3,4,5,6,7	1
Understand indications and contraindications of relevant interventional techniques	7	1
Skills		
Construct appropriate imaging pathway considering different pathologies and management options and according to available resource and case complexities	3,4,5,6	1
Report plain radiographs relevant to GI, hepatobiliary system and pancreas with awareness of limitations	3,4,5,6	1
Perform and report barium and water soluble contrast examinations	3,4,5,6,7	1
Performance/protocol of basic non invasive imaging; US, CT, MRI	7	1
Write provisional interpretation/report of imaging and inform clinicians and MDTs of findings urgently, where relevant, according to local guidelines	3,4,6,7	1
<b>Intervention</b> – Anatomically relevant image guided biopsy and drainage	7	1
Behaviour		
Apply/adhere to local/regional guidelines	5,6,7	1
Prioritise workload to respond to most urgent cases first	5,6,7,8	1,2
Rapid communication of results	5,6,7,8	1,2,3
Appropriate involvement of seniors	5,6,7,8	1,2,3
Attend MDTs	8	1,3

## Appendix 1 – Gastrointestinal Radiology Presentations and Diagnoses

### Common Presentations (Core)

#### Dysphagia

#### Dyspepsia, Abdominal / Pelvic Pain

- Acute
- Chronic
- Acute on Chronic

#### Change in Bowel Habit/ Intestinal Obstruction

- Acute
- Chronic

#### Anaemia / GI Bleeding

- Haematemesis
- Melaena
- Rectal Bleeding

#### Weight Loss / Steatorrhoea / Malabsorption

#### Jaundice / Abnormal Liver Function

#### Abdominal/Pelvic Mass

#### Trauma

## E Head and Neck

### Core Head and Neck Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of head and neck disease with reference to common presentations (Appendix 1)		
Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2,4,5,6	1
Applied anatomy to interpret head and neck imaging	1,6	1
Understand role of radiology in the specific clinical setting	2,5,6	1
Local/regional guidelines in relation to presentations	2,6	1
Skills		
Determine optimal imaging examination	4,5,6	1
Plain x-ray interpretation and limitations	4,5,6	1
Perform and interpret imaging studies – swallows, videofluoroscopy	6,7	1
Basic head and neck ultrasound	7	1
Basic CT/MRI interpretation and report presentations	6,7	1
<b>Intervention – FNA</b>	7	1,2
Behaviour		
Apply/adhere to local/regional guidelines	2,7	1,2
Prioritise workload to respond to most urgent cases first	6,7	1,2,3
Rapid communication of results	6,7	1,2,3
Appropriate involvement of seniors	8	1,2,3
Attend MDTs	8	1,2,3

### Appendix 1 – Head and Neck Radiology Presentations and Diagnoses

Common Presentations (Core)
<ul style="list-style-type: none"> <li>• Neck Lump</li> <li>• Proptosis</li> <li>• Nasal obstruction</li> <li>• Sinusitis</li> <li>• Stridor</li> <li>• Epistaxis</li> <li>• Facial pain</li> <li>• Trauma</li> <li>• High dysphagia</li> </ul>

## F Musculoskeletal

### Core Musculoskeletal Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of musculoskeletal disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Applied anatomy relevant to musculoskeletal disease and radiological diagnosis	1	1
Terminology relevant to MSK imaging	2,3,4,5,6	1
Role of different imaging modalities in MSK	1,2,4,5,7	1
Principles of bone and joint lesion characterisation	2	1
Awareness of tumour staging	2	1
Local/regional guidelines in relation to MSK presentations	2,7	1
Skills		
Link presentations with likely diagnoses	2,5,6	1,2
Determine optimal imaging examination	2,5,7	1,2
Plain x-ray interpretation and limitations	2,3,4,5,6	1,2
Perform basic MSK ultrasound e.g. common tendon injuries and joint effusions	7	1,2,3
Basic MSK CT interpretation and report for core presentations and diagnoses	2,3,4,5,6	1,2,3
Basic MSK MRI interpretation and report for core presentation	2,3,4,5,6	1,2,3
Decision making in relation to initial patient management	2,4,5,6,7	1,2,3,4
<b>Intervention</b> - US guided fluid aspiration	7	1,2,3
Behaviour		
Apply/adhere to local/regional guidelines	7,8	2,4
Prioritise workload to respond to most urgent cases first	8	1,2,3
Rapid communication of results	8	1,2,3
Appropriate involvement of seniors	8	1,2,3
Tailor examination to clinical indication	2,4,5,7	1,2,3
Attend MDTs	9	1,2,3

#### Appendix 1 – Musculoskeletal Radiology Presentations and Diagnoses

##### Common Presentations (Core)

- Bone/ Joint pain +/- trauma
- Spinal Cord Compression
- Acute nerve root compression / sciatica
- Acute and chronic injuries of tendons, muscles and ligaments
- Soft tissue/bony mass
- Musculoskeletal infection
- Incidental finding on plain radiograph

## G Neurological

### Core Neuroradiology Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of neurological disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Applied anatomy relevant to cranial and spinal imaging examinations	1	1
Know the common causes of acute cranial pathology and their management	1,2,4,6	1
Know the common causes of acute spinal pathology and their management	1,2,4,6	1
Skills		
Interpret emergency CT and MRI of the head	4,5,6	1,2
Understand the imaging pathway in relation to intracranial pathology	2,4,5,6	1,2
Give a definitive report for straightforward cases and a provisional report for more complex findings	4,5,6	1,2
Interpret emergency radiographs, CT and MRI of the spine	4,5,6	1,2
Understand the imaging pathway in relation to acute spinal pathology	3,4,5,6	1,2
Behaviour		
Involve seniors as appropriate	4,5,6	1,2,3
Recognise need for timely specialist opinion	4,5,6	1,2,3
Attend relevant MDT	8	1,2,3

### Appendix 1 – Neuroradiology Presentations and Diagnoses

Common Presentations (Core)
<p><b>Brain</b></p> <p><i>Acute:</i></p> <ul style="list-style-type: none"> <li>• Acute headache</li> <li>• Stroke</li> <li>• Head trauma including NAI</li> <li>• Hydrocephalus</li> <li>• Painful Horner's syndrome</li> <li>• Painful Third cranial nerve palsy</li> <li>• Coma</li> </ul> <p><i>Non-acute:</i></p> <ul style="list-style-type: none"> <li>• Seizure</li> <li>• Suspected multiple sclerosis</li> <li>• Pituitary dysfunction</li> <li>• Visual field defect</li> <li>• Common cranial nerve palsies</li> <li>• Sensorineural hearing loss</li> <li>• Raised intracranial pressure</li> <li>• Progressive headache</li> </ul> <p><b>Spine</b></p> <p><i>Acute:</i></p> <ul style="list-style-type: none"> <li>• Suspected cord/cauda equina compression</li> <li>• Trauma</li> </ul> <p><i>Non-acute:</i></p> <ul style="list-style-type: none"> <li>• Myelopathy and radiculopathy</li> <li>• Spina bifida</li> </ul>

## H Oncological

### Core Oncology Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of oncological disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Applied anatomy to interpret oncology imaging	1,2,6	1
State typical pathways of spread of common tumours	2,4,5,6	1
Recall the common tumour staging nomenclature	2,5,6	1
Recall the application of imaging modalities in oncological practise	1,2,4,5,6	1
State the most common radiological manifestations of complications of cancer treatments	2,4,6	1
Local/regional guidelines in relation to cancer imaging	6	1,2
Awareness of TNM staging	2,4,5,6	1
Skills		
Determine optimal imaging examination relevant to oncology	2,4,5,6	1
Plain radiograph interpretation and limitations in cancer imaging	1,2,4,5,6	1
Perform and interpret pertinent staging and follow-up examinations of common tumours	5,6	1
Ultrasound in cancer patients	4,5,6	1
CT/MRI interpretation and reporting in common cancer presentations	4,5,6	1
Perform image-guided biopsy of readily accessible tumours	7	1
<b>Intervention</b> – see procedural skills	7	1,2,3
Behaviour		
Break bad news when required e.g. ultrasound	6,7,8	1,3
Apply/adhere to local/regional guidelines	5,6,7	1,2
Prioritise workload to respond to most urgent cases first	5,6,7,8	1
Rapid communication of results	5,6,7,8	1,3
Appropriate involvement of seniors	5,6,7,8	1,3
Attend MDT meeting	8	1,2,3

### Appendix 1 – Oncological Radiology Presentations and Diagnoses

Common Presentations (Core)
<ul style="list-style-type: none"> <li>• New/known cancer (see organ specific content)</li> <li>• Cancer follow up</li> <li>• Paraneoplastic syndrome</li> <li>• Complication of therapy</li> </ul>

## I Paediatric

### Core Paediatric Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of paediatric diseases with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2,5,6,7	1
Applied anatomy and physiology to interpret paediatric imaging	1	1
Understand role of radiology in the specific clinical paediatric setting	6,7	1
Local/regional/national guidelines in relation to presentations	2,7	1
Skills		
Determine optimal imaging examination	2,4,5,6,7	1
Plain x-ray interpretation and limitations	3,4,5,6	1
Perform and interpret contrast imaging studies	6,7	1
Basic abdominal ultrasound	4,5,6,7	1
Basic CT and MRI in paediatric practice	4,5,6,7	1
Behaviour		
Apply/adhere to local/regional guidelines	6,7	1,2
Prioritise workload to respond to most urgent cases first	6,7	1
Rapid communication of results	6,7,8	1,3
Appropriate involvement of seniors	6,7,8	1,3
Attend MDTs	8	1,2,3

### Appendix 1 – Paediatric Radiology Presentations and Diagnoses

Common Presentations (Core)
<ul style="list-style-type: none"> <li>• Abdominal pain, vomiting or mass</li> <li>• Cough, Breathlessness, Wheeze, Stridor</li> <li>• Precocious/delayed puberty, ambiguous genitalia, failure to thrive</li> <li>• Limp</li> <li>• Childhood Abuse/Non Accidental Injury</li> <li>• UTI/haematuria/testicular pain</li> <li>• Pelvic pain, mass, ambiguous genitalia</li> <li>• Headache, diplopia, epilepsy, back pain or paralysis</li> </ul>

## J Radionuclide

### Core Radionuclide Radiology Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of radionuclide imaging with reference to common presentations. (Appendix 1)

Knowledge	Assessment Methods	GMP
Basic science – for physics and mathematics refer to Part 1 FRCR curriculum	1	1
Role of common radiopharmaceuticals currently available	2,6	1
Understand the principles and indications of commonly performed radionuclide studies and relation to other imaging investigations (refer to specific systems)	2,4,5,6	1
Describe patient preparation, precautions and complications of commonly performed investigations	2,4,5,6	1
Role of hybrid technologies such as SPECT CT and PET CT	2,4,5,6	1
Skills		
Demonstrate the ability to translate regulatory framework into local practice	2,4,5,6	1
Safe handling of radiopharmaceuticals	2,4,5,6,7	1,2
Interpretation of normal and abnormal results of commonly performed investigations across all clinical systems.	2,4,5,6,7	1,2
Behaviour		
Recognise the need to understand the basic science appropriate to radionuclide radiology	6,7	1
Be willing to learn new skills and keep up to date with latest technology	6,7	1,2,3
Appreciate the importance of safe handling of radiopharmaceuticals for self and others	2,4,5,6,7	1,2,3
Attend MDTs	8	1,3

## K Thoracic

### Core Thoracic Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of thoracic disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Applied anatomy relevant to thoracic disease and radiological diagnosis including the pulmonary lobule	1	1
Role of Chest Radiograph	6,10	1
Role of CT	6,10	1
Terminology relevant to thoracic imaging (Fleischner glossary 2008)	2	1
Appearance and positioning of lines, tubes and devices	2,4,5,6	1
Techniques and subsequent imaging appearances of thoracic surgery	6,10	1
Awareness of TNM staging in thoracic malignancy	5,6	1
Local/regional guidelines in relation to clinical presentations	6	1
Skills		
Link presentations with likely diagnoses	2,5,6	1,2
Determine optimal imaging examination taking account of clinical indication and implications	5,6	1,2
Plain chest radiograph interpretation and limitations	4,5	1,2
Construct reasoned and succinct differential diagnoses	4,5,6	1,2
Identify and characterise basic signs of thoracic disease: collapse, consolidation, pneumothorax, pleural vs. parenchymal disease on CXR and CT	3,4,5,6	1,2
Diagnosis of PE on V/Q and CT	3,4,5,6	1,2
US of the chest	6	1,2
<b>Intervention – image guided chest drainage</b>	7	1,2,3
Behaviour		
Apply/adhere to local/regional guidelines	6,7	1,2,3
Prioritise workload to respond to most urgent cases first	6,7,8	1,2,3,4
Rapid communication of results	6,7,8	1,2,3
Appropriate involvement of seniors	6,7,8	1,2,3
Attend MDM		1,2,3

## Appendix 1 – Thoracic Radiology Presentations and Diagnoses

Common Presentations (Core)
<ul style="list-style-type: none"> <li>• Chest pain</li> <li>• Breathlessness</li> <li>• Cough</li> <li>• Fever</li> <li>• Febrile neutropenia</li> <li>• Haemoptysis</li> <li>• Wheeze</li> <li>• Hoarseness / stridor</li> <li>• Erythema Nodosum</li> <li>• Incidental finding on CXR</li> <li>• Incidental finding on Chest CT</li> <li>• Trauma</li> </ul>

### L Uro-gynaecological

#### Core Urogynaecological Training

##### Objective

To acquire basic clinical, pathological and radiological understanding of urogynaecological disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2,4,5,6	1
Know applied anatomy to interpret urogynaecological imaging	2,4,5,6	1
Understand role of radiology in the specific clinical setting	2,4,5,6	1
Know local/regional guidelines in relation to presentations	2,4,5,6	1
<b>Intervention</b> – see procedural knowledge	2,4,5,7	1
Skills		
Determine optimal imaging examination and know limitations of study	4,5,6	1
Plain x-ray interpretation	4,5,6	1
Perform and interpret imaging studies	6,7	1
Perform and report abdominal and pelvic ultrasound of common presentations	7	1
Interpret and report CT/MRI studies of common presentations	7	1
<b>Intervention</b> – see procedural skills	7	1
Behaviour		
Apply/adhere to local/regional guidelines	7,8	1,2
Prioritise workload to respond to most urgent cases first	7,8	1,2,3
Communicate results rapidly	7,8	1,2,3
Involve seniors appropriately	8	1,2,3
Attend MDTs	8	1,2,3

## Appendix 1 – Urogynaecological Radiology Presentations and Diagnoses

### Common Presentations (Core)

- Haematuria
  - Macroscopic
  - Microscopic
- Loin pain
- Recurrent infection
- Anuria
- Renal failure (acute or chronic)
- Renovascular Hypertension
- Lower Urinary Tract Symptoms
- Haematuria
- Dysuria
- Retention of urine
- Incontinence of urine
- Poor urinary flow
- Pelvic Mass
- Pelvic Pain
- Abdominal Pain
- Abdominal Mass
- Raised PSA
- Scrotal pain (acute and chronic)
- Scrotal Mass
- Pelvic Mass
- Pelvic Pain
- Dysmenorrhoea
- Infertility – male & female
- Vaginal Prolapse

## 6.6 Interventional Radiology Specific – Core and Higher Training

### M Radiology Procedural Skills

#### Core Radiology Procedural Skills Training

##### Objective

To acquire basic clinical, pathological and radiological understanding of non-vascular interventional skills with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Understand clinical significance of pathologies requiring intervention	2,4,5,6,7	1
Familiarity with conditions requiring tissue/fluid aspiration for diagnosis (culture, cytology and biochemical analysis)	2,4,5,6,7	1
Understand when core biopsy is required for histology	2,4,5,6,7	1
Recognise common indications/contraindications to interventional procedures	2,4,5,6,,7	1
Recall basic anatomy in clinical practice relevant to imaging examinations of gastrointestinal tract, trauma, cancer	1,2,4,5,6,7	1
Familiarity with a range of needles, catheters and guidewires	2,4,5,7	1
Be aware of local/regional guidelines in relation to presentations	6,7	1
Skills		
Determine optimal imaging guidance	2,4,5,6,7	1
Assess the urgency of clinical situation	2,4,5,6,7	1
Recommend/perform protocols and interpret appropriate basic non invasive imaging; US, CT, MRI	2,4,5,6,7	1
Perform fine needle aspiration e.g. thyroid, lymph node, breast, lung	7	1
Perform fluid aspiration/drainage e.g. pleural, peritoneal, joint effusion/abscess	7	1
Perform core biopsy e.g. liver, solid organ, soft tissue	7	1
Collect and prepare specimen correctly	7	1
Perform image guided NG tube placement	7	1
Document procedure and detail aftercare in notes	7	1
Perform imaging guided drainage in various clinical scenarios including nephrostomy, percutaneous transhepatic drainage, percutaneous cholecystotomy	7	1
Recognise complications of interventional procedures	7	1
Prescribe appropriately for patients undergoing IR e.g. sedation, analgesia	7	1
Behaviour		
Recognise need for specialist opinion from other clinicians/radiologists	4,5,6,7	1,2
Apply/adhere to local/regional guidelines	6,7	1,2
Prioritise workload to respond to most urgent cases first	6,7	1
Communicate results rapidly	5,6,7	1,3
Involve seniors appropriately	6,7	1,3
Attend MDTs	8	1,3

## Appendix 1 – Radiology Procedural Skills

### Common Presentations (Core)

- Fluid collections requiring aspiration or drainage
- Situations requiring tissue diagnosis
- Acute and chronic renal tract obstruction including renal colic and renal dysfunction
- Ureteric leak
- Bile tract Obstruction
- Nutritional Disorders
- Gastrointestinal tract obstruction

## Level 1 Radiology Procedural Skills Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of non-vascular interventional skills with reference to presentations and common diagnoses (Appendix 1)		
Knowledge	Assessment Methods	GMP
Recall and build upon normal and post-surgical anatomy relevant to image guided intervention examinations	6,7,10	1
Know common acute and chronic presentation of pathologies in different organ systems and how the clinical scenario affects management strategy	6,7,10	1
Recognise clinical sequelae of these conditions	6,7,10	1
Recognise the medical, interventional and surgical management options for these conditions	6,7,10	1
Understand the management of patients with contraindications to interventional procedure	6,7,10	1
Understand nutritional assessment and support	6,7	1
Be aware of national IR audits and registries	6	1
Skills		
Require minimal supervision with most cases	7	1
Perform clinical assessment of patients in ward and out patient settings before and after interventions	7	1
Manage patients' drains e.g. monitoring output, skin care and exchange	7	1,2,3
Perform advanced nutritional procedures – NJ tube placement, radiological insertion of gastrostomies/jejunostomies, adjustment of gastric bands	7	1,2,3
Increase skills in imaging guided intervention using Ultrasound and CT	7	1
Convert nephrostomy to ureteric stent	7	1,2,3
Convert external biliary drain to internal biliary stent	7	1,2,3
Organise and undertake appropriate follow up imaging		
Undertake post-procedural follow-up of patients	8	1,2,3
Take part in teaching and training	8,10	1
Behaviour		
Formulate a plan for investigation and management	7	1,2
Initiate additional examinations as appropriate	7	1,2
Seek support from specialist nurse/radiographer practitioners	7,8	1,2,3
Request specialist opinion and assistance from other clinicians	7	1,2,3
Record performance data in local and national registries	7	1
Perform audit/research in intervention procedures	7,9	1,2
Seek additional clinical information relevant to case	7	1,2
Tailor procedure to clinical indication	7	1,2,3
Participate in MDTs	8,10	1,2,3

## Level 2 Radiology Procedural Skills Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of non-vascular interventional skills with reference to presentations and uncommon diagnoses (Appendix 1)		
Knowledge	Assessment Methods	GMP
Understand in detail most acute clinical presentations and diagnoses	6,7,10	1
Know normal and variant anatomy (post-surgical anatomy) relevant to above	6,7,10	1
Recognise uncommon conditions	6,7,10	1
Know the expected outcomes of different diagnostic and therapeutic options	6,7,10	1
Understand indications and techniques for percutaneous tumour ablation	6,7,10	1
Be familiar with a range of interventional equipment – balloons, stents, feeding tubes	6,7,10	1
Skills		
Perform plugged or transjugular biopsy in the presence of abnormal clotting	7	1,2,3
Perform retroperitoneal biopsy – lymph node, pancreas	7	1,2
Perform drainage of complex collections e.g. loculated collections, empyema, phlegmon	7	1,2,3
Perform advanced procedures in the urinary tract e.g. percutaneous nephrolithotomy and pyeloplasty	7	1,2,3
Perform advanced procedures in GI tract – balloon dilatation of strictures, stent insertion (oesophageal, duodenal, colonic)	7	1,2,3
Perform tumour ablation	7	1,2,3
Perform ablation of bone lesions	7	1,2
Take part in one stop clinics	7, 8	1,2,3
Take part in teaching and training of junior trainees and associate specialties	10	1,2,3
Behaviour		
Highly organised work pattern	7,10	1,2,3
Automatically prioritise cases according to clinical need	7	1,2
Discuss/recommend management of complex cases with other clinicians	7	1,2,3
Quickly establish nature of clinical problem	6,7	1,2
Be able succinctly to relate clinical and imaging findings	6,7	1,2
Recognise National Guidelines and Standards of Practice eg. NICE, SIGN, RCR	6,7	1,2,3
Have an active role in interventional service delivery	6,7,10	1,2,3
Be able to accept referrals for imaging and intervention	7	1,2,3
Assume a leadership role in multidisciplinary meetings	7,8	1,2,3

## Appendix 1 – Radiology Procedural Skills

### Diagnoses – Common/Uncommon (Level1/2)

- Pleural effusion, ascites, pelvic collection etc
- Infected fluid, abscess, empyema
- Obstructed systems biliary, renal tract
- Focal mass requiring biopsy or fine needle aspiration
- Diffuse disease e.g. liver, kidney
- Renal stone disease
- Renal tract neoplasm
- Extrinsic obstruction
- Post surgery
- Traumatic
- Neoplastic
- Benign and Malignant strictures of the bile duct
- Intraductal stones
- Extrinsic obstruction
- Neurological disorders
- Head injury
- Benign and neoplastic strictures of the oesophagus/duodenum
- Benign and neoplastic strictures of the large intestine
- Primary and secondary neoplasm in liver,
- Neoplasms in e.g. in liver, kidney, lung, bone
- Recanalisation of Fallopian tubes

## N Vascular

### Core Vascular Training

#### Objective

To acquire basic clinical, pathological and radiological understanding of vascular disease with reference to common presentations (Appendix 1)

Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2	1
Identify the role of vascular radiology in the specific clinical setting	2	1
Recall basic vascular anatomy in clinical practice relevant to imaging examinations of the: <ul style="list-style-type: none"> <li>• <b>Gastrointestinal tract</b></li> <li>• <b>Trauma</b></li> <li>• <b>Peripheral vascular disease</b></li> <li>• <b>Cerebrovascular disease</b></li> <li>• <b>Cancer</b></li> <li>• <b>Aorta</b></li> <li>• <b>Dialysis access</b></li> <li>• <b>Veins</b></li> </ul>	1,6	1
Local/regional guidelines in relation to vascular presentations	2,7	1,2
Skills		
Report plain radiographs relevant to CV disease showing awareness of limitations	4,5,6	1,2
Determine optimal imaging examination	4,5,6	1,2
Undertake basic assessment of the urgency of clinical situation	6	1,2,3
Construct imaging pathway in relation to management options for vascular pathologies	5,6	1,2,3
Performance/protocol of basic non invasive imaging; US, CT, MRI	7	1
Write provisional interpretation/report of imaging	6,7	1
Recognise/seek constellations of appearances which advance diagnosis	6,7	1
Recognise clinical priority of certain presentations	6,7,8	1
Recognise how diagnosis affects management pathway	6,7	1
Perform clinical assessment of patients with vascular conditions in ward and outpatient settings	6,7	1,3
Develop procedural skills in elective and acute cases		
Ultrasound guided insertion of central lines	7	1
Perform diagnostic angiography	7	1
Perform angioplasty and stenting	7	1
Perform inferior Vena Caval Filter Insertion	7	1
Perform basic embolotherapy e.g. elective testicular & uterine Artery embolisation	7	1
Recognise complications of vascular interventions	6,7,8	1,2
Retrieval of Intravascular Foreign Bodies	7	1
Behaviour		
Apply/adhere to local/regional guidelines	5,6,7	1,2
Prioritise workload to respond to most urgent cases first	5,6,7,8	1,2,3
Rapid communication of results	5,6,7,8	1,2,3
Appropriate involvement of seniors	5,6,7,8	1,2,3

## Appendix 1 – Vascular Radiology Presentations and Diagnoses

### Common Presentations (Core)

#### Haemorrhage

- GI – haematemesis, melaena
- Trauma
- Haemoptysis
- Vessel rupture
- Post partum

#### Acute Ischaemia

- Peripheral
- Cerebrovascular
- Pulmonary Embolic

#### Chronic Ischaemia

- Peripheral
- GI
- Renal

#### Venous Occlusion

- Deep venous thrombosis
- Superior Vena Cava Obstruction.
- Budd Chiari Syndrome

#### Pulsatile Mass

- Femoral false aneurysm
- Abdominal Aortic aneurysm

## Level 1 Vascular Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of vascular disease with reference to presentations and common diagnoses (Appendix 1).

Knowledge	Assessment Methods	GMP
Recall vascular anatomy of all organ systems and peripheral circulation	6, 10	1
Recognise typical and variant presentations of common conditions	6,10	1
Familiarity with common acute and elective presentation of vascular pathologies in different organ systems and clinical scenarios	6,10	1
Recognise the clinical sequelae of the diagnoses of vascular conditions	6,10	1
Recognise the medical, interventional and surgical management options for vascular conditions	6,10	1
Skills		
Be able accurately to report most cases and emphasise the key findings and diagnoses	6,7	1
Participate in acute interventional rota	8	1,2,3
Organise and undertake appropriate imaging pathways in investigating vascular conditions	6,7	1,3
Take part in one stop clinics	7,8	1,2,3
Increase procedural skills in elective and acute cases		
Increase skills in Vascular Ultrasound examination in:		
<ul style="list-style-type: none"> <li>• <b>Peripheral vascular disease</b></li> <li>• <b>Carotid arteries</b></li> <li>• <b>Venous obstruction/thrombosis</b></li> <li>• <b>Dialysis access</b></li> </ul>	7	1,2,3,4
Complex central line insertion	7	1
Mesenteric angiography, embolisation/chemo-embolisation techniques	7	1
Perform high stakes embolotherapy e.g. emergency for haemorrhage	7	
Perform thrombin injection of false aneurysm	7	1
Perform high stakes angioplasty and stenting	7	1
Perform thrombolysis and thrombectomy	7	1
Recognise complications of vascular interventions	6,7,8	1,2
Behaviour		
Seek additional clinical information relevant to case	6,7	1,2,3
Tailor examination to clinical indication	6,7	1,2
Initiate additional examination/investigation as appropriate	6,7	1,2
Formulate appropriate DDx	6,7	1,2
Participate in MDTs	8	1,2,3
Enter performance data into local and national registries	9	1,2,3
Perform reflective learning from clinical practice, audit and registry data	6,9	1,2,3,4

## Level 2 Vascular Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of vascular disease with reference to uncommon presentations and diagnoses (Appendix 1)		
Knowledge	Assessment Methods	GMP
Detailed understanding of clinical presentations and diagnoses	6,10	1
Detailed knowledge of normal and variant vascular anatomy relevant to above	6,10	1
Recognition of uncommon conditions	6,10	1
Skills		
Provide expert opinion on appropriate patient imaging	6,7	1
Provide expert image interpretation	6,7	1
Participate in acute interventional rota	8	1,2,3
Organise and undertake appropriate imaging pathways in investigating vascular conditions	6,7	1,3
Independently runs one stop clinics	7,8	1,2,3
Increase procedural skills in elective and acute cases		
Perform high stakes angioplasty and stenting (renal, carotid, visceral)	7	1
Perform super-selective embolisation/chemo-embolisation		
Perform TIPPS	7	1
Perform endovascular stent grafting e.g. EVAR, tEVAR	7	1
Recognise and manage complications of vascular interventions	6,7,8	1
Behaviour		
Highly organised work pattern	8	1,2,3
Automatically prioritise cases according to clinical need	6,7,8	1,2,3
Discuss complex cases with referring clinicians and colleagues	6,7,8	1,2,3
Establishes clinical problem quickly	6,7	1
Be able succinctly to relate clinical and imaging findings	6,7	1
Show awareness of international relevant guidelines	6,7	1
Active role in service delivery	8	1,2,3
Assume a leadership role in multidisciplinary meetings	8	1,2,3
Offer timely specialist opinion	8	1,2,3
Discuss with specialist centre appropriately	7,8	1,2,3
Enter performance data into local and national registries	9	1,2,3

## Appendix 1 – Vascular Radiology Diagnoses

### Diagnoses – Common/Uncommon (Level1/2)

#### Arterial Disease

- Peripheral arterial disease upper and lower limbs.
- Thoracic aorta and upper extremity arterial disease.
- Aneurysm: thoracic and abdominal.
- Supra-aortic pathology, including carotid and vertebral.
- Arteriovenous malformations.
- Vascular trauma
- Visceral arterial pathology: gastrointestinal bleeding, visceral aneurysm and ischaemia, renal, tumours, bronchial.
- Arterial problems in obstetrics and gynaecology: fibroid embolisation.
- Arterial pathology in cancer.
- Management of hepatic malignancy (vascular)
- Syndromes with a major vascular component

#### Venous Disease

- Venous diagnosis and intervention.
- Peripheral venous disease inc Peripheral deep venous thrombosis
- Pulmonary thromboembolic disease
- Superior and inferior vena cava Disease
- Hepatic venous disease
- Portal venous disease including portal hypertension
- Gynaecological venous intervention
- Haemodialysis access
- Central Venous Access

## O Interventional Neuroradiology Training

### Level 1 Diagnostic Neuroradiology Training

To acquire detailed clinical, pathological and radiological understanding of diseases of the brain and spine with reference to presentations (Table NP) and common diagnoses (Table ND)		
Knowledge	Assessment Methods	GMP
Detailed applied anatomy relevant to cranial and spinal imaging examinations	6,10	1
Know a wide range of intracranial pathologies, their imaging and clinical management	6,10	1
Know a wide range of spinal pathologies, their imaging and clinical management	6,10	1
Skills		
Interpret MRI examination	6	1
Recognise/seek constellations of appearances which advance diagnosis	6,7	1
Recognise clinical priority of certain presentations	6,7	1
Recognise how diagnosis affects management pathway	6,7	1
Provide a definitive report on neuroaxis CT and MRI	6	1
Supervise more complex examinations (e.g. CTA)	6	1,2
Perform biopsy of straightforward spinal lesions.	7	1,2,3
Behaviour		
Formulate a Management Plan	6	1,2
Involve seniors as appropriate	6	1,2,3
Participate in relevant MDT	8	1,2,3

### Level 2 Diagnostic Neuroradiology Training

To acquire detailed clinical, pathological and radiological understanding of diseases of the brain and spine with reference to presentations (Table NP) and uncommon diagnoses (Table ND)		
Knowledge	Assessment Methods	GMP
Identify the full range of intracranial and spinal pathologies	6,10	1
Outline the full clinical management of neurological and neurosurgical cranial and spinal conditions.	6,10	1
Knowledge of range of imaging studies relevant to neuroradiology and their role e.g. radionuclide studies, PET – CT, perfusion imaging, MR spectroscopy, myelography, spinal angiography	6,10	1
Skills		
Provide expert opinion on appropriate patient imaging	6	1
Report and undertake more complex examinations	6	1
Provide expert opinion on appropriate patient imaging	6,7	1
Provide expert image interpretation	6	1
Perform biopsy of more complex spinal lesions	7	1,2,3
Take part in teaching and training of junior trainees and associated specialities	10	1,3
Behaviour		
Recognise National Guidelines eg. NICE, SIGN	6,8	1,2,3
Assume a leadership role in multidisciplinary meetings	8	1,2,3
Be able to discuss complex cases with referring clinicians and colleagues	6,7,8	1

## Table ND – Neuroradiology Diagnoses

### Diagnoses – Common/Uncommon (Level1/2)

#### Brain

##### *Acute:*

- Subarachnoid haemorrhage
- Intracranial aneurysm
- Venous sinus thrombosis
- Intracranial infection and complications (abscess, subdural empyema, herpes encephalitis, HIV)
- Carotid and vertebral artery dissection
- Cerebral infarction
- Intracranial haemorrhage
- Hydrocephalus

##### *Non-acute:*

- Common primary brain tumours
- Metastatic disease
- Pituitary tumours
- Craniopharyngioma and suprasellar masses
- Intracranial cysts
- Vestibular schwannoma
- Vascular malformations
- Demyelination and its differential diagnosis
- Common congenital disorders
- Cerebrovascular disease

#### Spinal

- Metastasis
- Infection, including TB, discitis, osteomyelitis, epidural abscess
- Spinal haematoma
- Spinal fractures and dislocations Degenerative disc disease Syringomyelia
- Intraspinous tumours
- Spinal dysraphism

## Core Clinical and Interventional Skills relevant to Interventional Neuroradiology

### Objective

To acquire basic clinical, pathological and radiological understanding of neurological disease with reference to common presentations (Appendix 1)		
Knowledge	Assessment Methods	GMP
Understand clinical significance of pathology associated with presentation and link with likely diagnoses	2	1
Identify the role of interventional neuroradiology in the specific clinical setting	2	1
Recall basic anatomy in clinical practice relevant to imaging examinations of the: brain and spine.	1	1
Recall the basic vascular anatomy in clinical practice relevant to imaging examinations of the head & spine.	1, 6	1
Local/regional guidelines in relation to neuroradiological presentations	2,7	1,2
Skills		
Report plain radiographs relevant to neurological disease showing awareness of limitations	4,5,6	1,2
Determine optimal imaging examination	4,5,6	1,2
Undertake basic assessment of the urgency of clinical situation	6	1,2,3
Construct imaging pathway in relation to management options for neurological pathologies	5,6	1,2,3
Performance/protocol of basic non invasive imaging; US, CT, MRI	7	1
Write provisional interpretation/report of imaging	6,7	1
Recognise/seek constellations of appearances which advance diagnosis	6,7	1
Recognise clinical priority of certain presentations	6,7,8	1
Recognise how diagnosis affects management pathway	6,7	1
Develop procedural skills in elective and acute cases		
Develop skills preparing for and assisting with <del>INR</del> interventional procedures	7	1
Perform diagnostic catheter angiography and vascular / non vascular interventional procedures	7	1
Recognise complications of interventional procedures	6,7,8	1,2
Behaviour		
Apply/adhere to local/regional guidelines	5,6,7	1,2
Prioritise workload to respond to most urgent cases first	5,6,7,8	1,2,3
Rapid communication of results	5,6,7,8	1,2,3
Appropriate involvement of seniors	5,6,7,8	1,2,3

## Appendix 1 – Neurological Presentations and Diagnoses

### Common Presentations (Core)

#### Haemorrhage

- SAH
- Parenchymal haemorrhage
- Intraventricular haemorrhage and hydrocephalus
- Spinal

#### Acute Ischaemia

- TIA and stroke

#### Tumour

#### Venous Occlusion

#### Vascular anomalies

- Aneurysm
- AVM

## Level 1 Interventional Neuroradiology Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of neurological disease with reference to presentations and common diagnoses (Appendix 1).		
Knowledge	Assessment Methods	GMP
Recall the anatomy of the CNS & related vasculature including anatomical variants	6, 10	1
Recognise typical and variant presentations of common conditions	6,10	1
Familiarity with common acute and elective presentation of neurological pathologies amenable to intervention in clinical scenarios	6,10	1
Recognise the clinical sequelae of the diagnoses of neurological conditions	6,10	1
Recognise the medical, interventional and surgical management options for neurological conditions	6,10	1
Skills		
Be able accurately to report most cases and emphasise the key findings and diagnoses	6,7	1
Participate in diagnostic and interventional neuroradiology rota	8	1,2,3
Organise and undertake appropriate imaging pathways in investigating neurological conditions	6,7	1,3
Perform clinical assessment of patients with neurological conditions in ward and outpatient settings	6,7	1,3
Take part in outpatient clinics	7,8	1,2,3
Increase procedural skills in elective and acute cases		
Increase skills in Vascular Ultrasound examination in Carotid arteries and vertebral (optional)	7	1,2,3,4
Complex Cerebral angiography	7	1
Perform balloon test occlusion	7	
Coil a cerebral aneurysm (non-complex)	7	1
Perform appropriate embolisation techniques	7	1
Appropriate management of cerebral venous thrombosis	7	1
Recognise complications of vascular interventions	6,7,8	1,2
Behaviour		
Seek additional clinical information relevant to case	6,7	1,2,3
Tailor examination to clinical indication	6,7	1,2
Initiate additional examination/investigation as appropriate	6,7	1,2
Formulate appropriate DDx	6,7	1,2
Participate in MDTs	8	1,2,3
Enter performance data into local and national registries	9	1,2,3
Perform reflective learning from clinical practice, audit and registry data	6,9	1,2,3,4

## Level 2 Interventional Neuroradiology Training

### Objective

To acquire detailed clinical, pathological and radiological understanding of neurovascular disease with reference to uncommon presentations and diagnoses (Appendix 1)		
Knowledge	Assessment Methods	GMP
Detailed understanding of clinical presentations and diagnoses	6,10	1
Knowledge of clinical neuroscience topics relevant to the care of patients with neurovascular diseases	6	1
Detailed knowledge of the anatomy of the central nervous system and related vasculature, including anatomical variations	6,10	1
Detailed understanding of diagnostic and interventional imaging equipment and techniques	1,2,3,4,5,6	1
Recognition of uncommon conditions	6,10	1
Skills		
Provide expert opinion on appropriate patient imaging	6,7	1
Provide expert image interpretation	6,7	1
Participate in acute interventional neuroradiology rota	8	1,2,3
Organise and undertake appropriate imaging pathways in investigating neurovascular conditions	6,7	1,3
Independently runs outpatient clinics	7,8	1,2,3
Increase procedural skills in elective and acute cases		
Perform high stakes angioplasty and stenting	7	1
Perform appropriate embolisation of cerebral AVMs, dural AV fistula and craniofacial & spinal tumours	7	1
Coil cerebral aneurysms	7	1
Use of rescue procedures, thrombolytics, antiplatelet agents, balloon, stent, snare or other retrieval devices	7	1
Use of complex assist techniques, balloon, stent or multiple catheters	7	1
Appropriate management of cerebral venous thrombosis	7	1
Recognise and manage complications of neurovascular interventions	6,7,8	1
Behaviour		
Highly organised work pattern	8	1,2,3
Automatically prioritise cases according to clinical need	6,7,8	1,2,3
Discuss complex cases with referring clinicians and colleagues	6,7,8	1,2,3
Establishes clinical problem quickly	6,7	1
Be able succinctly to relate clinical and imaging findings	6,7	1
Show awareness of international relevant guidelines	6,7	1
Active role in service delivery	8	1,2,3
Assume a leadership role in multidisciplinary meetings	8	1,2,3
Offer timely specialist opinion	8	1,2,3
Discuss with specialist centre appropriately	7,8	1,2,3
Enter performance data into local and national registries	9	1,2,3
Aware of requirement to register new interventional procedures and of processes to introduce new equipment	6,9	1,2,3,4
Performs reflective learning from clinical practice and audit and actively participates in quality improvement	6,9	1,2,3,4
Performs/participates in research	7,9	1,2

## Appendix 1 – Neurovascular Radiology Diagnoses

### Diagnoses – Common/Uncommon (Level1/2)

- Intracranial aneurysms
- Cerebral vasospasm
- Cerebral vasculopathies
- Craniofacial and spinal AVM and AVF
- Craniofacial and spinal DAVF
- Craniofacial and spinal tumours
- Craniofacial low-flow vascular malformations
- Diseases involving the cervical and arch vessels
- Reversible ischaemic events and ischaemic stroke
- Cerebral venous thrombosis

## **7 SUPPORT FOR LEARNING, SUPERVISION AND FEEDBACK**

### **7.1 *The Model of Learning***

Trainees will achieve the competences described in the curriculum through a variety of learning methods. There will be a balance of different modes of learning from formal teaching programmes to experiential learning 'on the job'. The proportion of time allocated to different learning methods may vary depending on the nature of the attachment within a rotation.

There must be robust arrangements for quality assurance in place to ensure consistent implementation of the curriculum.

#### **Work-based Experiential Learning**

The content of work-based experiential learning is decided by the local faculty for education but includes active participation in:

- Radiological attachments with gradual reduction in supervision according to increasing competence as judged by trainers (apprenticeship model). A major component of training in interventional radiology is achieved by the apprenticeship system with the trainee undertaking an increasing number of radiological tasks
- Outpatient clinics and ward rounds offer learning experiences in relation to pre-/post-procedural care and management of patients undergoing interventional procedures.
- Multidisciplinary team meetings. These inter-disciplinary meetings provide excellent learning opportunities.
- On-call and emergency provision.
- The degree of responsibility taken by the trainee will increase as competency increases. There should be appropriate levels of supervision throughout training with increasing independence and responsibility as learning outcomes are achieved.

#### **Formal Postgraduate Teaching**

- A programme of formal, regular teaching sessions to cohorts of trainees
- Case presentations
- Journal Clubs
- Research and audit projects
- Lectures and small group teaching
- Grand Rounds
- Radiological skills demonstrations and teaching
- Joint meetings with clinical specialties
- Attendance at training programmes organised on a deanery or regional basis, which are designed to cover aspects of the training programme outlined in this curriculum

### **Independent Self-Directed Learning**

Trainees will use this time in a variety of ways depending upon their stage of learning. Suggested activities include:

- Preparation for assessment and examinations
- Reading, including web-based material
- Maintenance of personal portfolio (self-assessment, reflective learning, personal development plan)
- Audit and research projects
- Reading journals
- Achieving personal learning goals beyond the essential, core curriculum

### **Formal Study Courses**

Time to be made available for formal courses is encouraged, subject to local conditions of service. Examples include management courses and communication courses.

### **Learning Experiences**

Clinical and educational supervisors will be encouraged to identify learner centred educational opportunities in the course of clinical work. IR trainees and their teachers will recognise the importance of maximising the wide variety of learning opportunities in the clinical radiological workplace:

- Learning from Practice – Trainees will spend a large proportion of work-based experiential learning involved in supervised radiological practice in a hospital setting. Learning will involve closely supervised practice until competences are achieved. The learning environment will be in all areas of the imaging department and in other areas where IR patients are managed (eg out-patient clinics, ward settings)
- Learning with Peers – There are many opportunities for trainees to learn with their peers. Local postgraduate teaching opportunities allow trainees of varied levels of experience to come together for small group sessions. Examination preparation encourages the formation of self-help groups and learning sets.
- Learning in Formal Situations – There are many opportunities for formal teaching in the local postgraduate teaching sessions and at regional, national and international meetings.
- Personal Study – Time will be provided during training for personal study. It may be possible for longer periods of private study to be offered as part of study leave.
- Specific Teacher Inputs – Individual units within a teaching programme will identify where specific teacher inputs will be provided. These will vary from programme to programme. Recommendations for good practice are identified in the learning portfolio. Examples are:
  - Each trainee having a radiological supervisor for each attachment for work-based experiential teaching
  - Special interest teaching in a radiological environment from a recognised specialist
  - Structured teaching sessions

### **Supervising and supporting workplace-based learning**

Educators need to identify their own professional development needs in order to carry out their role effectively, and develop the confidence and expertise to support workplace learning.

The roles of the educators needed to support learning activities include: advisor, appraiser, assessor, clinical supervisor, coach, co-learner, critical friend, educational supervisor, expert, facilitator, mentor, teacher, trainer and tutor.

### **Requirement for Trainers**

All trainers are expected to:

- have demonstrated an interest in and developed a knowledge of training
- have appropriate equipment available
- have a sufficiently large spectrum of cases to ensure curriculum coverage
- have appropriate teaching resources
- be up-to-date with the requirements of the RCR continuing professional development scheme and be in possession of appropriate supporting documents
- have substantial expertise and knowledge in their area(s) of clinical practice

When learning in and from practice, it is important to understand that the roles of trainers may overlap and differ in subtle ways. In these cases supervision provides essential support. However:

- the needs of the learner should determine which role is adopted, and these change over time and in different situations
- skilled educators move in and among these roles according to identified need
- enough time should be allocated to develop these roles and relationships
- those involved should aspire to mutually negotiated and fair outcomes, but they should also recognise that supervision involves a power relationship
- good educational practice requires a balance of the following aspects:
  - support
  - challenge
  - clarification of the standards to be achieved
  - clarification of the consequences of non-achievement

## Educational supervisor

All radiology trainees will have an educational supervisor

An educational supervisor is selected and appropriately trained to be responsible for the overall supervision and management of a specified trainee's educational progress during a training placement or series of placements. The Educational Supervisor is integral to the appraisal process. A trainee appraisal with the Educational Supervisor will include feedback on performance, review of outcomes of assessments, induction to posts and career advice. The Postgraduate Deaneries should recognise the active role of Educational Supervisor in training and offer appropriate support.

Local education providers must ensure that educational supervisors have adequate support and resources to undertake their training role. This will include training in equality and diversity.

The educational supervisor (ES) will:

- ensure that the programme is appropriate for the doctor's needs
- be responsible for the radiology trainee's educational agreement.
- meet with the radiology trainee at the beginning of each placement to agree how the learning objectives for this period of training will be met and confirm how formative feedback and summative judgments will be made.
- help radiology trainees by reviewing their learning needs in the light of achieved goals
- collate and/or carry out assessments from clinical supervisors, trainers and other assessors
- review the radiology trainee's learning ePortfolio
- conduct appraisals and give supportive feedback on the results of MSF
- completing the structured supervisor's report (which can include assessments for all competences) at the end of each year of training prior to the ARCP.
- support the doctor through any difficulty
- tell the clinical director, head of service or medical director and those responsible for training, of serious weaknesses in their trainee's performance that have not been dealt with, and any other the individual's problems with training programmes.
- tell the radiology trainee the content of any information about them that is given to someone else
- ensure that all training opportunities meet the requirements of equality and diversity legislation
- give appropriate handover to the next educational supervisor with the radiology trainee's knowledge.

The educational supervisor, when meeting with the trainee, should discuss issues of clinical governance, risk management and the report of any untoward clinical incidents involving the trainee. The educational supervisor is part of the clinical speciality team. Thus, if the clinical directorate (clinical director) should have any concerns about the performance of the trainee, or there were issues of doctor or patient safety, these would be discussed with the educational supervisor. These processes, which are integral to trainee development, must not detract from the statutory duty of the Employer to deliver effective clinical governance through its management systems.

### **Clinical supervisor**

A trainer is selected and appropriately trained to be responsible for overseeing a specified radiology trainee's clinical work and providing constructive feedback during a training placement. Clinical supervisors may/will change on a day-to-day basis depending on the rota for each radiology trainee. Some training programmes appoint an educational supervisor for each placement. The roles of clinical and educational supervisor may then be merged.

A clinical supervisor will usually be the consultant to whom a radiology trainee is directly responsible for their clinical work. There will be frequent contact between them. The educational supervisor may see the radiology trainee much less often.

Local education providers must ensure that clinical supervisors have adequate support and resources to undertake their training role. This will include training in equality and diversity.

The clinical supervisor is responsible for:

- ensuring that radiology trainees are never put in a situation where they are asked to work beyond their competence without appropriate support and supervision. Patient safety must be paramount at all times.
- guaranteeing suitable induction to the radiology department
- meeting with the radiology trainee at the beginning of each placement to discuss what is expected in the placement, learning opportunities available and the trainee's learning needs
- ensuring that the clinical experience available to the trainee is appropriate and properly supervised
- ensuring that all training opportunities meet the requirements of equality and diversity legislation
- monitoring, supporting and assessing the foundation doctor's day-to-day clinical and professional work
- providing regular feedback on the trainee's performance
- undertaking and facilitating WpBA
- allowing the trainee to give feedback on the experience, quality of training and supervision provided

- discussing serious concerns with the educational supervisor about a trainee's performance, health or conduct
- meet with the radiology trainee to assess whether they have met the necessary outcomes and complete an end of placement review form for each placement

The first year in clinical radiology can be a difficult year of transition for trainees. Training programme directors (TPDs) and College Tutors are encouraged to offer advice, a mentor system and a counselling service during the year. The following milestones should be acknowledged:

The trainee must meet with their Educational Supervisor (ES), the College Tutor (CT) in the hospital where they are working and their TPD at the start of their appointment, and again after three months in it. Some individuals may undertake more than one of these roles simultaneously.

The trainee's practice must be closely supervised and the safety of the patient is of paramount importance. Such aspects are monitored by the clinical supervisor for each individual rotation and documented in the formal ePortfolio. Formal mechanisms for feeding back any concerns raised by the clinical supervisor, to the trainee, and the ES, CT and TPD, should be in place. There should be a formal mechanism for counselling trainees who are unsuccessful in the First FRCR Examination.

All training in post-graduate radiology should be conducted in institutions with appropriate standards of clinical governance and that meet relevant Health and Safety standards for clinical areas. Training placements must also comply with the European Working Time Directive for trainee doctors.

Trainees must work with a level of clinical supervision commensurate with their clinical experience and level of competence. This is the responsibility of the relevant clinical supervisor after discussion with the trainee's educational supervisor and the designated clinical governance lead. In keeping with the principles of Good medical Practice, trainees should know that they must limit their clinical practice to within their level of clinical competence and seek help and support without hesitation.

## **7.2 Feedback**

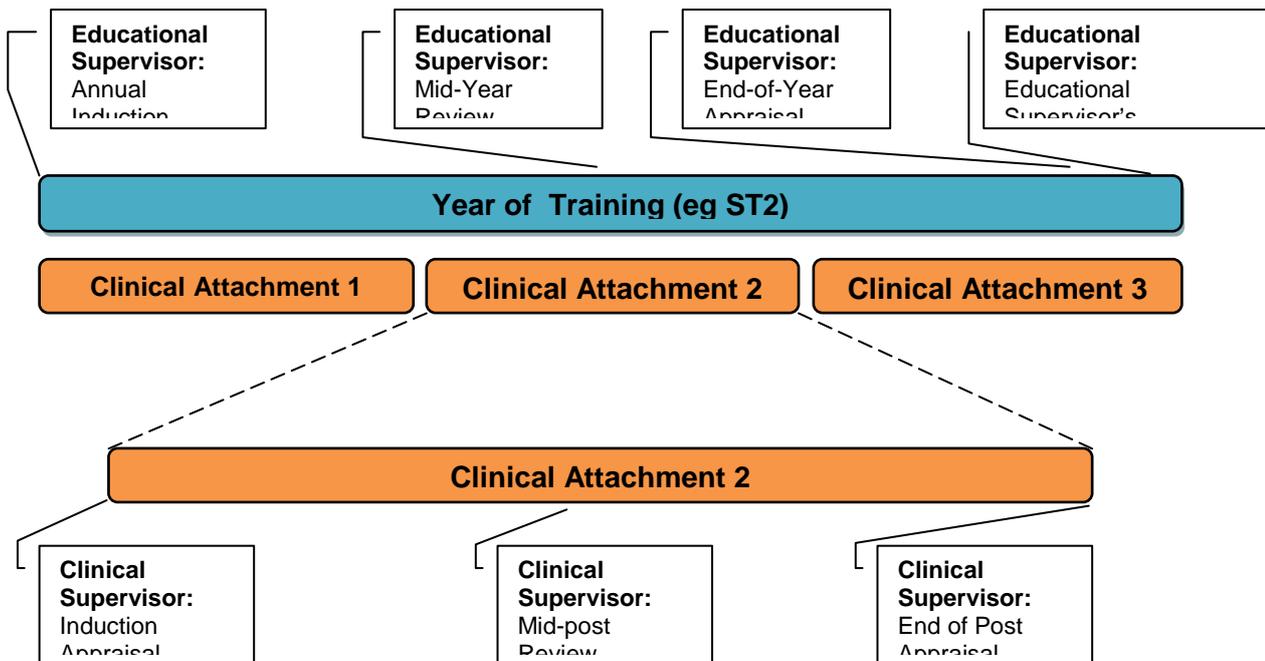
Frequent and timely feedback on performance is essential for successful work-based experiential learning. To train as an interventional radiologist, a doctor must develop the ability to seek and respond to feedback on clinical practice from a range of individuals to meet the requirements of Good Medical Practice and revalidation.

The local education faculty will establish clear processes for feedback, with close liaison with designated Clinical and Educational Supervisors.

Constructive feedback should be provided throughout training in both formal and informal settings. Opportunities for feedback will arise during appraisal meetings, when trainees are undergoing workplace-based assessments, in the workplace setting, and through discussions with supervisors, trainers, assessors and those within the team.

### 7.3 Appraisal

A formal process of appraisals and reviews underpins training. This process ensures adequate supervision during training, provides continuity between posts and different supervisors and is one of the main ways of providing feedback to trainees. A “typical” year of appraisals involving both clinical and educational supervisors is illustrated below (Diagram 1). All appraisals should be recorded in the ePortfolio.



**Diagram 1:** Appraisal Meetings during a Single Academic Year in Training

#### Annual Induction Appraisal

When radiology trainees start in a new training year, they must arrange a meeting with their educational supervisor. This is primarily the responsibility of the IR trainee. An educational agreement is signed between the educational supervisor and trainee is an essential starting point for negotiating the educational goals and discussing learning opportunities, the assessment process and use of the ePortfolio. Overarching educational aims for the year ahead should be agreed within the personal development plan.

#### Clinical Supervisor: Induction Appraisal

When IR trainees start in a new placement, they must arrange a meeting with their clinical supervisor (this role may be discharged in some cases by the educational supervisor). These arrangements are primarily the responsibility of the IR trainee. The appraisal discussions should cover the educational objectives for the clinical attachment and be used to inform the personal development plan (PDP).

### **Clinical Supervisor: Mid-Post Appraisal**

A mid-point meeting during a clinical attachment, although not mandatory is highly recommended. It gives the trainee and clinical supervisor the opportunity to look at the achievements of the trainee and highlights areas for future development, in terms of the PDP and curriculum competences.

### **Clinical Supervisor: End of Post Appraisal**

Towards the end of a placement, the IR trainee and clinical supervisor will meet again for an appraisal. They will need to review the ePortfolio, the PDP and the results of assessments made during the placement. This process will involve review of colleagues' comments, who have observed the doctor's performance in practice and/or in individual assessments. If the educational supervisor is different from the clinical supervisor, there should be a robust communication system to ensure a continuous, appropriate, and timely flow of evidence. This should include a 'supervisor's report sign off' document confirming satisfactory performance and progress. It should detail any outstanding issues that still need to be addressed.

### **Educational Supervisor's Mid-Year Appraisal**

A mid-year appraisal with the educational supervisor is an opportunity to look at the trainee's progress against the agreed educational objectives within the ePortfolio. It is at/around this meeting that the MSF is undertaken.

### **Feedback and debriefing**

Feedback is a key component of the interactions between supervisors and IR trainees. Giving and receiving feedback and engaging in constructive conversations about learning, successes, difficulties and progress are all part of an effective professional learning environment. Improvement in clinical radiological practice will only happen if regular review leads to constructive feedback. Unscheduled assessments are a good opportunity for immediate feedback. This is particularly true of Rad-DOPS and Mini-IPX, which may be opportunistic. It is essential that trainers provide, and radiology trainees receive, structured feedback.

### **Log Book**

*Logbooks should be used for documenting the skills and experience attained and to facilitate reflective learning. Logbooks are mandatory for all interventional procedures.*

The training objectives identified in this curriculum document (encompassing knowledge, skills and behaviours) are mapped with the appropriate assessment tools, which can be used to illustrate proof of learning across the curriculum. All these methods and tools are included in the ePortfolio.

These training objectives are used to assist trainee appraisal and assessment during training and when achieved can verify that training has taken place to the required standard for a Certificate of Completion of Training (CCT) to be awarded.

### **ePortfolio**

The ePortfolio is the record for documenting assessments and other achievements. It is essential that radiology trainees populate the ePortfolio as it will be used to inform the end of year report by the education supervisor.

### **End of Training Year Appraisal**

The results of educational activities for an academic year will be drawn together and included in a formal structured educational supervisor's report. This will cover the overall performance of the trainee in each placement. The overall judgment of a

trainee will include a triangulated view of the doctor's performance, which will include their participation in educational activities, appraisals, the assessment process and recording of this in the ePortfolio.

The outcome of the final appraisal discussion should be agreed by both the IR trainee and the educational supervisor and recorded in the trainee's ePortfolio in the structured supervisor's report.

Placement reports put together in an annual structured educational supervisor's report will form the basis of the education supervisor's recommendations of satisfactory completion of the year of training.

#### **7.4 Research**

IR trainees who wish to acquire extensive research competences, in addition to those specified in this curriculum, may undertake a research project as an ideal way of obtaining those competences. Options to be considered include taking time out of programme to complete a specified project or research degree. Applications to research bodies, the deanery and the College will need to be done by the trainee. The deanery will make an application to GMC for approval of the out of programme research. All applications for out of programme research must be prospectively approved.

Funding will need to be identified for the duration of the research period. A maximum period of three years out of programme is allowed. During this period trainees will be able to gain recognition of continuing clinical competences. As such the RCR may recognise up to a maximum of 12 months clinical training during this time.

All trainees are required to demonstrate an understanding of research methodology and critical appraisal linked to clinical practice. There are various ways in which this can be demonstrated. Trainees should consider undertaking a research project during training. Alternatively, trainees should, with their educational supervisors, develop a research question and a protocol as a theoretical exercise. All trainees should develop their critical appraisal skills and regularly appraise and discuss current research papers – for example as part of regular journal clubs.

## 8 ASSESSMENT

### Purpose of assessment:

- enhance learning by providing formative assessment, enabling trainees to receive immediate feedback, measure their own performance and identify areas for development;
- drive learning and enhance the training process by making it clear what is required of trainees and motivating them to ensure they receive suitable training and experience;
- provide robust, summative evidence that trainees are meeting the curriculum standards during the training programme;
- ensure trainees are acquiring competencies within the domains of Good Medical Practice;
- assess trainees' actual performance in the workplace;
- ensure that trainees possess the essential underlying knowledge required for their sub-specialty;
- inform the Annual Review of Competence Progression (ARCP), identifying any requirements for targeted or additional training where necessary and facilitating decisions regarding progression through the training programme;
- identify trainees who should be advised to consider changes of career direction

### Assessment methodology

#### **Continuous assessment**

Improvement in clinical practice will only happen if regular review leads to constructive feedback. Thus continuous review and assessment is a fundamental part of Interventional Radiology Training. IR trainees are expected to demonstrate improvement and progression during each attachment. This should be reflected in increasingly higher grades. Therefore it is not anticipated that IR trainees will achieve high grades on day one. They must arrange for these assessments to be spread throughout the year.

Arriving at the overall assessment and judgement of the IR trainee must be based on multiple assessments by many observers. During core training, within a typical three/four month placement, an individual consultant/assessor is unlikely to build up a coherent picture of competences, let alone performance of an individual trainee. Therefore, the training programme director (TPD) should ensure that there is a local faculty capable of building a balanced judgement of a doctor's performance supported by the workplace based assessment results. Such an approach will prevent any individual having undue influence regarding a doctor's progression.

#### **Self Assessment**

IR trainees have a personal responsibility to undertake self assessment an integral part of their professional life. It is good educational practice for this to be stated clearly and discussed fully during induction.

## Assessment Systems and Tools

Radiological practice will be assessed using an integrated package of workplace-based assessments and summative examination of knowledge and radiological skills, which will sample across the domains of the curriculum. The assessment methods are developed from and mapped onto the curriculum in an integrated way.

The assessments will generate structured feedback for trainees within core radiological training and level1/2 Training. The assessment tools have been selected on the basis of their fitness for purpose.

### **Summative Assessment**

The First FRCR Examination (Physics module) and Final FRCR Part A Examination test knowledge through single best answer (SBA) questions. The First FRCR Examination (Anatomy module) tests knowledge by requiring the identification of normal anatomical structures on images. The Final FRCR Part B Examination assesses competence (interpretative, analytical and communication skills).

### **Formative Assessment**

Workplace based assessment will be the cornerstone of assessment for day-to-day practice (Figure 4). There is a range of tools available for this use. These have undergone or are undergoing evaluation in terms of their feasibility, validity and reproducibility. There are a further range of IR specific WpBA tools currently under development. These PBAs (Procedural Based Assessments) and Patient Questionnaires are identified as tools that will allow assessment of competences in higher training and will allow evidence of proof of learning in the latter years of training. These will be developed in conjunction with lay and patient input.

The generic and radiologically specific workplace-based assessment tools are:

#### **A. Multi-Source Feedback**

- This tool assesses generic skills across the domains of Good Medical Practice. It consists of the collated views from a range of co-workers (previously described as 360-degree assessment). It will be mapped to a self-assessment tool with identical domains
- MSF should usually take place once a year.
- For each assessment, the radiology trainee should nominate 15 raters. A minimum of 10 returns are required
- Most raters/assessors should be supervising consultants, doctors in training more senior than the trainee under assessment and experienced radiographic, nursing or allied health professional colleagues.

Recommended mix of raters/assessors is as follows:

- 2–4 senior doctors
- 2–4 doctors in training
- 2–4 radiographers
- 2–4 nurses/allied health professionals
- 2–4 other team members including clerks, secretaries and auxiliary staff.

## B. Direct observation of doctor/patient encounter

Two tools can be used to assess radiologist/patient encounters:

- Mini-imaging interpretation exercise (Mini-IPX)
- Radiology- Direct observation of procedural skills (Rad-DOPS)

IR trainees are required to undertake a minimum of twelve observed encounters in each year of training although it is anticipated that they may/will undertake many more, as the WpBA are the vehicles by which the trainee will guarantee one-to-one teaching and ensure appropriate curriculum coverage during their clinical attachments.

- **Mini-imaging interpretation exercise (Mini-IPX)**

This is a structured assessment of an observed radiology interpretation/reporting episode:

- trainees should complete a minimum of six mini-IPX in each year of training. These should be spaced out during the year with at least two mini-IPX completed in each four month period
- a different assessor should be used for each mini-IPX wherever possible, including at least one of consultant level, per four month placement
- assessors **must** be trained in giving feedback and understand the role of assessment.
- each mini-IPX must represent a different clinicoradiological problems, sampling across the radiology specific content (categories listed in the *Syllabus and Competences*)
- trainees should agree the timing, problem and assessor.
- assessors should also carry out unscheduled assessments.

- **Radiology-Direct observation of procedural skills (Rad-DOPS)**

This is a structured checklist for assessing the radiology trainee's interaction with the patient when performing a practical procedure:

- trainees must submit a minimum of six rad-DOPS per annum
- different assessors should be used for each encounter wherever possible
- assessors must be trained both in the procedure and feedback methodology. They could include consultants, more senior doctors in training, advanced practitioner radiographers, qualified nurses or allied health professionals
- each Rad-DOPS should represent a wide range of different procedures/skills
- trainees should choose timing, procedure and observer/assessor
- assessors may also carry out unscheduled assessments.

## C. Teaching Observation

- The Teaching Observation Tool evaluates the competence of a trainee to deliver a teaching episode in a wide variety of settings.
- The Teaching Observation form is designed to provide structured, formative feedback to trainees on their competence at teaching.

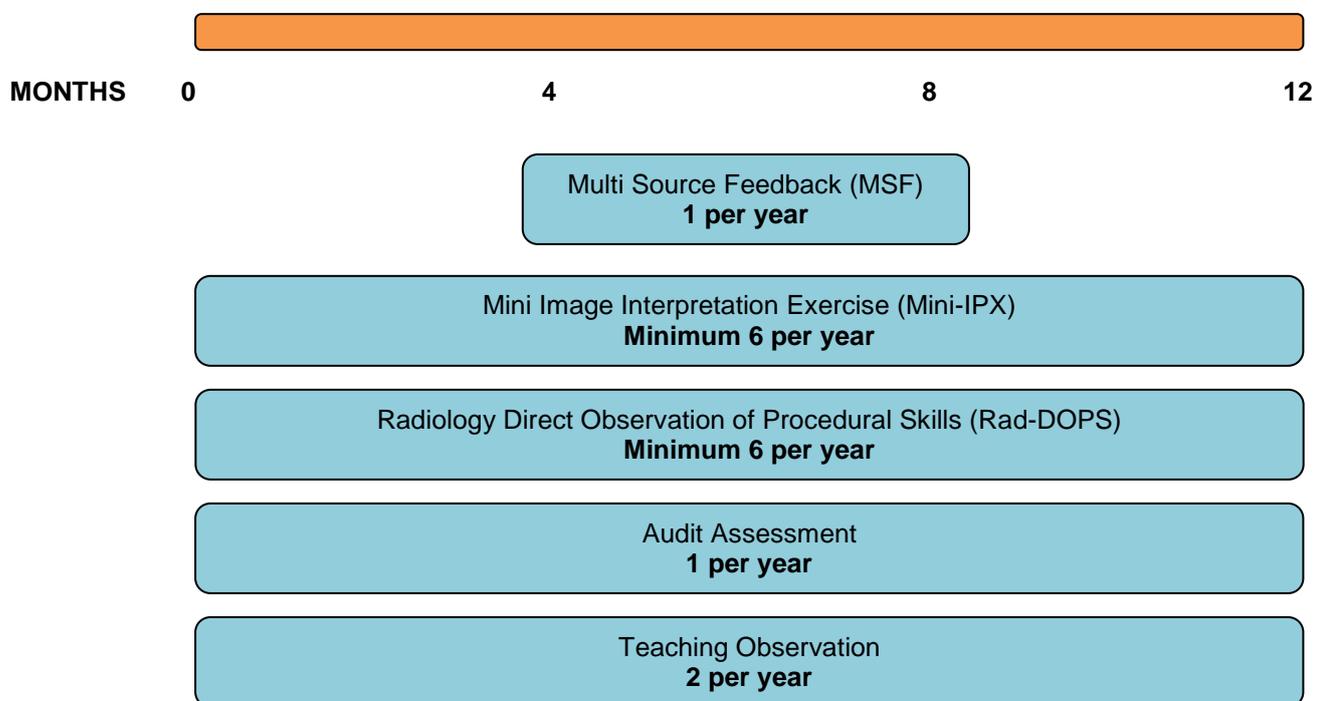
The Teaching Observation can be based on any instance of formalised teaching by the trainee that has been observed by the assessor. The process should be trainee-led (identifying appropriate teaching sessions and assessors).

## D. Audit Assessment

The Audit Assessment Tool is designed to assess a trainee's competence in completing an audit. The Audit Assessment can be based on review of audit documentation or on a presentation of the audit at a meeting. If possible the trainee should be assessed on the same audit by more than one assessor.

All trainees are expected to complete an audit project each year within the training programme. Trainees should show how they have instigated, collated and presented a piece of work, as well as reflected upon any changes in clinical management as a result of work completed.

Figure 1. Assessment during a Year of the Clinical Radiology Training Programme



## 9 ANNUAL REVIEW OF COMPETENCY PROGRESSION (ARCP)

Individual progress will be monitored by an annual review (ARCP, replacing RITA). It facilitates decisions regarding progression through the training programme, as well as identifying any requirements for targeted or additional training where necessary. The RCR recommends that the postgraduate dean should collaborate with the training programme director (TPD) and the regional postgraduate education adviser (REA) when overseeing these reviews. College tutors should also be involved in the process. The College offers every deanery the services of an external REA to provide “externality” to the ARCP process.

### ARCP Decision Aid

The following decision aid grids offer **guidance** on the domains to be reviewed and level of attainments required to inform an ARCP panel.

#### Standards for Satisfactory Progression (Outcome 1)

	ST1	ST2	ST3	ST4	ST5-6
Curriculum coverage: Generic	30% focus area content at core level descriptor	50% focus area content at core level descriptor	Competent in all focus area content at core level descriptor	50% focus areas content at Level1/2 descriptors	Competent in all focus area content at Level1/2 descriptors
Curriculum coverage: Radiology Specific	30% common presentations at core level descriptor	60% common presentations at core level descriptor	90% common presentations at core level descriptor	Complete common presentations L1 – Special interest area(s)	L2 – Special interest area/multiple L1 interest areas
Indicative Workplace based Assessments/yr	6 mini-IPX (minimum 2 per clinical attachment), 6 Rad-DOPS (minimum 2 per clinical attachment), 1 MSF, 1 Audit Assessment, 2 Teaching Observations WpBA should be undertaken in a timely and educationally appropriate manner <b>throughout</b> the training year. Progression predicated by satisfactory anchor statements				
Examinations	First FRCR Examination	Final FRCR Part A Examination: three modules	Final FRCR Part A Examination: all six modules	Final FRCR Part B Examination	--
Research	One research project (actual or theoretical) undertaken during training and discussed with educational supervisor – see paragraph 7.4				
Education Supervisor's Structured Report	All areas of personal and professional development addressed with overall progress at expectation or above.				

## Standards for Unsatisfactory Progression – No additional Training Time Required (Outcome 2)

	ST1	ST2	ST3	ST4	ST5-6
Curriculum coverage: Generic	20-30% focus area content at core level descriptor	40-50% focus area content at core level descriptor	80-100% competency in focus area content at core level descriptor	40-50% focus area content at Level1/2 descriptors	80-100% competent in focus area content at Level1/2 descriptors
Curriculum coverage: Radiology Specific	20-30% common presentations at core level descriptor	50-60% common presentations at core level descriptor	80-90% common presentations at core level descriptor	90-100% common presentations/Minimal L1 – Special interest area(s)	Minimum L2 – Special interest area/small number of L1 interest areas
Indicative Workplace based Assessments/yr	Insufficient minimum number of WpBAs.( less than six mini-IPX/Rad-DOPS, no MSF, Audit Assessment or Teaching Observation) Inappropriate use and timing of WpBAs during clinical attachments. Borderline/Below expectation anchor statements in a number of WpBAs				
Examinations	Failed to pass both modules of First FRCR Examination	Final FRCR Part A Examination: less than three modules	Final FRCR Part A Examination: less than six modules	Not passed Final FRCR Part B Examination	
Education Supervisor's Structured Report	Gaps in areas of personal and professional development identified through an overall progress summary with expectations borderline or below.				

### Standards for Unsatisfactory Progression – Additional Training Time Required (Outcome 3)

	ST1	ST2	ST3	ST4	ST5-6
Curriculum coverage: Generic	10-20% focus area content at core level descriptor	30-40% focus area content at core level descriptor	70-80% Competency in focus area content at core level descriptor	30-40% focus area content at Level1/2 descriptors	60-80% in focus area content at Level1/2 descriptors
Curriculum coverage: Radiology Specific	10-20% common presentations at core level descriptor	40-50% common presentations at core level descriptor	70-80% common presentations at core level descriptor	80-90% common presentations/No L1 – Special interest area(s)	No L2 – Special interest area / minimal L1 interest areas
Indicative Workplace based Assessments/yr	Persistent failure to undertake appropriate number of WpBAs Inappropriate use and timing of WpBAs during clinical attachments. Lack of progression predicated by multiple below satisfactory anchor statements				
Examinations	Not passed First FRCR Examination	Final FRCR Part A Examination: less than two modules passed	Final FRCR Part A Examination: less than four modules passed	Not passed Final FRCR Parts A & B Examinations	--
Education Supervisor's Structured Report	Significant concerns in multiple areas of personal and professional development (including patient safety) identified through an overall progress summary below expectation.				

The main possible outcomes of this assessment and the ARCP process are listed below:

- **Progress** into the next year of training. Indicative of satisfactory progression across all domains within the decision aid grid.
- **Unsatisfactory progression** will be informed by some or all of the following (the decision being undertaken by the ARCP panel): lack of curriculum coverage, inadequate or poor outcomes in workplace based assessments and/or examinations and areas of concern within the structures supervisor's report. This will result in one of two outcomes.
  - **Conditional progress** into the next year of training. A specific action plan will be formulated with the trainee to redress deficiencies in performance. Progress will be re-assessed as appropriate within the next year of training.
  - **Directed training without progression.** If the trainee is so far short of the objectives for their year of training such as to prevent them continuing into the next year of training, directed training is recommended to achieve those objectives. The RCR recommends that repetition of the entire year should only be recommended for exceptional reasons.

## 10 APPENDICES

### **APPENDIX A: CURRICULUM IMPLEMENTATION AND MANAGEMENT**

Summary of the management of curriculum implementation:

- The new curriculum has already been discussed with all Regional Postgraduate Education Advisers and Training Programme Directors, who meet twice yearly at the Royal College of Radiologists.
- Local training programmes will develop rotations that deliver the curriculum, which is checked by:
  - Regional Postgraduate Education Advisers at the workplace and through the Deanery led RITA/ARCP process
  - The training accreditation process supervised by local Deaneries and the GMC with input from the RCR

#### **Local Curriculum Management**

The organisation of training programmes for core radiological training and special interest training is the responsibility of Postgraduate Deaneries.

The Deaneries have established appropriate programmes for postgraduate radiological training in their regions. In England, Wales and Northern Ireland, deanery Schools of Radiology have been set up to achieve this. As the term "School of Radiology" is not applicable to Scotland, in this curriculum, the general term "local faculties for radiological training" will be used. The deaneries, through their local faculties and training programmes, will co-ordinate local postgraduate radiological training, with terms of reference as follows:

- Oversee recruitment and induction of trainees from Foundation and core training in other specialties into core radiological training.
- Allocate trainees into particular rotations for core IR training, and then at ST4, ST5 and ST6 levels into rotations appropriate to their sub-specialty IR training needs. The Royal College recognises that it may be necessary for local training programmes to organise for trainees to travel to either regional centres of IR training or to look at the possibility of out of programme training opportunities.
- Oversee the quality of training posts provided locally.
- Interface with other Deanery Specialty Training faculties (General Practice, Anaesthesia etc).
- Ensure adequate provision of appropriate educational events.
- Ensure curricula implementation across training programmes.
- Oversee the workplace-based assessment process and programmes.
- Co-ordinate the ARCP process for trainees.

- Provide adequate and appropriate career advice.
- Provide systems to identify and assist trainee radiologists with training difficulties.
- Provide flexible training.
- Ensure the appropriate provision of potential to progress into an academic career

### **Intended Use of Curriculum by Trainers and Trainees**

Each trainee will be given access to download the curriculum and portfolio upon enrolling as a radiological trainee with the Royal College of Radiologists.

Each trainee will engage with the curriculum by maintaining a portfolio. The trainee will use the curriculum to develop learning objectives, self-assess accomplishments in disparate areas of the curriculum, and reflect on learning experiences.

### **ePortfolio (<https://www.nhseportfolios.org>)**

The ePortfolio will be a record of a trainee's progress and development through IR training. It will provide a record of evidence of competence to work in a range of clinical settings and a record of satisfactory performance. This means that ePortfolio completion will contribute to the end of year report, annual review of competence progression (ARCP) and may also be used in interviews. Successful completion of the curriculum requires the achievement of competence in a variety of domains relating to generic medical practice, radiological and clinical practice. The assessments of these competences will be recorded in the ePortfolio

### **Ensuring Curriculum Coverage**

The details of how the curriculum is covered in any individual training programme and training unit is the responsibility of the local faculty in consultation with the Royal College of Radiologists. The need to show how trainees are progressing in their attainment of competencies will be a strong driver in ensuring that all the curriculum objectives are met.

### **Curriculum Management**

Local management of the curriculum is the responsibility of the local faculty of education.

Coordination of the curriculum at a national and regional level is the joint responsibility of the Deaneries and the Royal College of Radiologists, with robust arrangements for quality assurance of training.

## **APPENDIX B: CURRICULUM REVIEW**

The way in which this curriculum has evolved is set out in the Introduction and in the *How to Use the Curriculum* section. The Specialty Training Board of the Faculty of Clinical Radiology of the Royal College of Radiologists is responsible for review of the curriculum. Formal review will take place every two years. Interventional Radiology, including Vascular, Non-Vascular and Interventional Neuroradiology, as a technology supported specialty, is a rapidly changing and evolving specialty. The curriculum needs to be able to respond appropriately to these changes to ensure that training and education reflect modern practice. The regular meetings of Special Interest Groups, the Specialty Training Advisory Committee, the Professional Support and Standards Board and the Specialty Training Board allow opportunities for the curriculum to be discussed and amendments to be proposed and considered in advance of formal review.

Curriculum evaluation should establish how trainees have responded to the curriculum and that the curriculum facilitates practical delivery of the required training. The curriculum will be evaluated by means of a range of qualitative and quantitative data.

Trainees and lay representatives have been involved in the preparation of this curriculum and will continue to be involved in reviews, through representation from the Faculty's Junior Radiologists' Forum and the Patient Liaison Group. Trainers, tutors, Regional Advisers and Programme Directors will also continue to be involved in reviews through their membership of relevant working parties and committees.

### **Curriculum evaluation and monitoring**

#### *Evaluation of Training*

The curriculum is an educational guide, which will be interpreted and shaped locally. Evaluation is an essential element of the curriculum for monitoring and developing local implementation. Training programmes will vary in the extent to which they currently evaluate teaching, learning and supervision. Whilst there are GMC surveys of trainees and trainers that provide insights into the performance of training programmes, an evaluation process is a more forensic and locally relevant enquiry than can be achieved through national questionnaire. Local evaluation will provide the evidence for training programme development, as well as material with which to respond to the findings of the annual GMC survey. The Faculty of Clinical Radiology is not intending to conduct local evaluation at the present time. It is, therefore, the responsibilities of individual training programmes to carry out this necessary work. The sections below are intended as a guide.

#### *Who is involved in evaluation?*

Anyone involved in the programme will have a contribution to make to its evaluation. Out of these experiences, new ideas and ways of delivery could be sought. The Training Programme Director would typically co-ordinate the process with administrative support.

Local training programme committees, radiology schools and local faculties are best placed to analyse the results of evaluation.

Trainee involvement in curriculum review will be facilitated through:

- Involvement of trainees in local faculties of education
- Trainee involvement in the Specialty Training Board and Specialty Training Advisory Committee (STAC)
- Informal feedback during appraisal, ARCP and College meetings

*When should evaluation occur?*

Evaluation should be embedded in the training programme. It is an annual process. Some 'data' will be collected throughout the year, eg evaluation of teaching sessions, whilst other 'data' can be collected at a single time point, eg review of e-portfolios. The various strands of evidence will need to be summarised, analysed and formulated in time for response to the GMC survey, deanery report and recommendations for programme development.

*What to look for?*

Evaluation should be broad ranging in terms of individuals and sources without obstructing education or compromising confidentiality. There should be ample opportunities for qualitative and quantitative data analysis. The following are suggestions for sources of information to inform the evaluation process:

<b>Category</b>	<b>Sub-category</b>	<b>Sources/methods of data collection</b>
<b>Stakeholder Views</b>	Trainees	GMC Survey/Local Trainee Questionnaire/Structured Interview/Trainee Representation at LEB
	Trainers	GMC Survey/Local Trainer Questionnaire/Structured Interview/LEB minutes/review of MSF
	Support Staff	Structured Interview/Local Support Staff Questionnaire
	Clinicians	Audit of Opinions
	Patients	Departmental Patient Satisfaction Survey
<b>Teaching</b>	Formal	Trainee Attendance Record/Teacher Attendance Record/Evaluation Forms/GMC Survey
	Opportunistic	GMC Survey/Quality and ease of completion of WpBA
	Self Directed	GMC Survey/Local Trainee Questionnaire / Study Leave Records / Access to e-learning / Structured Interview /
<b>Teaching Experience</b>		Review of Outputs of Teaching Observation Tool / Structured Interview / Local Trainee Questionnaire

Category	Sub-category	Sources/methods of data collection
<b>Supervision</b>	Clinical	GMC Survey / Local Trainee Questionnaire / ePortfolio review / Trainer Qualification Record / Peer Observation / Review of Job Plans
	Educational	GMC Survey / Local Trainee Questionnaire / ePortfolio review / Trainer Qualification Record / Peer Observation / Review of Job Plans
<b>Clinical</b>	Induction	GMC Survey / Trainee Rep / Local Trainee Questionnaire
	Workload	Logbook or PACS data / Rota review / GMC Survey / Local Trainee Questionnaire / Trainee Rep at LEB / Structured Interview / Diary Card Exercise
	Support	GMC Survey / Local Trainee Questionnaire / Trainee Rep at LEB / Structured Interview / Discrepancy Audit / Complaints /
<b>Audit</b>		Review of Portfolios / Review of Audit Observation Tool / Structured Interview / Local Trainee Questionnaire
<b>Research</b>		Review of portfolios / Structured Interview / Local Trainee Questionnaire
<b>Other</b>		Ratio of Applicant to places for training scheme / Attrition rate / FRCR success rate / CCT Success / Consultant Interview Success

Monitoring and reporting will be the responsibility of the Programme Directors within the local faculties of education and Heads of Schools.

The Specialty Training Board (STB) of the Faculty of Clinical Radiology will oversee central evaluation of this curriculum and the ePortfolio. The curriculum should be regarded as a living document and the STB will ensure that it will be able to respond swiftly to new developments. The outcome of these evaluations will inform the future development of the curriculum.

The Specialty Training Advisory Committee (STAC) will undertake the practical aspects of curriculum review. The STAC is a sub-committee of the Specialty Training Board.

## **APPENDIX C: STANDARDS FOR TRAINING IN INTERVENTIONAL RADIOLOGY**

### **Entry and Indicative training**

#### **Summary of Standard Training for a CCT in Clinical Radiology (Interventional Radiology):**

- Primary Medical Qualification
- 2 Years of Foundation Years Training (FY 1&2) or equivalent is the minimum requirement. Interventional Radiology involves managing those elements of a patient's clinical condition that is relevant to the procedure being undertaken and for this reason trainees entering an IR training programme may choose to acquire greater acute clinical experience such as in acute medicine, surgery, neurology or neurosurgery before embarking on an IR career.
- Clinical Radiology Training as a specialty registrar (ST1-5) over an indicative period of five years followed by:
- A sixth year of advanced Interventional Radiology, Vascular, Non-Vascular or Interventional Neuroradiology sub- specialty training (ST6).

### **Special circumstances**

#### **Absences from training**

Absence on sick leave or maternity leave reduces the time spent in training. In appropriate circumstances, an absence for sick or maternity leave of up to three months may occur without necessarily affecting the expected date for completion of specialty training. Such absences must be notified to the Training Office of the Royal College of Radiologists as soon as is feasible, preferably in advance. The Training Office will provide guidance to the trainee and his/her training programme director about the effect of the absence upon the trainee's expected CCT date and how use of the absence allowance might be considered and recommended.

#### **Acting-up as a consultant**

A trainee who has passed the Final FRCR Part B Examination may spend up to three months, during the final year of specialist training, "acting-up" as a consultant without affecting his/her expected CCT date, provided that a consultant supervisor is identified for the post, prospective approval has been obtained from the College's Training Office, and satisfactory progress is made. Trainees and deaneries do not need to seek approval from the GMC as this training has been pre-approved across the UK.

#### **Alternative Entry Points**

Those trainees who move into a specialty training programme from a Locum Appointment – Training (LAT) post or a Fixed Term Training Post will be eligible to have the earlier post and trainee accepted towards their CCT, provided that the original post has been approved by GMC, that their training is relevant to the CCT programme in clinical radiology and that progress and performance have been satisfactory. Approval to count previous LAT training must be agreed by the College at the start of the specialty training programme. Retrospective approval once training

has started will not be allowed by the GMC. It is a legal requirement that a CCT can be awarded only to a person who has completed an entire course of training approved by GMC. Those with training and/or qualifications from outside the UK will usually be required to complete the full duration of the CCT training programme, including success in all parts of the FRCR Examination if they wish to acquire a CCT in clinical radiology. Appointment panels may take account of previous experience that has not been prospectively approved by the GMC. Trainees who meet the required criteria are not entitled to be awarded a CCT, but apply for specialist registration through the Certificate of Eligibility for Specialist Registration combined programme (CESR CP) route.

Trainees may be appointed above ST1 and must complete the rest of their training as though a CCT trainee, by following the training assessment blueprint at point of entry.

### **Out of Programme Activities**

Approval to spend time out of programme, such as for a Fellowship post or research, should be obtained in advance from the trainee's deanery and the College's Training Office. It should be noted that any time spent outside the trainee's own training programme that is to be counted towards his/her CCT, either as Out of Programme Research (OOPR) or Out of Programme Training (OOPT), will require prospective approval to be obtained from the GMC by the trainee's deanery. Further guidance can be found on the College's website:

<http://www.rcr.ac.uk/content.aspx?PageID=955>

### **Appeals**

There are formal mechanisms for appealing against decisions taken at all stages of training. Appeals against decisions of the Deanery Specialty Training Committee are conducted locally under the supervision of the Postgraduate Dean. Appeals related to examination results are conducted by the RCR; information can be obtained from the Examinations section of the College's website. Appeals against a failure to award a CCT may be made to GMC. It is important to be aware that the relevant regulations specify strict time limits within which appeals must be lodged.

## **APPENDIX D: ENSURING QUALITY IN INTERVENTIONAL RADIOLOGY**

Responsibility for the approval of the training provided in Interventional Radiology rests with the GMC as regulator (and UK competent authorities with regard to EU legislation).

### **Quality assurance - carried out by the regulatory authorities.**

Quality assurance encompasses all the policies, standards, systems and processes directed to ensuring maintenance and enhancement of the quality of postgraduate medical education in the UK. The regulators undertake planned and systematic activities to provide public and patient confidence that postgraduate medical education satisfies given requirements for quality within the principles of good regulation.

### **Quality management - carried out by the postgraduate deanery**

Quality management refers to the arrangements by which the postgraduate deanery discharges its responsibility for the standards and quality of postgraduate medical education. It satisfies itself that local education and training providers are meeting the regulator's standards through robust reporting and monitoring mechanisms.

### **Quality control - carried out at local education provider (LEP) level**

Quality control relates to the arrangements (procedures, organisation) within local education providers (Health Boards, NHS Trusts, independent sectors) that ensure postgraduate medical trainees receive education and training that meet local, national and professional standards. A guide of evidence for local quality control is outlined in *Curriculum Evaluation and Monitoring*.

These processes are interdependent. Regulators' QA is a systematic educational audit of the deanery quality management systems; the latter must include review of LEP quality control measures. The regulators have set national standards for the delivery and outcomes of Interventional Radiology and deaneries are required to demonstrate through reports and visits that the standards have been met. There are nine domains of activity described:

- patient safety
- quality assurance, review and evaluation
- equality, diversity and opportunity
- recruitment, selection and appointment
- delivery of curriculum including assessment
- support and development of trainees, trainers and local faculty
- management of education and training
- educational resources and capacity
- outcomes

In each domain, the regulators have described who is responsible for its achievement, the standard(s) to be reached, and the criteria by which its achievement is judged. The standards set by the regulators are mandatory, but the processes by which deaneries quality manage, and LEP quality control, the programme provision are not specified.

## **APPENDIX E: EQUALITY AND DIVERSITY**

The Royal College of Radiologists will comply, and ensure compliance, with the requirements of equality and diversity legislation, such as the

- Sex Discrimination Act 1975
- Race Relations Act 1976
- Data Protection Acts 1984 and 1998
- Disability Discrimination Act 1995
- Race Relations (Amendment) Act 2000
- Special Educational needs and Disabilities Act 2001
- Employment Equality (Sexual Orientation) and (Religious Belief) Regulations 2003
- Employment Equality (Age) Regulations 2006
- Equality Act 2006 (covers service delivery in relation to sexual orientation and religious belief)
- Equality Act 2010

The Royal College of Radiologists believes that equality of opportunity is fundamental to all radiological practice and to the many and varied ways in which individuals become involved with the College, either as members of staff and Officers; as advisers from the medical profession or in a lay capacity; as members of the College's professional bodies or as radiologists in training and examination candidates. Accordingly, it warmly welcomes contributions and applications from as diverse a population as possible, and actively seeks to recruit people to all its activities regardless of race, religion, ethnic origin, disability, age, gender or sexual orientation.

Deanery quality assurance will ensure that each training programme complies with the equality and diversity standards in postgraduate medical training as set by GMC.

Compliance with anti-discriminatory practice will be assured through

- monitoring of recruitment processes;
- ensuring all College representatives and TPDs have attended appropriate training sessions prior to appointment or within 12 months of taking up post;
- ensuring trainees have an appropriate, confidential and supportive route to report examples of inappropriate behaviour of a discriminatory nature;
- monitoring of College Examinations;
- ensuring all assessments discriminate on objective and appropriate criteria and do not unfairly disadvantage trainees because of gender, ethnicity, sexual orientation or disability (other than that which would make it impossible to practise safely as a radiologist). All efforts shall be made to ensure the participation of people with a disability in training.

The Royal College of Radiologists takes its obligations under the relevant equal opportunities legislation, such as the Race Relations (Amendment) Act 2000, seriously. This includes ensuring that members of staff involved in the delivery of examinations receive appropriate briefing on the implications of race equality in the treatment of candidates.

All those appointed as examiners are required to sign up to the following statement in the Examiner application form “I have read and accept the conditions with regard to the UK Race Relations Act 1976, as amended by the Race Relations (Amendment) Act 2000, and the Disabilities Discrimination Acts of 1995 and 2005 as documented above.”

In order to meet its obligations under the relevant equal opportunities legislation, such as the Disability Discrimination Acts 1995 and 2005, the RCR considers and adopts appropriate standard operating procedures to deal with the common problems as they arise. These may include dyslexia/learning disability, mobility difficulties, chronic progressive condition, upper limb or back problem, repetitive strain injury (RSI), chronic recurrent condition (eg asthma, epilepsy), deafness/hearing loss, mental health difficulty, autism spectrum disorder (including Asperger’s syndrome) and others as appropriate. The Specialty Training Board is responsible for policy and regulations in respect of decisions about accommodations to be offered to candidates with disabilities.

The Regulations introduced to update the Disability Discrimination Acts and to ensure that they are in line with EU Directives have been considered by the RCR.

For implementation see Generic curriculum – Maintaining GMP: Equality & Diversity

## **APPENDIX F: CHANGES SINCE PREVIOUS VERSIONS**

### **Changes In Relation To The Specialty Of Clinical Radiology**

This new sub-specialty curriculum for Interventional Radiology, including Vascular, Non-Vascular and Interventional Neuroradiology, incorporates and utilises changes instigated through the Clinical Radiology specialty curriculum review as well as the results of wide consultation involving the British Society of Interventional Radiology, the British Society of Neuroradiology, junior and lay representatives.

#### **Structural outline**

- the whole curriculum has been designed in educational terms with full integration of generic and radiology content
- the curriculum highlights the fact that knowledge and skills of diagnostic radiology are core to interventional radiology
- both the core clinical and interventional radiology syllabi have been modified to the educational requirements of IR.
- the layout brings the syllabus, competences and accompanying assessment to the forefront. This will facilitate easier navigation for the principal users, i.e. trainees and trainers

#### **Assessment**

- workplace based assessment methodology has been developed and radiology specific tools introduced and piloted
- specified assessments have been directly linked to each competence
- an e-Log book has been produced to record competence in procedural skills
- there is clarification of educational and clinical supervisor roles and responsibilities
- in the assessment tools, separate descriptors have been written for all grades ie for core, level 1 and level 2
- generic assessment tools for teaching skills and audit assessment have been included.

#### **Syllabus and competences**

- a new generic competences section has been included which underpins all medical practice and brings together attitudes and behaviours desirable in all doctors/radiologists
- The rationale of common presentations/diagnoses has been developed as a way of bringing the curriculum to life
- All assessments (summative and formative) have been comprehensively mapped onto the syllabus contents

### **Changes Between 2010 And 2012**

Specific references to Interventional Neuroradiology included in Introduction, section 3.2 Training Pathway, section 4 How to Use the Curriculum.

New syllabus section O added to include competencies for interventional neuroradiology.

Removed name of ex-Warden at end of introduction

Removed Section 3.2 Development as it duplicated appendix G

Updated Flexible Training guidance based on GMC document from Oct 2011.

Section 7.4 Research and the ARCP Decision Aid includes new requirement for a research project.

Appendix C clarified.

Appendix D – removed as too much detail to be in curriculum and liable to change. Up to date exams information is on RCR website

Appendix F and G (was H) – updated.

## ***APPENDIX G: CURRICULUM DEVELOPMENT***

The physics syllabus has been developed by the Physics Working Group and agreed by the Fellowship Examining Board and the Specialty Training Board of the Faculty of Clinical Radiology.

The anatomy syllabus has been developed by the Anatomy Working Group and agreed by the Fellowship Examination board and the Specialty Training Board of the Faculty of Clinical Radiology.

This curriculum was produced by members of the Specialty Training Advisory Committee of the Faculty of Clinical Radiology. The group has a broad UK representation and includes trainees and laypersons, as well as consultants who are actively involved in teaching and training.

This curriculum applies to those who commence sub-specialty training in interventional radiology from August 2010. It incorporates all the significant and relevant revisions found within clinical radiology as applicable to IR training. It is designed to ensure the delivery of IR specific training in such a way that this curriculum meets the seventeen GMC Standards for Curricula and Assessment.

The curriculum was updated by the curriculum sub-group of the Specialty Training Advisory Committee in 2012. This included the incorporation of Interventional Neuroradiology competencies, based on syllabus content developed by the British Society of Neuroradiologists.