The Intercollegiate Surgical Curriculum

Educating the surgeons of the future

Cardiothoracic Surgery Curriculum
(and Congenital Cardiac Surgery Sub-specialty)

August 2014
Including Simulation
(Updated 2015)

ISCP INTERCOLLEGIATE SURGICAL CURRICULUM PROGRAMME

Contents

This document was updated in 2015 to include changes to the Core modules and amended text to reflect the adoption of the ISCP by the Royal College of Surgeons in Ireland.

Curriculum Overview

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Introduction

The intercollegiate surgical curriculum provides the approved UK framework for surgical training from completion of the foundation years through to consultant level. In the Republic of Ireland it applies from the completion of Core Surgical Training through to consultant level. It achieves this through a syllabus that lays down the standards of specialty-based knowledge, clinical judgement, technical and operative skills and professional skills and behaviour, which must be acquired at each stage in order to progress. The curriculum is web based and is accessed through www.iscp.ac.uk.

The website contains the most up to date version of the curriculum for each of the ten surgical specialties, namely: Cardiothoracic Surgery; General Surgery; Neurosurgery; Oral and Maxillofacial Surgery (OMFS); Otolaryngology (ENT); Paediatric Surgery; Plastic Surgery; Trauma and Orthopaedic Surgery (T&O); Urology and Vascular Surgery. They all share many aspects of the early years of surgical training, but naturally diverge further as training in each discipline becomes more advanced. Each syllabus will emphasise the commonalities and elucidate in detail the discrete requirements for training in the different specialties.

Doctors who will become surgical trainees

After graduating from medical school doctors move onto a mandatory two-year foundation programme in clinical practice (in the UK) or a one year Internship (in the Republic of Ireland). During their final year of medical school students are encouraged to identify the area of medicine they wish to pursue into specialty training. During the Foundation programme or Internship, recently qualified doctors are under close supervision whilst gaining a wide range of clinical experience and attaining a range of defined competences. Entry into surgery is by open competition and requires applicants to understand, and provide evidence for their suitability to become members of the surgical profession.

Selection into a surgical discipline

The responsibility for setting the curriculum standards for surgery rests with the Royal Colleges of Surgeons which operate through the Joint Committee on Surgical Training (JCST) and its ten Specialty Advisory Committees (SACs) and Core Surgical Training Committee (CSTC). In the UK, each SAC has developed the person specifications for selection into its specialty and the person specification for entry to ST1/CT1 in any discipline. Postgraduate Medical Deaneries and/or Local Education and Training Boards (LETBs) and their Schools of Surgery are responsible for running training programmes, which are approved by the UK's General Medical Council (GMC), and for aiding the SACs in the recruitment and selection to all levels of pre-Certification training. In the Republic of Ireland, these roles are undertaken by the Royal College of Surgeons in Ireland (RCSI) and by Ireland's Medical Council of Ireland (MCoI).

The critical selection points for surgical training are at initial entry either directly into specialty training in the chosen discipline (ST1) or into a generic training period referred to as core training (CT1). Those who enter core training are then selected into the discipline of their choice after two core years and join the specialty programme at a key competency point (ST3) after which transfer from one discipline to another would be relatively unusual. Selection at both core and higher surgical training takes place via a national selection process overseen by the Deaneries/LETBs and JCST and, in the Republic of Ireland, by the RCSI.

Those who are selected into training programmes will then have to achieve agreed milestones in terms of College examinations and the Annual Review of Competence Progression (ARCP) requirements.

Guidance about the UK recruitment process, application dates and deadlines and links to national person specifications by specialty are available from the Specialty Training website here. The RCSI provides this information for Ireland.

Educational Principles of the Curriculum

The provision of excellent care for the surgical patient, delivered safely, is at the heart of the curriculum.

The aims of the curriculum are to ensure the highest standards of surgical practice in the UK and the Republic of Ireland by delivering high quality surgical training and to provide a programme of training from the completion of the foundation years through to the completion of specialty surgical training, culminating in

the award of a CCT/CESR-CP[1]/CCST. The curriculum was founded on the following key principles which support the achievement of these aims:

- A common format and similar framework across all the specialties within surgery.
- Systematic progression from the end of the foundation years through to completion of surgical specialty training.
- Curriculum standards that are underpinned by robust assessment processes, both of which conform to the standards specified by the GMC/RCSI.
- Regulation of progression through training by the achievement of outcomes that are specified within the specialty curricula. These outcomes are competence-based rather than time-based.
- Delivery of the curriculum by surgeons who are appropriately qualified to deliver surgical training.
- Formulation and delivery of surgical care by surgeons working in a multidisciplinary environment.
- Collaboration with those charged with delivering health services and training at all levels.

The curriculum is broad based and blueprinted to the GMC's Good Medical Practice and RCS England's (on behalf of all four Royal Colleges in the UK and the Republic of Ireland) Good Surgical Practice frameworks to ensure that surgeons completing the training programme are more than just technical experts.

Equality and diversity are integral to the rationale of the curriculum and underpin the professional behaviour and leadership skills syllabus. The ISCP encourages a diverse surgical workforce and therefore encourages policies and practices that:

- ensure that every individual is treated with dignity and respect irrespective of their age, disability, race, religion, sex, sexual orientation or marital status, or whether they have undergone gender reassignment or are pregnant.
- promote equal opportunities and diversity in training and the development of a workplace environment in which colleagues, patients and their carers are treated fairly and are free from harassment and discrimination.

It is expected that these values will be realised through each individual hospital trust's equality and diversity management policies and procedures. This principle also underlies the Professional Behaviour and Leadership syllabus.

Who Should Use the Curriculum?

The ISCP comprises the curricula for the ten surgical specialties which are GMC-approved in the UK and MCoI-approved in the Republic of Ireland. It reflects the most up to date requirements for trainees who are working towards a UK Certificate of Completion of Training (CCT), a UK Certificate of Eligibility for Specialist Registration via the Combined Programme (CESR-CP) or, in the Republic of Ireland, a Certificate of Completion of Specialist Training (CCST). Where an older version of the curriculum is superseded, trainees will be expected to transfer to the most recent version in the interests of patient safety and educational quality.

The GMC's position statement on moving to the most up to date curriculum is here.

The curriculum is appropriate for trainees preparing to practice as consultant surgeons in the UK and the Republic of Ireland. It guides and supports training for a UK Certificate of Completion of Training (CCT), a UK Certificate of Eligibility for Specialist Registration via the Combined Programme (CESR-CP) or, in the Republic of Ireland, Certificate of Completion of Specialist Training (CCST) in a surgical specialty. The curriculum enables trainees to develop as generalists within their chosen surgical specialty, to be able to deliver an on-call emergency service and to deliver more specialised services to a defined level.

A CCT/CESR-CP/CCST can only be awarded to trainees who have completed a fully- or part-approved specialty training programme. Doctors applying for a full Certificate of Eligibility for Specialist Registration (CESR) will be required to demonstrate that they meet the standards required for a CCT/CESR-CP/CCST as set out in the most up to date curriculum at the time of application.

Components of the Curriculum

The surgical curriculum has been designed around four broad areas, which are common to all the surgical specialties:

- **Syllabus** - what trainees are expected to know, and be able to do, in the various stages of their training
- **Teaching and learning** - how the content is communicated and developed, including the methods by which trainees are supervised
- **Assessment and feedback** - how the attainment of outcomes are measured/judged with formative feedback to support learning
- **Training systems and resources** - how the educational programme is organised, recorded and quality assured

In order to promote high quality and safe care of surgical patients, the curriculum specifies the parameters of knowledge, clinical skills, technical skills, professional behaviour and leadership skills that are considered necessary to ensure patient safety throughout the training process and specifically at the end of training. The curriculum therefore provides the framework for surgeons to develop their skills and judgement and a commitment to lifelong learning in line with the service they provide.

Length of training

A similar framework of stages and levels is used by all the specialties. Trainees progress through the curriculum by demonstrating competence to the required standard for the stage of training. Within this framework each specialty has defined its structure and indicative length of training. Each individual specialty syllabus provides details of how the curriculum is shaped to the stages of training.

In general terms, by the end of training, surgeons have to demonstrate:

- Theoretical and practical knowledge related to surgery in general and to their specialty practice;
- Technical and operative skills;
- Clinical skills and judgement;
- Generic professional and leadership skills;
- An understanding of the values that underpin the profession of surgery and the responsibilities that come with being a member of the profession;
- The special attributes needed to be a surgeon;
- A commitment to their on-going personal and professional development and practice using reflective practice and other educational processes;
- An understanding and respect for the multi-professional nature of healthcare and their role in it; and
- An understanding of the responsibilities of being an employee in the UK and/or Republic of Ireland health systems and/or a private practitioner.

In the final stage of training, when the trainee has attained the knowledge and skills required for the essential aspects of the curriculum in their chosen specialty, there will be the opportunity to extend his/her skills and competences in one or two specific fields. The final stage of the syllabus covers the major areas of specialised practice. The syllabuses are intended to allow the future CCT/CESR-CP/CCST holder to develop a particular area of clinical interest and expertise prior to appointment to a consultant post. Some will require further post-certification training in order to achieve the competences necessary for some of the rarer complex procedures. In some specialties, interface posts provide this training in complex areas pre-certification.

Acting up as a consultant (AUC)

'Acting up' under supervision provides final year trainees with experience to help them make the transition from trainee to consultant. A period of acting up offers trainees an opportunity to get a feel for the consultant role while still being under a level of supervision.

The post must be defined as acting up for an absent consultant, and cannot be used to fill a new locum consultant post or to fill service needs.

The trainee acting up will be carrying out a consultant's tasks but with the understanding that they will have a named supervisor at the hosting hospital and that the designated supervisor will always be available for support, including out of hours or during on-call work.

Specialty Advisory Committee (SAC) support is required and must be sought prospectively through an application to the JCST. Further GMC prospective approval is not required unless the acting up post is outside the home Deanery/LETB. If accepted the AUC will be able to count towards the award of a CCT/CESR-CP/CSD. Trainees will need to follow the JCST guidance which can be found on the JCST website.

Educational Framework

The educational framework is built on three key foundations that are interlinked:

- Stages in the development of competent practice
- Standards in the areas of specialty-based knowledge, clinical judgement, technical and operative skills, and professional behaviour and leadership
- Framework for Appraisal, Feedback and Assessment

Stages of training

The modular surgical curriculum framework has been designed to define stages in the development of competent surgical practice, with each stage underpinned by explicit outcome standards. This provides a means of charting progress through the various stages of surgical training in the domains of specialty-based knowledge, clinical and technical skills and professional behaviour and leadership (including judgement).

Each surgical specialty has adapted this approach to reflect their training pathway. Therefore, although the educational concept is the same for all specialties the composition of the stages will differ.

UK Only

The core (or initial stage for run-through training) reflects the early years of surgical training and the need for surgeons to gain competence in a range of knowledge and skills many of which will not be specialty-specific. A syllabus, which is common to all the surgical specialties (the common component of the syllabus, which is founded in the applied surgical sciences) has been written for this stage. This is supplemented by the topics from the appropriate surgical specialty syllabus as defined in each training programme (the specialty-specific component of the syllabus).

UK and Republic of Ireland

During the intermediate and final stages the scope of specialty practice increases with the expansion in case mix and case load and this is accompanied by the need for greater depth of knowledge and increasing skills and judgement. The content is therefore based on progression, increasing in both depth and complexity through to the completion of training.

Standards of training

Surgeons need to be able to perform in differing conditions and circumstances, respond to the unpredictable, and make decisions under pressure, frequently in the absence of all the desirable data. They use professional judgement, insight and leadership in everyday practice, working within multi-professional teams. Their conduct is guided by professional values and standards against which they are judged. These values and standards are laid down in the General Medical Council's Good Medical Practice in the UK and the Republic of Ireland Medical Council's Guide to Professional Conduct and Ethics.

The Professional Behaviour and Leadership Skills syllabus is mapped to the Leadership framework as laid out by the Academy of Medical Royal Colleges and derived from Good Medical Practice. The Professional Behaviour and Leadership skills section of the syllabus is common to all surgical specialties and is based on Good Medical Practice.

The syllabus lays down the standards of specialty-based knowledge, clinical judgement, technical and operative skills and professional skills and behaviour that must be acquired at each stage in order to progress. The syllabus comprises the following components:

- A specialty overview which describes the following:
  - Details of the specialty as it practised in the UK and the Republic of Ireland
  - The scope of practice within the specialty
  - The key topics that a trainee will cover by the end of training
  - An overview of how, in general terms, training is shaped
- Key topics that all trainees will cover by certification and will be able to manage independently, including complications. These are also referred to as essential topics.
- Index procedures that refer to some of the more commonly performed clinical interventions and operations in the specialty. They represent evidence of technical competence across the whole range of specialty procedures in supervised settings, ensuring that the required elements of specialty practice are acquired and adequately assessed. Direct Observations of Procedural Skills (DOPS) and Procedure-based Assessments (PBAs) assess trainees carrying out index procedures (whole procedures or specific sections) to evidence learning.
- The stages of training, which comprise a number of topics to be completed during a notional period of training. Within each stage there is the syllabus content which contains the specialty topics that must be covered. Each of these topics includes one or more learning objectives and the level of performance / competence to be achieved at completion in the domains of:
  - Specialty-based knowledge
  - Clinical skills and judgement
  - Technical and operative skills

Standards for depth of knowledge during early years surgical training (UK only)

In the early years of training, the appropriate depth and level of knowledge required can be found in exemplar texts tabulated below. We expect trainees to gain knowledge from these texts in the context of surgical practice defined in the core surgical component of the curriculum above.

The curriculum requires a professional approach from surgical trainees who will be expected to have a deep understanding of the subjects, to the minimum standard laid out below. It is expected that trainees will read beyond the texts below and will be able to make critical use, where appropriate of original literature and peer scrutinised review articles in the related scientific and clinical literature such that they can aspire to an excellent standard in surgical practice.

The texts are not recommended as the sole source within their subject matter and there are alternative textbooks and web information that may better suit an individual's learning style. Over time it will be important for associated curriculum management systems to provide an expanded and critically reviewed list of supporting educational material.

Topic	Possible textbooks or other educational sources
Anatomy	Last's Anatomy: Regional and Applied (MRCS Study Guides) by R.J. Last and Chummy Sinnatamby Netter's Atlas of Human Anatomy 4th Edition Saunders-Elsevier ISBN-13-978-1-4160-3385-1
Physiology	Ganong's Review of Medical Physiology, 23rd Edition (Lange Basic Science)
Pathology	Robbins Basic Pathology by Vinay Kumar MBBS MD FRCPath, Abul K. Abbas MBBS, Nelson Fausto MD, and Richard Mitchell MD PhD
Pharmacology	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S.

	Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Microbiology	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Radiology	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Grainger & Allison's Diagnostic Radiology, 5th Edition. Andy Adam (Editor), Adrian Dixon (Editor), Ronald Grainger (Editor), David Allison (Editor) Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Common surgical conditions	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Surgical skills	Basic surgical skills course and curriculum
Peri-operative care including critical care	ATLS® course CCrISP course Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Surgical care of children	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor) Jones Clinical Paediatric Surgery Diagnosis and Management Editors JM Hutson, M O'Brien, AA Woodward, SW Beasley 6th Edition 2008 Melbourne Blackwell Paediatric Surgery: Essentials of Paediatric urology by D Thomas, A Rickwood, P Duffy

Care of the dying	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)
Organ transplantation	Principles and Practice of Surgery by O. James Garden MB ChB MD FRCS(Glasgow) FRCS(Edinburgh) FRCP (Edinburgh) FRACS(Hon) FRCSC(Hon) Professor, Andrew W. Bradbury BSc MBChB MD MBA FRCSEd Professor, John L. R. Forsythe MD FRCS(Ed) FRCS, and Rowan W Parks Bailey and Love's Short Practice of Surgery 25th Edition by Norman S. Williams (Editor), Christopher J.K. Bulstrode (Editor), P. Ronan O'Connell (Editor)

In addition to these standard texts, sample MRCS MCQ examination questions are also available at www.intercollegiatemrcs.org.uk, which will demonstrate the level of knowledge required to be able to successfully pass the MRCS examination.

Standards for depth of knowledge during intermediate and final years surgical training

In the intermediate and final stages of surgical training the following methodology is used to define the relevant depth of knowledge required of the surgical trainee. Each topic within a stage has a competence level ascribed to it for knowledge ranging from 1 to 4 which indicates the depth of knowledge required:

1. knows of
2. knows basic concepts
3. knows generally
4. knows specifically and broadly

Standards for clinical and technical skills

The practical application of knowledge is evidenced through clinical and technical skills. Each topic within a stage has a competence level ascribed to it in the areas of clinical and technical skills ranging from 1 to 4:

1. Has observed

Exit descriptor; at this level the trainee:

- Has adequate knowledge of the steps through direct observation.
- Demonstrates that he/she can handle instruments relevant to the procedure appropriately and safely.
- Can perform some parts of the procedure with reasonable fluency.

2. Can do with assistance

Exit descriptor; at this level the trainee:

- Knows all the steps - and the reasons that lie behind the methodology.
- Can carry out a straightforward procedure fluently from start to finish.
- Knows and demonstrates when to call for assistance/advice from the supervisor (knows personal limitations).

3. Can do whole but may need assistance

Exit descriptor; at this level the trainee:

- Can adapt to well- known variations in the procedure encountered, without direct input from the trainer.
- Recognises and makes a correct assessment of common problems that are encountered.
- Is able to deal with most of the common problems.
- Knows and demonstrates when he/she needs help.
- Requires advice rather than help that requires the trainer to scrub.

4. Competent to do without assistance, including complications

Exit descriptor, at this level the trainee:

- With regard to the common clinical situations in the specialty, can deal with straightforward and difficult cases to a satisfactory level and without the requirement for external input.
- Is at the level at which one would expect a UK consultant surgeon to function.
- Is capable of supervising trainees.

The explicit standards form the basis for:

- Specifying the syllabus content;
- Organising workplace (on-the-job) training in terms of appropriate case mix and case load;
- Providing the basis for identifying relevant teaching and learning opportunities that are needed to support trainees' development at each particular stage of progress; and
- Informing competence-based assessment to provide evidence of what trainees know and can do.

Standards for the professional skills and leadership syllabus

The methodology used to define the standards for this component of the syllabus is through a series of descriptors that indicate the sorts of activities that trainees should be able to successfully undertake at two specific time points, namely the end of "early years" training (i.e. entry into ST3, or ST4 in Neurosurgery) and the end of surgical training (i.e. certification).

The Framework for Appraisal, Feedback and Assessment

The curriculum is consistent with the four domains of Good Medical Practice:

- Knowledge, skills and performance
- Safety and quality
- Communication, partnership and team-working
- Maintaining trust

The knowledge, skills and performance aspects are primarily found within the specialty-specific syllabus. All domains are reflected within the professional behaviour and leadership syllabus, which also reflect the Academy's common competence and leadership competence frameworks.

The purpose and structure of the training programme

The curriculum is competence-based. It focuses on the trainee's ability to demonstrate the knowledge, skills and professional behaviours that they have acquired in their training (specified in the syllabus) through observable behaviours. Since it is competence-based, it is not time-defined and accordingly it allows these competences to be acquired in different time frames according to variables such as the structure of the programme and the ability of the trainee. Any time points used are therefore merely indicative.

There are certain milestones or competence points which allow trainees to benchmark their progress:

- Entry to surgical training - CT1 (or ST1 for those specialties or localities with run-through programmes)
- Entry to entirely specialised training - ST3*
- Exit at certification

*** A critical competence point is ST3 at which point, in practice, trainees will make a clear commitment to one of the ten SAC-defined disciplines of surgery.**

UK Only

Within the early years of training (defined as the period prior to entry into ST3), much of the content is common across all the surgical specialties. During this period, trainees will acquire the competences that are common to all surgical trainees (defined as common competences) together with a limited range of competences that are relevant to their chosen surgical specialty (defined as specialty-specific competences).

- Those who have made a definitive choice of their desired surgical specialty, and who have been able to enter a "run-through" training programme, will be able to focus upon achieving the common competences and the specialty-specific competences for their chosen specialty.
- Those who have not yet made a definitive choice of their desired surgical specialty will obtain a range of extra competences in a variety of surgical specialties, while at the same time sampling those specialties, before focussing on the chosen specialty prior to entry into ST3.

For those not in run-through programmes, within the early years, training is not committed to a specific surgical specialty and trainees can enter any of the relevant specialties at ST3 level provided they a) meet their educational milestones in the common surgical component of the curriculum and b) satisfy all the specialty requirements for entry in the specialty of their choice. The different training schemes offered by the Postgraduate Deaneries and Local Education and Training Boards (LETBs) meet different educational needs and permit trainees to make earlier or later final career choices based on ability and preference.

It is essential that trainees achieve both common and specialty-specific competence to be eligible to compete at the ST3 specialty entry competence level. In the early years (initial stage), the common core component reflects the level of competence that all surgeons must demonstrate, while specialty-specific competence reflects the early competences relevant to an individual specialty.

From August 2013, the MRCS examination became a formal exit requirement from Core Surgical Training. It is also a mandatory requirement to enter higher specialty training in any discipline, irrespective of candidates reaching all other educational requirements. Otolaryngology trainees are required to pass the MRCS(ENT) examination or the MRCS and the DO-HNS examination.

UK and Republic of Ireland

Following entry into higher specialty training (which for those who have undergone training in core programmes will follow on from a second selection process), the trainee will typically undergo a period of training in the broad specialty and at the higher levels begin to develop an area of special interest, to allow some degree of specialisation in his or her subsequent career.

Early Years Surgical Training – UK Only

The purposes of early years (i.e. the initial stage) training are:-

1. To provide a broad based initial training in surgery with attainment of knowledge, skills and professional behaviours relevant to the practice of surgery in any specialist surgical discipline. This is defined within the common component of the syllabus (which is also the syllabus of the MRCS).
2. In addition it will provide early specialty training such that trainees can demonstrate that they have the knowledge, skills and professional behaviours to enter higher specialty training in a surgical specialty. The specialty element in the early years is not tested in the MRCS but through workplace-based assessments (WBAs) in the first instance.

Additionally trainees will be continuously assessed on the contents of the common component and their specialty specific slots through WBAs and structured reports from Assigned Educational Supervisors (AES) which in turn contribute to the Annual Review of Competence Progression (ARCP); this includes the level of

competence expected of all doctors including surgeons to meet their obligations under Good Medical Practice (GMP) in order to remain licensed to practise.

Trainees who gain entry to higher specialty training despite some remediable and identified gaps in their specialty specific curriculum competences must ensure that these are dealt with expeditiously during ST3. All these gaps must be addressed by the time of a ST3 ARCP as part of their overall permission to progress to ST4. They must be specifically addressed through local learning agreements with educational supervisors. Trainees with identified gaps must be accountable to the Training Programme Directors (TPDs) whom in turn must address this as part of their report to the ARCP process.

Intermediate and Final Years Specialty Training – UK and Republic of Ireland

The purposes of the intermediate and final years training are:

1. To provide higher specialty training in the specialty with attainment of knowledge, skills and professional behaviours relevant to the practice in the specialty. This is defined within the specialty-specific component of the early years syllabus and the intermediate and final stages of the syllabus (and is also the syllabus of the FRCS).
2. To develop competence to manage patients presenting either acutely or electively with a range of symptoms and conditions as specified in the syllabus (and the syllabus of the FRCS).
3. To develop competence to manage an additional range of elective and emergency conditions by virtue of appropriate training and assessment opportunities obtained during training as specified by special interest or sub-specialty components of the final stage syllabus. This is tested either by the FRCS and/or by WBAs.
4. To acquire professional competences as specified in the syllabus and in the General Medical Council's Guide to Professional Conduct and Ethics.

The Training Pathway

From the trainee's perspective, he or she will be able to undertake surgical training via differing routes depending on which training scheme they choose or are selected for.

1. Run-through training (UK only)

For those trainees who are certain of their specialty choice, and who choose to enter "run-through" training, competitive entry into ST1 will be possible in their chosen specialty to certification, where this is offered by the specialty. As well as specialty-specific competences, those on this route will still need to attain the level of competence common to all surgeons before entering ST3 (ST4 in Neurosurgery) and this will be assessed through the MRCS, WBAs and the ARCP. This route is currently available in Neurosurgery (and in some Deaneries/LETBs Cardiothoracic Surgery, Oral and Maxillofacial Surgery and Trauma and Orthopaedic Surgery).

2. Uncoupled training

This route is currently available in General Surgery, Cardiothoracic Surgery, Oral and Maxillofacial Surgery, Otolaryngology, Paediatric Surgery, Plastic Surgery, Trauma and Orthopaedic Surgery, Urology and Vascular Surgery.

For those trainees who are either uncertain of their chosen specialty, who are unable to gain entry to run-through training, or who choose a specialty that does not offer the run-through route, a period of "Core" surgical training will be necessary. This period of training is designated CT1 and CT2 in the UK. During this period trainees will attain the common surgical knowledge and skills and generic professional behaviours, while sampling a number of surgical specialties. In addition to attaining common competences, trainees will need to complete their speciality specific competences to be eligible to enter ST3 in their chosen specialty. They will then seek to enter specialty training at the ST3 level by competitive entry. Open competition will test trainees against SAC defined competences for ST3 entry.

This model has a number of possible variants. Core training might sample several specialties, without any particular specialty focus. In such cases some specialty top up training may be needed later on in order to reach specialty entry at ST3 level. Another variant would organise core training along a theme that supports

progression to a specific specialty. In these situations many trainees may pass straight from CT2 to ST3 in their chosen discipline if selected. In practice, core surgical training will run over an indicative timescale of 2 years (CT1-2).

3. Academic training

In the UK some early years' trainees may wish to pursue an academic surgical career and will devote a significant proportion of their time to additional academic pursuits including research and teaching. For the majority this will lead (later in specialised training) to a period of time in dedicated research, resulting in the award of a higher degree in a scientific area related to their chosen specialty. For others who wish to revert to full time clinical training, this will also be possible, providing that the relevant clinical competences are achieved.

General information on UK academic pathways can be found using the following link: http://specialtytraining.hee.nhs.uk/news/the-gold-guide/

The JCST is keen to support academic careers within surgery and has ensured that the surgical curriculum is flexible enough to accommodate an academic pathway. The curriculum specifies that each individual trainee's training is planned and recorded through the learning agreement.

In England, Academic Clinical Fellows (ACFs) are generally expected to achieve the same level of clinical competence as other surgical trainees within the same timeframe. In order to progress through training pathways the ACF, in addition to demonstrating competence in clinical aspects, will generally be required to have obtained a funded Research Training Fellowship in order to undertake a PhD or MD, which they will complete during an out of programme period. Some trainees during their period of full-time research may want to carry out some clinics or on call, if they and their academic supervisor feel that it is in their best interests. On successful completion of a PhD or MD the ACF will either return to their clinical programme, apply for an Academic Clinical Lecturer (ACL) or Clinician Scientist post.

Arrangements for academic training differ in detail in the devolved nations of the UK and in the Republic of Ireland. For Wales, further information can be obtained from http://www.walesdeanery.org/index.php/en/wcat.html. For Scotland, information can be obtained at http://www.nes.scot.nhs.uk/, and for Northern Ireland at http://www.nimdta.gov.uk/.

In the Republic of Ireland trainees with an interest in academic surgery may choose to spend time out of training in a dedicated research post.

Academic trainees will need to complete all the essential elements of their specialty syllabus satisfactorily in order to be awarded a CCT, CESR-CP or CCST. It is acknowledged that Clinical Academics may take somewhat longer in training to achieve competence at CCT/CESR-CP level than trainees taking a clinical pathway; however they will be supported fully and treated as individuals with their personal progress being matched to their learning agreement.

Moving from one discipline of surgery to another

In the early years it is possible that a trainee who has started to develop a portfolio consistent with a particular specialist discipline might wish to move to another. One of the strengths of the flexible early years programme is that it will be possible, depending on the local circumstances, to make such changes with an identification of suitable educational competences that may be transferred. This is strictly conditional on a trainee achieving the educational milestones so far agreed for them. Moving from one discipline to another because of the need to remediate in the original discipline would not normally be permitted. All common requirements, for example, possession of the MRCS, would be transferable. Those leaving ENT however could not use the DO-HNS examination as equivalent to the MRCS examination and those wishing to enter ENT (and already having the MRCS) would be required to sit the Part 2 DO-HNS examination.

In order to be eligible to move from one discipline to another the following conditions therefore apply:

1. Achieve a satisfactory outcome in ARCPs up to that point including all relevant WBAs.
2. Fulfil the minimum period in the new specialty of choice in order to progress to ST3 in that discipline (ST4 in Neurosurgery).
3. Obtain the new position through open competition in the annual selection round.

4. Pass the MRCS, MRCS(ENT) (or DO-HNS in addition to the MRCS) examination

The process in practice would be subject to local negotiations between the Postgraduate Dean or appointed nominee in the Republic of Ireland, designated training supervisors and the trainee making the request. If the decision to change theme in core programmes occurs early the effective increase in training time may be minimal. If the decision occurs later or during run-through, more time spent in the early years is almost inevitable. The progression to ST3 is in essence competence rather than time dependent. Those spending longer having made a change may be subject to limitations on any subsequent period required for remediation, although this ultimately would be a Deanery/LETB decision.

Completion of training

Successful completion of the programme in the UK will result in a Certificate of Completion of Training (CCT) or a Certificate of Eligibility for Specialist Registration via the Combined Programme (CESR-CP) and, in Ireland, a Certificate of Completion of Specialist Training (CCST), and placement on the Specialist Register of the GMC or the Medical Council of Ireland (MCoI). This will indicate that the surgeon has reached the curriculum standards of competence to practice as a consultant surgeon in the UK or the Republic of Ireland. These requirements are set by the SACs and the Royal Colleges of Surgeons, are approved by the GMC in the UK or MCol in Ireland, and translate into the ability to manage a significant proportion of the elective work within the specialty and to undertake the primary management of emergencies. It is anticipated that where additional, well-recognised specialist skills are required by the service, these will be gained by the completion of additional modules before the completion of training and the award of the specialty certificate.

Doctors who wish to join the GMC's Specialist Register and have not followed a full or part of a training programme approved by the GMC in the UK leading to a CCT/CESR-CP but who may have gained the same level of skills and knowledge as CCT/CESR-CP holders can apply for a Certificate of Eligibility for Specialist Registration (CESR).

Once on the Specialist Register, all surgeons will be expected to maintain their professional development in line with Good Medical Practice for the purpose of revalidation in the UK, and in accordance with the Professional Competence Scheme (PCS) in the Republic of Ireland.

The Syllabus

Overview and objectives of the Cardiothoracic Surgery Curriculum

Cardiothoracic Surgery is the speciality of medicine that deals with the diagnosis, evaluation and surgical management of diseases of the heart, lungs oesophagus and chest. Cardiothoracic surgeons undertake surgical treatment of a wide range of serious conditions, and cardiothoracic operations tend to be major and often complex procedures. Many of these operations require support from advanced forms of technology, such as cardiopulmonary bypass, invasive monitoring and minimally invasive equipment. Because of the serious nature of the conditions and the scale of the operations, many cardiothoracic patients require care on the intensive therapy unit, and cardiothoracic surgeons are also proficient in this aspect of their patients' care.

Cardiothoracic surgeons generally work closely with their colleagues in Cardiology, Respiratory Medicine, Oncological Medicine, Anaesthesia and Intensive Care. They also have close professional relationships with other non-medical staff such as perfusionists, intensive care staff and operating department personnel.

Whilst many cardiothoracic surgeons develop proficiency in the broad range of the specialty, some tend to focus and develop expertise in more complex areas of special interest. These include:

- Cardiac surgery
- Thoracic surgery
- Surgery of the aorta
- Transplantation and heart failure surgery
- Congenital surgery in children
- Congenital surgery in adults
- Oesophageal surgery

The Society for Cardiothoracic Surgery in Great Britain and Ireland represents the professional interests of the speciality and has a web site (www.scts.org) where further information can be obtained. Further information about cardiothoracic surgery, including training-related material, can be found on the excellent CTSnet site http://www.ctsnet.org/.

Tim Graham - SAC Chair
Steve Livesey - SAC Content Editor

The Purposes of Training in the Specialty of Cardiothoracic Surgery

The purpose of the training programme is to produce trained cardiothoracic surgeons, who will have the clinical knowledge, the surgical expertise and the professional skills necessary for consultant practice in the UK.

This includes:

- Competence in the management of patients presenting with a range of symptoms and elective conditions as specified in the core syllabus for the specialty of cardiothoracic surgery.
- Competence to manage an additional range of elective and emergency conditions by virtue of appropriate training and assessment opportunities obtained during training.
- Professional competences as specified in the syllabus and derived from the framework of Good Medical Practice of the General Medical Council of the UK, respectively.

The Training Pathway in the Specialty of Cardiothoracic Surgery

Entry into cardiothoracic surgery is currently extremely competitive, and there is projected to be a shortage of consultant posts for future trainees. New ways of working in cardiothoracic surgery are currently being explored and debated.

The standards and the delivery of training are overseen by the Specialist Advisory Committee (SAC) in Cardiothoracic Surgery. The SAC has a consultant member nominated by the trainees (the Cardiothoracic Dean) who is responsible for direct contact with trainees and who is available to deal with problems or questions trainees may have.

The objective of the training programme is to produce trained cardiothoracic surgeons, who will have the clinical knowledge, the surgical expertise and the professional skills necessary for consultant practice.

The syllabus, therefore, defines the requirements of the training programme in cardiothoracic surgery. It identifies distinct topics within the specialty and defines the requirements or competences within each of these areas, at each stage of training.

Within each module, the levels of competence are further defined in the following domains:

Knowledge: e.g. basic scientific knowledge; clinical knowledge

Clinical skills: e.g. history, examination, data interpretation, patient management

Technical skills and procedures: e.g. technical procedures, operative management

Professional behaviour and leadership skills: transferable or generic, professional skills expected of all surgeons

The curriculum also identifies the tools that will be used to **assess competence and monitor progress.** Cardiothoracic training is now to be seen as competence based rather than, as in the past, determined solely by the number of years in training or by the numbers of procedures performed. The competence levels are defined for each key stage. The programme is therefore now described in terms of **initial, intermediate I and II, and final** phases.

Upon successful completion of the programme the Cardiothoracic Trainee will be able to demonstrate competence in all aspects of the management (including operative management) of a number of key topics.

Special Interest Training

Some trainees may wish to develop a particular special interest in the latter stages of their training and to develop expertise and competence in these areas, beyond those normally expected at CCT.

These areas of special interest for cardiothoracic surgery are described in the syllabus. It is recognised that to develop these competencies may require an extension of the training period, and in some cases full competence will only be achieved by mentoring during the post CCT period.

Congenital Heart Disease

The assessment and management of adults and children with congenital heart disease to include:

- Competence in the operative management of common uncomplicated congenital conditions (e.g. PDA, atrial and ventricular septal defects, coarctation, shunts and PA banding)
- Exposure to and experience in more complex operative procedures (e.g. valve surgery, Tetralogy of Fallot, pulmonary atresia, Fontan procedures, extra cardiac conduits, AV canal defects.)
- Full competence in operative management of more complex cases, including secondary procedures to be developed in the post CCT period.

Surgery for Heart Failure and Intrathoracic Transplantation

- The assessment and management of a patient with heart failure including the selection criteria for various treatment options
- Operative management of heart failure including transplantation, revascularisation, ventricular reverse remodelling and mitral valve surgery
- Full competence in the operative management of more complex cases, including secondary procedures to be developed in the post CCT period

Disorders of the Oesophagus

- The assessment and management of a patient with benign and malignant oesophageal disease including reflux disorders
- Operative management of benign and malignant oesophageal disease in suitable situations
- Full competence in operative management of more complex cases to be developed in the post CCT period.

Academic Surgery

Academic surgery provides an exciting and challenging career for those who wish to combine clinical surgery with a major commitment to research and undergraduate teaching.

- Trainees interested in this career pathway will, in addition to completing clinical training in general cardiothoracic surgery acquire a high level of competency in research.
- Previously, the majority of trainees in cardiothoracic surgery completed a higher degree before embarking on formal training in the specialty – whilst this may no longer be the norm, those considering an academic career should consider applying principally to those units where there is a Chair in Cardiothoracic Surgery.

The Scope and Standards of Cardiothoracic Surgical Practice at CCT

The areas of practice in cardiothoracic surgery are:

- Critical Care and Postoperative Management
- Cardiopulmonary Bypass, Myocardial Protection and Circulatory Support
- Ischaemic Heart Disease
- Heart Valve Disease
- Aorto-vascular Disease
- Intrathoracic Transplantation and Surgery for Heart Failure
- Congenital Heart Disease
- Cardiothoracic Trauma
- Thoracic Surgery – General
- Neoplasms of the Lung
- Disorders of the Pleura
- Disorders of the Chest Wall
- Disorders of the Diaphragm
- Emphysema and Bullae
- Disorders of the Pericardium
- Disorders of the Mediastinum
- Disorders of the Airway
- Benign Oesophageal Disease
- Malignant Oesophageal Disease

The specific requirements of each of these areas of practice are explained in depth in each topic within the syllabus.

The Configuration and Delivery of Cardiothoracic Surgical Services

Cardiothoracic surgery tends to be concentrated into large regional or teaching hospitals, where there is easy access to all medical and support facilities. There will usually be somewhere between 5 and 10 consultant surgeons in each unit, each surgeon performing approximately 200 major operations each year.

Entry into cardiothoracic surgery is currently extremely competitive and is currently by a process of national selection at ST3. The national selection currently occurs once per year.There was a moratorium on new trainees entering the specialty but this was lifted in 2006 as the requirement for future specialists in cardiothoracic surgery became clear.

Future Trends in Cardiothoracic Surgery

There are many influences on the type of work undertaken by cardiothoracic surgeons.

In cardiac surgery the predominant disease that we deal with is coronary artery disease. Although many more patients are now treated by percutaneous intervention than by cardiac surgery, the increasing age of the population has maintained the requirement for many patients to have surgical revascularisation – often for increasingly complex disease.

Changing demographics and downward pressure on waiting times are also increasing the demand for surgery for valvular heart disease.

In thoracic surgery there is some evidence that too few resections for lung cancer are being performed in the UK when compared to similar countries; this, combined with an increasing trend for the management of all patients suffering from lung cancer to be discussed at multi-disciplinary meetings, is increasing the need for surgeons who specialise in thoracic surgery.

Key Topics

1. **Critical Care and Postoperative Management**

    - The management of critically ill cardiothoracic surgical patients in the pre and post operative periods

2. **Cardiopulmonary Bypass, Myocardial Protection and Circulatory Support**

    - The management of a patient undergoing cardiopulmonary bypass
    - The management of myocardial protection during cardiac surgery
    - The management of a patient requiring circulatory support

3. **Ischaemic Heart Disease**

    - The assessment and management of patients with coronary heart disease, including elective and emergency presentations. To include competence in both primary and secondary procedures, and where appropriate to include off-pump and on-pump strategies and arterial revascularisation
    - The preliminary assessment and initial management of patients with complications of myocardial infarction, including mitral regurgitation, ventricular aneurysm and septal defects. To include operative management in appropriate situations. Full competence in operative management of complex cases to be developed in the post CCT period

4. **Heart Valve Disease**

    - The assessment and management of patients with valvular heart disease; including both isolated and combined aortic and mitral valve disease.
    - The assessment and management of patients with combined coronary and valvular heart disease, including operative management.
    - Full competence in operative management of complex cases including mitral valve repair and secondary procedures to be developed in the post CCT period.

5. **Aortovascular Disease**

    - The preliminary assessment and initial management of patients with acute dissection of the ascending aorta. To include operative management in appropriate situations.
    - Full competence in operative management of complex cases to be developed in the post CCT period

6. **Cardiothoracic Trauma**

    - The assessment and management of patients with minor and major cardiothoracic trauma. To include operative management in appropriate situations.
    - Full competence in the operative management of complex cases including great vessel injury to be developed in the post CCT period

7. **General Management of a Patient Undergoing Thoracic Surgery**

    - Patient selection and determination of suitability for major thoracic surgery and the pre and postoperative management of a thoracic surgical patient.
    - The assessment and management of a patient by bronchoscopy including foreign body retrieval
    - The assessment and management of a patient by mediastinal exploration

- Competence in performing appropriate thoracic incisions

8. **Neoplasms of the Lung**

    - The assessment and management of lung cancer, including the scientific basis of staging systems and techniques used in the determination of stage and fitness for surgery

    - An understanding of the role of surgical treatment in the multidisciplinary management of lung cancer and other intrathoracic malignant diseases, including an appreciation of the principles of other treatment modalities and their outcomes

9. **Disorders of the Pleura**

    - The assessment and management of patients with pleural disease; including pneumothorax and empyema, and including both VATS and open strategies

10. **Disorders of the Chest Wall**

    - The assessment and management of patients with chest wall abnormalities, infections and tumours

11. **Disorders of the Diaphragm**

    - The assessment and management of patients disorders of the diaphragm, including trauma to the diaphragm

12. **Emphysema and Bullae**

    - The assessment and management of patients with emphysematous and bullous lung disease; including surgical management if appropriate and utilising both VATS and open strategies.

    - Full competence in operative management of complex cases, including lung reduction surgery, to be developed in the post CCT period

13. **Disorders of the Pericardium**

    - The assessment and management of patients with disorders of the pericardium and pericardial cavity; including surgical management if appropriate and utilising both VATS and open strategies

14. **Disorders of the Mediastinum**

    - The assessment and management of patients with mediastinal tumours and masses; including surgical management if appropriate and utilising both VATS and open strategies

15. **Disorders of the Airway**

    - The assessment and management of patients with disorders of the major airways. Including operative management in suitable cases.

    - Full competence in operative management of complex cases, including tracheal resection, to be developed in the post CCT period

16. **Congenital Heart Disease**

17. **Intrathoracic Transplantation and Surgery for Heart Failure**

18. **Disorders of the Oesophagus**

Core Surgical Training Modules
Initial Stage 2010

Initial Stage Overview

The purpose of the initial stage (early years) (CT1 - 3) is to allow the trainee to develop the basic and fundamental surgical skills common to all surgical specialties, together with a few surgical skills relevant to Plastic Surgery.

The outcome of early years training is to achieve the competences required of surgeons entering ST3. These competences include:

- Competence in the management of patients presenting with a range of symptoms and elective and emergency conditions as specified in the core syllabus for surgery.
- Competence in the management of patients presenting with an additional range of elective and emergency conditions, as specified by the Plastic Surgery specialty component of the early years syllabus.
- Professional competences as specified in the syllabus and derived from Good Medical Practice documents of General Medical Council of the UK

By the end of CT2/3, trainees, (including those following an academic pathway), will have acquired to the defined level:

- Generic skills to allow team working and management of Plastic Surgery patients
- The ability to perform as a member of the team caring for surgical patients
- The ability to receive patients as emergencies and review patients in clinics and initiate management and diagnostic processes based on a reasonable differential diagnosis
- The ability to manage the perioperative care of their patients and recognise common complications and either be able to deal with them or know to whom to refer
- To be safe and useful assistant in the operating room
- To perform some simple procedures under minimal supervision and perform more complex procedures under direct supervision

In addition they will have attained the knowledge, skills and behaviour as defined in the following (common) modules of the syllabus:

Module 1: Basic Science Knowledge relevant to surgical practice (These can all be contextualised within the list of presenting symptoms and conditions outlined in module 2)

- Anatomy
- Physiology
- Pharmacology - in particular safe prescribing
- Pathological principles underlying system specific pathology
- Microbiology
- Diagnostic and interventional radiology

Module 2: Common surgical conditions

- To assess and initiate investigation and management of common surgical conditions which may confront any patient whilst under the care of surgeons, irrespective of their speciality.
- To have sufficient understanding of these conditions so as to know what and to whom to refer in a way that an insightful discussion may take place with colleagues whom will be involved in the definitive management of these conditions.
- This defines the scope and depth of the topics in the generality of clinical surgery required of any surgeon irrespective of their ST3 defined speciality

Module 3 Basic surgical skills

- To prepare oneself for surgery
- To safely administer appropriate local anaesthetic agents
- To handle surgical instruments safely
- To handle tissues safely
- To incise and close superficial tissues accurately
- To tie secure knots
- To safely use surgical diathermy
- To achieve haemostasis of superficial vessels.
- To use a suitable surgical drain appropriately.
- To assist helpfully, even when the operation is not familiar.
- To understand the principles of anastomosis

- To understand the principles of endoscopy including laparoscopy

Module 4: The principles of assessment and management of the surgical patient
- To assess the surgical patient
- To elicit a history that is relevant, concise, accurate and appropriate to the patient's problem
- To produce timely, complete and legible clinical records.
- To assess the patient adequately prior to operation and manage any pre-operative problems appropriately.
- To propose and initiate surgical or non-surgical management as appropriate.
- To take informed consent for straightforward cases.

Module 5: Peri-operative care of the surgical patient
- To manage patient care in the peri-operative period.
- To assess and manage preoperative risk.
- To take part in the conduct of safe surgery in the operating theatre environment.
- To assess and manage bleeding including the use of blood products.
- To care for the patient in the post-operative period including the assessment of common complications.
- To assess, plan and manage post-operative fluid balance
- To assess and plan perioperative nutritional management.

Module 6: Assessment and early treatment of the patient with trauma
- To safely assess the multiply injured patient.
- To safely assess and initiate management of patients with
- traumatic skin and soft tissue injury
- chest trauma
- a head injury
- a spinal cord injury
- abdominal and urogenital trauma
- vascular trauma
- a single or multiple fractures or dislocations
- burns

Module 7: Surgical care of the paediatric patient
- To assess and manage children with surgical problems, understanding the similarities and differences from adult surgical patients.
- To understand common issues of child protection and to take action as appropriate.

Module 8: Management of the dying patient
- To manage the dying patient appropriately.
- To understand consent and ethical issues in patients certified DNAR (do not attempt resuscitation)
- To manage the dying patient in consultation with the palliative care team.

Module 9: Organ and tissue transplantation
- To understand the principles of organ and tissue transplantation.
- To assess brain stem death and understand its relevance to continued life support and organ donation.

Module 10: Health promotion
- To promote good health.

Initial Stage / Core surgical training modules

(For reference, revised for simulation as submitted to the GMC in October 2012 and awaiting approval)

Module 1	Basic sciences	Assessment technique	Simulation Techniques
Objective	• To acquire and demonstrate underpinning basic science knowledge appropriate for the practice of surgery, including:- • Applied anatomy: Knowledge of anatomy appropriate for surgery • Physiology: Knowledge of physiology relevant to surgical practice • Pharmacology: Knowledge of pharmacology relevant to surgical practice centred around safe prescribing of common drugs • Pathology: Knowledge of pathological principles underlying system specific pathology • Microbiology: Knowledge of microbiology relevant to surgical practice Imaging: • Knowledge of the principles, strengths and weaknesses of various diagnostic and interventional imaging methods	Course completion certificate MRCS	**Essential:** Life support training CCrisp course **Desirable** Interactive human patient simulators and manikins Access to Anatomy demonstrations or prosections Team-Based clinical Scenario training Optional Human Factors training
Knowledge	Applied anatomy: • Development and embryology • Gross and microscopic anatomy of the organs and other structures • Surface anatomy • Imaging anatomy This will include anatomy of thorax, abdomen, pelvis, perineum, limbs, spine, head and neck as appropriate for surgical operations that the trainee will be involved with during core training (see Module 2). Physiology: General physiological principles including: • Homeostasis • Thermoregulation • Metabolic pathways and abnormalities • Blood loss and hypovolaemic shock • Sepsis and septic shock • Fluid balance and fluid replacement therapy • Acid base balance • Bleeding and coagulation • Nutrition This will include the physiology of specific organ systems relevant to surgical care including the cardiovascular, respiratory, gastrointestinal, urinary, endocrine and neurological systems. Pharmacology:		

	• The pharmacology and safe prescribing of drugs used in the treatment of surgical diseases including analgesics, antibiotics, cardiovascular drugs, antiepileptic, anticoagulants, respiratory drugs, renal drugs, drugs used for the management of endocrine disorders (including diabetes) and local anaesthetics. • The principles of general anaesthesia • The principles of drugs used in the treatment of common malignancies • Can describe the effects and potential for harm of alcohol and other drugs including common presentations, wide range of acute and long term presentations (e.g. trauma, depression, hypertension etc.), the range of interventions, treatments and prognoses for use of alcohol and other drugs. Pathology: General pathological principles including: • Inflammation • Wound healing • Cellular injury • Tissue death including necrosis and apoptosis • Vascular disorders • Disorders of growth, differentiation and morphogenesis • Surgical immunology • Surgical haematology • Surgical biochemistry • Pathology of neoplasia • Classification of tumours • Tumour development and growth including metastasis • Principles of staging and grading of cancers • Principles of cancer therapy including surgery, radiotherapy, chemotherapy, immunotherapy and hormone therapy • Principles of cancer registration • Principles of cancer screening • The pathology of specific organ systems relevant to surgical care including cardiovascular pathology, respiratory pathology, gastrointestinal pathology, genitourinary disease, breast, exocrine and endocrine pathology, central and peripheral, neurological systems, skin, lymphoreticular and musculoskeletal systems Microbiology: • Surgically important micro organisms including blood borne viruses • Soft tissue infections including cellulitis, abscesses, necrotising fasciitis, gangrene • Sources of infection		

	• Sepsis and septic shock • Asepsis and antisepsis • Principles of disinfection and sterilisation • Antibiotics including prophylaxis and resistance • Principles of high risk patient management • Hospital acquired infections Imaging: • Principles of diagnostic and interventional imaging including x-rays, ultrasound, CT, MRI. PET, radiounucleotide scanning		

Module 2	Common Surgical Conditions		Assessment technique	Simulation Techniques
Objective	This section assumes that trainees have general medical competences consistent with a doctor leaving Foundation in the UK. It also assumes an ongoing commitment to keeping these skills and knowledge up to date as laid out in GMP. It is predicated on the value that surgeons are doctors who carry our surgery and require competence. To demonstrate understanding of the relevant basic scientific principles for each of these surgical conditions and to be able to provide the relevant clinical care as defined in modules assessment and management as defined in Modules 1 and 4.		Certificate of successful completion of course MRCS	**Essential:** A basic surgical skills course designed to meet the objectives of this module A basic laparoscopic skills course An anastomosis work shops **Desirable** Access to a cadaveric / wet lab Access to high fidelity laparoscopic simulators Access to angiographic simulators Vascular ultrasound courses Access to a cadaveric/ wet lab access for surgical approaches to fractures
Topics	Presenting symptoms or syndromes • Abdominal pain • Abdominal swelling • Change in bowel habit • Gastrointestinal haemorrhage • Rectal bleeding	To include the following conditions • Appendicitis • Gastrointestinal malignancy • Inflammatory bowel disease • Diverticular disease		

	• Dysphagia • Dyspepsia • Jaundice	• Intestinal obstruction • Adhesions • Abdominal hernias • Peritonitis • Intestinal perforation • Benign oesophageal disease • Peptic ulcer disease • Benign and malignant hepatic, gall bladder and pancreatic disease • Haemorrhoids and perianal disease • Abdominal wall stomata		
	Breast disease • Breast lumps and nipple discharge • Acute Breast pain	To include the following conditions • Benign and malignant breast lumps • Mastitis and breast abscess		
	Peripheral vascular disease Presenting symptoms or syndrome • Chronic and acute limb ischaemia • Aneurismal disease • Transient ischaemic attacks • Varicose veins • Leg ulceration	To include the following conditions • Atherosclerotic arterial disease • Embolic and thrombotic arterial disease • Venous insufficiency • Diabetic ulceration		
	Cardiovascular and pulmonary disease	To include the following conditions • Coronary heart disease • Bronchial carcinoma • Obstructive airways disease • Space occupying lesions of the chest		

	Genitourinary disease Presenting symptoms or syndrome • Loin pain • Haematuria • Lower urinary tract symptoms • Urinary retention • Renal failure • Scrotal swellings • Testicular pain	To include the following conditions • Genitourinary malignancy • Urinary calculus disease • Urinary tract infection • Benign prostatic hyperplasia • Obstructive uropathy		
	Trauma and orthopaedics Presenting symptoms or syndrome • Traumatic limb and joint pain and deformity • Chronic limb and joint pain and deformity • Back pain	To include the following conditions • Simple fractures and joint dislocations • Fractures around the hip and ankle • Basic principles of Degenerative joint disease • Basic principles of inflammatory joint disease including bone and joint infection • Compartment syndrome • Spinal nerve root entrapment and spinal cord compression • Metastatic bone cancer • Common peripheral neuropathies and nerve injuries		
	Disease of the Skin, Head and Neck Presenting symptoms or syndrome • Lumps in the neck • Epistaxis • Upper airway obstructions	To include the following conditions • Benign and malignant skin lesions • Benign and malignant lesions of the mouth and tongue		
	Neurology and Neurosurgery Presenting symptoms or syndrome • Headache • Facial pain • Coma	To include the following conditions • Space occupying lesions from bleeding and tumour		
	Endocrine Presenting symptoms or syndrome	To include the following conditions		

	• Lumps in the neck • Acute endocrine crises	• Thyroid and parathyroid disease • Adrenal gland disease • Diabetes		

Module 3	Basic surgical skills	Assessment technique	Simulation Techniques
Objective	• Preparation of the surgeon for surgery • Safe administration of appropriate local anaesthetic agents • Acquisition of basic surgical skills in instrument and tissue handling. • Understanding of the formation and healing of surgical wounds • Incise superficial tissues accurately with suitable instruments. • Close superficial tissues accurately. • Tie secure knots. • Safely use surgical diathermy • Achieve haemostasis of superficial vessels. • Use suitable methods of retraction. • Knowledge of when to use a drain and which to choose. • Handle tissues gently with appropriate instruments. • Assist helpfully, even when the operation is not familiar. • Understand the principles of anastomosis • Understand the principles of endoscopy	WBA- PBA, CBD, DOPS	**Essential** A Basic surgical skills course designed to meet the objectives of this module **Desirable:** Access to a Basic Surgical Skills Laboratory Local anastomosis workshops Cadaveric / Wet lab training Endoscopy simulators
Knowledge	Principles of safe surgery • Preparation of the surgeon for surgery • Principles of hand washing, scrubbing and gowning • Immunisation protocols for surgeons and patients Administration of local anaesthesia • Choice of anaesthetic agent • Safe practise Surgical wounds • Classification of surgical wounds • Principles of wound management • Pathophysiology of wound healing • Scars and contractures • Incision of skin and subcutaneous tissue: o Langer's lines o Choice of instrument o Safe practice • Closure of skin and subcutaneous tissue: o Options for closure o Suture and needle choice • Safe practice • Knot tying o Range and choice of material for suture and ligation o Safe application of knots for surgical sutures and ligatures • Haemostasis:		

	○ Surgical techniques ○ Principles of diathermy • Tissue handling and retraction: ○ Choice of instruments • Biopsy techniques including fine needle aspiration cytology • Use of drains: ○ Indications ○ Types ○ Management/removal • Principles of anastomosis • Principles of surgical endoscopy		
Clinical Skills	4 Preparation of the surgeon for surgery • Effective and safe hand washing, gloving and gowning • Administration of local anaesthesia • Accurate and safe administration of local anaesthetic agent 4 Preparation of a patient for surgery • Creation of a sterile field • Antisepsis • Draping		
Technical Skills and Procedures	4 Preparation of the surgeon for surgery • Effective and safe hand washing, gloving and gowning 4 Administration of local anaesthesia • Accurate and safe administration of local anaesthetic agent 4 Incision of skin and subcutaneous tissue: • Ability to use scalpel, diathermy and scissors 4 Closure of skin and subcutaneous tissue: • Accurate and tension free apposition of wound edges 4 Knot tying: • Single handed • Double handed • Instrument • Superficial • Deep 3 Haemostasis: • Control of bleeding vessel (superficial) • Diathermy • Suture ligation • Tie ligation • Clip application • Transfixion suture 4 Tissue retraction: • Tissue forceps • Placement of wound retractors 3 Use of drains:		

	• Insertion • Fixation • Removal 3 Tissue handling: • Appropriate application of instruments and respect for tissues • Biopsy techniques 4 Skill as assistant: • Anticipation of needs of surgeon when assisting		

Module 4	The assessment and management of the surgical patient	Assessment technique	Simulation Techniques
Objective	To demonstrate the relevant knowledge, skills and attitudes in assessing the patient and manage the patient, and propose surgical or non-surgical management.	Examinations- MRCS	**Essential:** ATLS course CCrisp course **Desirable** Interactive human patient simulators and manikins Life Support and Critical Care training Team-Based clinical Scenario training Optional: Human Factors training
Knowledge	The knowledge relevant to this section will be variable from patient to patient and is covered within the rest of the syllabus – see common surgical conditions in particular (Module 2). As a trainee develops an interest in a particular speciality then the principles of history taking and examination may be increasingly applied in that context.		
Clinical Skills	4 Surgical history and examination (elective and emergency) 3 Construct a differential diagnosis 3 Plan investigations 3 Clinical decision making 3 Team working and planning 3 Case work up and evaluation; risk management 3 Active participation in clinical audit events 3 Appropriate prescribing 3 Taking consent for intermediate level intervention; emergency and elective 3 Written clinical communication skills 3 Interactive clinical communication skills: patients 3 Interactive clinical communication skills: colleagues		

Module 5	Peri-operative care	Assessment technique	Simulation Techniques
Objective	To assess and manage preoperative risk To manage patient care in the peri-operative period To conduct safe surgery in the operating theatre environment To assess and manage bleeding including the use of blood products To care for the patient in the post-operative period including the assessment of common complications To assess, plan and manage post-operative fluid balance To assess and plan perioperative nutritional management To prevent, recognise and manage delirium in the surgical patient within the appropriate legal framework in place across the UK (see **footnote**). **Footnote** The relevant legislation includes: • Mental Capacity Act (2005) • Mental Health Act (1983 and 2007) • Adults with Incapacity (Scotland) Act (2000) • Mental Health (Care and Treatment) (Scotland) Act (2003) • Adult Support and Protection (Scotland) Act (2007)	WBA Course test completion certificate	**Essential:** A CCrisp Course A basic surgical skills Course Life Support and Critical Care training **Desirable** Interactive human patient simulators and manikins Team-Based clinical Scenario training Human Factors training Part trainer skills lab-tranining in- CVP line and urethral catheterisation simulators
Knowledge	Pre-operative assessment and management: • Cardiorespiratory physiology • Diabetes mellitus and other relevant endocrine disorders • Fluid balance and homeostasis • Renal failure • Pathophysiology of sepsis – prevention and prophylaxis • Thromboprophylaxis • Laboratory testing and imaging • Risk factors for surgery and scoring systems • Pre-medication and other preoperative prescribing • Principles of day surgery Intraoperative care: • Safety in theatre including patient positioning and avoidance of nerve injuries • Sharps safety • Diathermy, laser use • Infection risks • Radiation use and risks		

	• Tourniquet use including indications, effects and complications • Principles of local, regional and general anaesthesia • Principles of invasive and non-invasive monitoring • Prevention of venous thrombosis • Surgery in hepatitis and HIV carriers • Fluid balance and homeostasis Post-operative care: • Post-operative monitoring • Cardiorespiratory physiology • Fluid balance and homeostasis • Diabetes mellitus and other relevant endocrine disorders • Renal failure • Pathophysiology of blood loss • Pathophysiology of sepsis including SIRS and shock • Multi-organ dysfunction syndrome • Post-operative complications in general • Methods of postoperative analgesia To assess and plan nutritional management • Post-operative nutrition • Effects of malnutrition, both excess and depletion • Metabolic response to injury • Methods of screening and assessment of nutritional status • Methods of enteral and parenteral nutrition Haemostasis and Blood Products: • Mechanism of haemostasis including the clotting cascade • Pathology of impaired haemostasis e.g. haemophilia, liver disease, massive haemorrhage • Components of blood • Alternatives to use of blood products • Principles of administration of blood products • Patient safety with respect to blood products Coagulation, deep vein thrombosis and embolism: • Clotting mechanism (Virchow Triad) • Effect of surgery and trauma on coagulation		

	• Tests for thrombophilia and other disorders of coagulation • Methods of investigation for suspected thromboembolic disease • Principles of treatment of venous thrombosis and pulmonary embolism including anticoagulation • Role of V/Q scanning, CTpulmonary angiography, D-dimer and thrombolysis • Place of pulmonary embolectomy • Prophylaxis of thromboembolism: • Risk classification and management of DVT • Knowledge of methods of prevention of DVT, mechanical and pharmacological Antibiotics: • Common pathogens in surgical patients • Antibiotic sensitivities • Antibiotic side-effects • Principles of prophylaxis and treatment Metabolic and endocrine disorders in relation perioperative management • Pathophysiology of thyroid hormone excess and deficiency and associated risks from surgery • Causes and effects of hypercalcaemia and hypocalcaemia • Complications of corticosteroid therapy • Causes and consequences of Steroid insufficiency • Complications of diabetes mellitus • Causes and effects of hyponatraemia • Causes and effects of hyperkalaemia and hypokalaemia Delirium • Epidemiology and prognosis of delirium • Causes and clinical features of delirium • The impact of delirium on patient, family and carers		
Clinical Skills	3 Pre-operative assessment and management:		

	• History and examination of a patient from a medical and surgical standpoint • Interpretation of pre-operative investigations • Management of co morbidity • Resuscitation • Appropriate preoperative prescribing including premedication 3 Intra-operative care: • Safe conduct of intraoperative care • Correct patient positioning • Avoidance of nerve injuries • Management of sharps injuries • Prevention of diathermy injury • Prevention of venous thrombosis 3 Post-operative care: • Writing of operation records • Assessment and monitoring of patient's condition • Post-operative analgesia • Fluid and electrolyte management • Detection of impending organ failure • Initial management of organ failure • Principles and indications for Dialysis • Recognition, prevention and treatment of post-operative complications 3 Haemostasis and Blood Products: • Recognition of conditions likely to lead to the diathesis • Recognition of abnormal bleeding during surgery • Appropriate use of blood products • Management of the complications of blood product transfusion 3 Coagulation, deep vein thrombosis and embolism • Recognition of patients at risk • Awareness and diagnosis of pulmonary embolism and DVT • Role of duplex scanning, venography and d-dimer measurement • Initiate and monitor treatment of venous thrombosis and pulmonary embolism • Initiation of prophylaxis		

	3 Antibiotics: • Appropriate prescription of antibiotics 3 Assess and plan preoperative nutritional management • Arrange access to suitable artificial nutritional support, preferably via a nutrition team including Dietary supplements, Enteral nutrition and Parenteral nutrition 3 Metabolic and endocrine disorders • History and examination in patients with endocrine and electrolyte disorders • Investigation and management of thyrotoxicosis and hypothyroidism • Investigation and management of hypercalcaemia and hypocalcaemia • Peri-operative management of patients on steroid therapy • Peri-operative management of diabetic patients • Investigation and management of hyponatraemia • Investigation and management of hyperkalaemia and hypokalaemia Delirium 3 Assessment of cognitive impairment seeking to differentiate dementia from delirium, with the knowledge that delirium is common in people with dementia 3 Management of patients with delirium including addressing triggers and using non-pharmacological and pharmacological methods where appropriate 3 Explanation of delirium to patients and advocates		
Technical Skills and Procedures	2 Central venous line insertion 4 Urethral catheterisation		

Module 6	Assessment and management of patients with trauma (including the multiply injured patient)	Assessment technique	Simulation Techniques
Objective	Assess and initiate management of patients with chest trauma • who have sustained a head injury • who have sustained a spinal cord injury	WBA Course test and certificate	**Essential:** ATLS Course CCrisp Course **Desirable**

	• who have sustained abdominal and urogenital trauma • who have sustained vascular trauma • who have sustained a single or multiple fractures or dislocations • who have sustained traumatic skin and soft tissue injury • who have sustained burns • Safely assess the multiply injured patient. • Contextualise any combination of the above • Be able to prioritise management in such situation as defined by ATLS, APLS etc It is expected that trainees will be able to show evidence of competence in the management of trauma (ATLS / APLS certificate or equivalent).		Interactive human patient simulators and manikins Life Support and Critical Care training Team-Based clinical Scenario training Human Factors training Trauma management course Part trainer –skills lab providing training in-CVP, Chest drain, peritoneal lavage,urethral and suprapubic catheterisation simulators
Knowledge	General • Scoring systems for assessment of the injured patient • Major incident triage • Differences In children Shock • Pathogenesis of shock • Shock and cardiovascular physiology • Metabolic response to injury • Adult respiratory distress syndrome • Indications for using uncross matched blood Wounds and soft tissue injuries • Gunshot and blast injuries • Stab wounds • Human and animal bites • Nature and mechanism of soft tissue injury • Principles of management of soft tissue injuries • Principles of management of traumatic wounds • Compartment syndrome Burns • Classification of burns • Principle of management of burns Fractures • Classification of fractures		

	• Pathophysiology of fractures • Principles of management of fractures • Complications of fractures • Joint injuries Organ specific trauma • Pathophysiology of thoracic trauma • Pneumothorax • Head injuries including traumatic intracranial haemorrhage and brain injury • Spinal cord injury • Peripheral nerve injuries • Blunt and penetrating abdominal trauma • Including spleen • Vascular injury including iatrogenic injuries and intravascular drug abuse • Crush injury • Principles of management of skin loss including use of skin grafts and skin flaps		
Clinical Skills	General 4 History and examination 3 Investigation 3 Referral to appropriate surgical subspecialties 4 Resuscitation and early management of patient who has sustained thoracic, head, spinal, abdominal or limb injury according to ATLS and APLS guidelines 4 Resuscitation and early management of the multiply injured patient 3 Specific problems • Management of the unconscious patient • Initial management of skin loss • Initial management of burns • Prevention and early management of the compartment syndrome		
Technical Skills and Procedures	2 Central venous line insertion 3 Chest drain insertion 2 Diagnostic peritoneal lavage 4 Urethral catheterisation 2 Suprapubic catheterisation		

Module 7	Surgical care of the Paediatric patient	Assessment technique	Simulation Techniques
Objective	To assess and manage children with surgical problems, understanding the similarities and differences from adult surgical patients	WBA MRCS	**Essential:** CCrisp Course Child protection training

	To understand the issues of child protection and to take action as appropriate		**Desirable** Interactive human patient simulators Team-Based clinical Scenario training
Knowledge	• Physiological and metabolic response to injury and surgery • Fluid and electrolyte balance • Thermoregulation Safe prescribing in children • Principles of vascular access in children • Working knowledge of trust and Local Safeguarding Children Boards (LSCBs) and Child Protection Procedures • Basic understanding of child protection law • Understanding of Children's rights • Working knowledge of types and categories of child maltreatment, presentations, signs and other features (primarily physical, emotional, sexual, neglect, professional) • Understanding of one personal role, responsibilities and appropriate referral patterns in child protection • Understanding of the challenges of working in partnership with children and families • Recognise the possibility of abuse or maltreatment • Recognise limitations of own knowledge and experience and seek appropriate expert advice • Urgently consult immediate senior in surgery to enable referral to paediatricians • Keep appropriate written documentation relating to child protection matters • Communicate effectively with those involved with child protection, including children and their families		
Clinical Skills	3 History and examination of the neonatal surgical patient 3 History and examination of paediatric surgical patient 3 Assessment of respiratory and cardiovascular status 3 Undertake consent for surgical procedures (appropriate to the level of training) in paediatric patients		

Module 8	Management of the dying patient	Assessment technique	Simulation Techniques
Objective	Ability to manage the dying patient appropriately. To understand consent and ethical issues in patients certified DNAR (do not attempt resuscitation) Palliative Care: Good management of the dying patient in consultation with the palliative care team.	MRCS	**Essential:** Nil **Desirable** Team-Based clinical Scenario training Human Factors training
Knowledge	Palliative Care: • Care of the terminally ill • Appropriate use of analgesia, antiemetics and laxatives Principles of organ donation: • Circumstances in which consideration of organ donation is appropriate • Principles of brain death Understanding the role of the coroner and the certification of death		
Clinical Skills	3 Palliative Care: • Symptom control in the terminally ill patient 3 Principles of organ donation: • Assessment of brain stem death • Certification of death		

Module 9	Organ and Tissue transplantation	Assessment technique	Simulation Techniques
Objective	To understand the principles of organ and tissue transplantation	MRCS	
Knowledge	• Principles of transplant immunology including tissue typing, acute, hyperactute and chronic rejection • Principles of immunosuppression • Tissue donation and procurement • Indications for whole organ transplantation		

Module 10	**Health Promotion**
General Aspects	
Objective	This syllabus module aims to enable all surgical trainees to develop the competencies necessary to support patients in caring for themselves, to empower them to improve and maintain their own health.
Knowledge	• Damaging health and social issues such as excessive alcohol consumption, obesity, smoking and illicit drugs and the harmful effects they have on health • The connection between mental health and physical health • The importance of health education for promoting self-care for patients
Clinical Skills	3 Modification of explanations to match the intellectual, social and cultural background of individual patients 3 Patient centred care 4 Identification and utilisation of opportunities to promote health
Reference to other relevant syllabus items	• Nutrition (Module 5, Perioperative Care) • Drugs and alcohol (Module 1, Pharmacology) • Screening (Module 1, Pathology) • Child protection (Module 7, Surgical Care of the Paediatric Patient)
Obesity	
Objective	• Recognise the health risks posed by obesity including an increased incidence of coronary heart disease, type 2 diabetes, hypertension, stroke, and some major cancers. • Assess and explain the higher risks for obese individuals undergoing surgery.
Knowledge	• Classification of excess body mass • Social, psychological and environmental factors that underpin obesity • Physiological and metabolic effects of obesity on the surgical patient • Available treatments for obesity including diet, exercise, medication and surgery
Clinical Skills	4 The ability to treat patients who are obese in a supportive and sensitive manner 3 Management of cardiovascular, respiratory and metabolic complications in patients with obesity undergoing surgery 2 Provide advice and guidance about weight loss to overweight and obese patients within the context of a multidisciplinary team
Dementia	
Objective	• Adapt surgical treatment in order to deliver high quality and person-centred care for patients with dementia • Apply the appropriate legal framework to the treatment of patients with cognitive impairment
Knowledge	• Clinical features of dementia and the distinction between it and delirium • The impact of dementia on patient, family and carers • Principles and key provisions of the relevant legislation regarding the safeguarding of vulnerable adults across the UK (see **footnote**).

Clinical Skills	3 Recognises cognitive impairment and appropriately refers 2 Management of surgical patients in the context of their dementia 4 A range of techniques and strategies to communicate effectively with people with dementia and their carers/families 4 Assessment of capacity, involvement of advocates and documentation of consent and best interests in accordance with current legislation in place across the nations of the UK (see **footnote**). **Footnote** The relevant legislation includes: • Mental Capacity Act (2005) • Mental Health Act (1983 and 2007) • Adults with Incapacity (Scotland) Act (2000) • Mental Health (Care and Treatment) (Scotland) Act (2003) • Adult Support and Protection (Scotland) Act (2007).
Exercise and physical fitness	
Objective	• Promote the use of exercise in the prevention and management of long term chronic conditions such as coronary heart disease, diabetes, hypertension, obesity, cancer, osteoporosis, peripheral vascular disease and depression and the promotion of health and well being
Knowledge	• Physical inactivity as an independent risk factor for ill health and obesity • Relationship between physical exercise programmes and healthy eating and smoking cessation programmes • Government behaviour change programmes such as 'Let's Get Moving' and 'Shift into Sports'
Clinical Skills	4 Utilisation of all patient interactions as opportunities for health and fitness promotion 4 Modification of advice on physical exercise to the specific requirements of individual patients

Specialty-Specific Modules
Initial Stage

Requirement to meet the ST3 in Cardiothoracic Surgery

In order to meet the job specifications of an ST3 trainee an early year's trainee must take a clear role in the cardiothoracic team, managing clinic, cardiac intensive care and ward based patients under supervision, including the management of acute admissions. They will need to be able to take part in an outpatient clinic and see patients themselves with the consultant available for advice.

Therefore in early years training, IN ADDITION to the generic competencies for all surgeons, it is necessary to address the specifics of a developing interest in Cardiothoracic surgery during these years. This means spending 6-12 months in cardiothoracic surgery in a service which gives trainees access to the appropriate learning opportunities. Also by the time a trainee enters ST3 they need to be familiar with the operating room environment both with respect to elective and emergency cases.

Trainees must attend MDT and other Departmental meetings and ward rounds, prepare operating lists (and actually perform some surgery under appropriate supervision. They must manage all patients in a ward environment, preoperatively and post operatively. This includes recognising and initiating the management of common complications and emergencies, over and above those already laid out in the generic curriculum, particularly module 2.

The range of conditions a trainee needs to manage are laid out below and in the depth demonstrated in a text book such as Chikwe J, Beddow E, Glenville B. Cardiothoracic Surgery Oxford University Press 2006.

Early Years training in Cardiothoracic Surgery		Simulation
Objective	To acquire experience in the management of a post surgical patient on the critical care, high dependency and post operative wards. To be able to manage, with appropriate supervision, such a patient. To participate under supervision in the operative management of cardiothoracic patients	
Knowledge	Basic science relevant to the management of patients with cardiothoracic disease (including anatomy, physiology, pharmacology, pathology and radiology) Principles of management of patients presenting with the common elective and emergency cardiothoracic disease, including post operative and intensive care Specific knowledge relating to the principles of cardiopulmonary bypass and myocardial management and their consequences. Includes an understanding of the relevant equipment and technology	
Clinical Skills	History and examination of the post-operative and critically ill patient Analysis and interpretation of post operative and critical care charts and documentation. Recognition, evaluation and treatment of haemodynamic abnormalities: Recognition, evaluation and treatment of ventilatory abnormalities: Recognition, evaluation and treatment of multiorgan dysfunction:	
Technical Skills and Procedures	**Practical Skills:** 4 Use of defibrillator 2 Practical use of inotropes and vasoactive drugs 2 Principles of the use of intra aortic balloon pump 1 Echocardiography including TOE 3 Arterial cannulation 2 Central venous cannulation 2 Pulmonary artery catheterisation **Operative Management:** 3 Saphenous vein harvest 2 Median Sternotomy 3 Chest aspiration 3 Chest drain insertion and management	**Aortic cannulation simulation PBA (essential)** **Echocardiography simulation(desirable)**

Assessment

The speciality elements of the early years will all be assessed primarily in the workplace and then scrutinised in the Annual Review of Competency Progression. All these documents would be included in a portfolio which would contribute as evidence in subsequent applications to enter ST3.

Specific evidence includes

Assessment type	Subject
DOPS a selection of types and numbers of each type according to learning agreements	Arterial cannulation Central venous cannulation Pulmonary artery catheterisation Saphenous vein harvest Chest aspiration Chest drain insertion and management Median Sternotomy
Case Based Discussion	One per attachment
CEX	Clinical examination of the cardiovascular system Clinical examination of the respiratory system Interpretation of an ECG in a clinical context
PBAs	None at this level
Training Supervisors report	Evidenced by the above WPBAs
ARCP for each specified training interval	As per local Deanery specifications
MRCS	Generic syllabus

Intermediate Stage I

Intermediate Stage Overview

Clinical placements during the intermediate stage (ST3-6) will be purely in Cardiothoracic Surgery. The purpose of the intermediate stage is to allow the trainee to develop further the skills necessary for independent cardiothoracic practice. These will include skills in general cardiothoracic surgery and in emergency cardiothoracic surgery. They will also be an introduction to some specialist areas of Cardiothoracic Surgery.

Entry into ST3

Entry into ST3 will usually involve a competitive selection process. The current person specifications for entry into ST3 in Cardiothoracic Surgery are shown on the Modernising Medical Careers website. The essential components are completion of the common component of the core surgical training programme (as evidenced by successful ARCP, WPBA and completion of the MRCS examination) and completion of the cardiothoracic specific components of the early years training as evidenced by a successful ARCP and completion of the appropriate WPBA.

Intermediate (I) Stage

Intermediate (I) Phase of training (ST3 &ST4)

The intermediate (I) phase of training will consist of an indicative period of two years. These two years should in turn consist of four modules, each of 6 months. Trainees will be expected to have completed at least one module in cardiac surgery and one module in thoracic surgery by the end of this phase.

The purpose of this stage is to **acquire and develop experience and competence in the generality of cardiothoracic surgery.**

The curriculum for each of the modules is defined (see syllabus). Aims and levels of competence to be attained within each module by the end of this stage are identified.

Intermediate (I) modules:

- Critical Care and Postoperative Management
- Cardiopulmonary Bypass, Myocardial Protection & Circulatory Support
- Ischaemic Heart Disease
- Heart Valve Disease
- Aortovascular Disease
- Cardiothoracic Trauma
- General Management of a Patient Undergoing Thoracic Surgery
- Neoplasms of the Lung
- Disorders of the Pleura
- Disorders of the Chest Wall
- Disorders of the Diaphragm
- Emphysema and Bullae
- Disorders of the Pericardium
- Disorders of the Mediastinum
- Disorders of the Airway
- Congenital Heart Disease
- Intrathoracic transplantation and surgery for heart failure
- Disorders of the Oesophagus

Intermediate Stage I Topics

Topic	Critical Care and Post-operative Management	Simulation
Category	Critical Care and Post-operative Management	
Sub-category:	None	
Objective	*To be able to manage a post surgical patient on the critical care, high dependency and post operative wards. To work as part of a multi-professional, multidisciplinary team in the management of a patient requiring complex critical care. Competence in the management of uncomplicated situations should be achieved during this period. Management of complicated or difficult situations will require appropriate supervision and guidance.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Haemodynamics: physiology and measurement 4Cardiac arrhythmia 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma and surgery 4GIT, renal and hepatic physiology 4Nutrition 4Temperature regulation Anatomy 4Heart, pericardium and great vessels 4Mediastinum, thoracic inlet and neck 4Tracheobronchial tree and lungs 4Chest wall and diaphragm Pathology 4Inflammation and wound healing 4Myocardial infarction and complications 4Endocarditis 4Pericarditis 4Systemic Inflammatory Response Syndrome	

	4Bronchopulmonary infection 4ARDS Pharmacology 4Drugs used in the treatment of hypertension, heart failure and angina 4Inotropes, vasodilators and vasoconstrictors 4Anti-arrhythmic drugs 4Haemostatic drugs 4Antiplatelet, anticoagulant and thrombolytic drugs 4Analgesics 4Antibiotics 4Anaesthetic agents, local and general Microbiology 4Organisms involved in cardiorespiratory infection 4Antimicrobial treatment and policies CLINICAL KNOWLEDGE 3 Cardiopulmonary resuscitation 3 Management of cardiac surgical patient 3 Management of thoracic surgical patient 3 Treatment of cardiac arrhythmia 3 Management of complications of surgery 3 Blood transfusion and blood products 3Wound infection and sternal disruption 3 Neuropsychological consequences of surgery and critical care	
Clinical Skills	HISTORY AND EXAMINATION 4 History and examination of the post-operative and critically ill patient DATA INTERPRETATION 4 Analysis and interpretation of post operative and critical care charts and documentation 4 Routine haematology and biochemical investigations	

	3 Chest radiograph and ECG 3 Echocardiography including TOE PATIENT MANAGEMENT General management of surgical patient 3 Management of fluid balance and circulating volume 3 Pain control 3 Wound management 3 Management of surgical drains 3 Antimicrobial policy and prescribing 3 Management of post-operative haemorrhage 3 Cardiopulmonary resuscitation (ALS) 3 Management of complications of surgery 3 Blood transfusion and blood products 3 Wound infection and sternal disruption Recognition, evaluation and treatment of haemodynamic abnormalities 3 Evaluation and interpretation of haemodynamic data 3 Practical use of inotropes and vasoactive drugs 3 Use of intra aortic balloon pump Recognition, evaluation and treatment of cardiac arrhythmias 3 Interpretation of ECG 3 Use of anti-arrhythmic drugs 3 Use of defibrillator 3 Understanding and use of cardiac pacing Recognition, evaluation and treatment of ventilatory abnormalities (level as indicated) 4 Interpretation of blood gas results 3 Airway management 2 Understanding of ventilatory techniques and methods	ALS Moulage (essential) Advanced Cardiac Surgery scenarios(desireable) NOTTS assessment Simulation on Balloons Bypass Circulatory support course(essential) ACLS scenarios (essential) CALS Scenarios(essential)

	2 Understanding of anaesthetic drugs and methods Recognition, evaluation and treatment of multiorgan dysfunction (level as indicated) 2 Renal dysfunction and support 2 GIT dysfunction, feeding and nutrition 2 Recognition and evaluation of cerebral and neuropsychological problems	
Technical Skills and Procedures	PRACTICAL SKILLS (level as indicated) 4 Arterial cannulation 4 Central venous cannulation 3 IABP insertion 3 IABP timing and management 1 Tracheostomy 2 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 4 Chest drain management 2 Establish an airway 2 Internal Cardiac Massage OPERATIVE MANAGEMENT 2 Re-exploration for bleeding or tamponade	Simulation on Balloons Bypass Circulatory support course(essential
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Cardiopulmonary Bypass	Simulation
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	Cardiopulmonary Bypass	
Objective	*To manage with supervision the clinical and technical aspects of cardiopulmonary bypass.*	
Knowledge	BASIC KNOWLEDGE Physiology	

	3 Haemodynamics: physiology and measurement 3 Cardiac arrhythmias 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Pulmonary physiology, ventilation and gas exchange 3 Metabolic response to trauma and surgery 3 GIT, renal and hepatic physiology 3 Temperature regulation Anatomy 3 Heart, pericardium and great vessels 3 Mediastinum, thoracic inlet and neck 3 Chest wall and diaphragm 3 Femoral triangle and peripheral vascular system Pathology 3 Inflammation and wound healing 3 Systemic Inflammatory Response Syndrome 3 ARDS Pharmacology 3 Drugs used in the treatment of hypertension, heart failure and angina 3 Inotropes, vasodilators and vasoconstrictors 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general Microbiology 3 Organisms involved in cardiorespiratory infection 3 Antimicrobial treatment and policies SPECIFIC KNOWLEDGE 3 Principles and practice of CPB 3 Relevant equipment and technology and its application 3 Monitoring during CPB 3 Inflammatory and pathophysiological response to bypass 3 Pulsatile and non pulsatile flow 3 Effect of CPB on pharmacokinetics 3 Priming fluids and haemodilution 3 Acid base balance - pH and alpha stat 3 Neuropsychological consequences of CPB 3 Cell salvage and blood conservation	
Clinical Skills	N/A	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Median sternotomy open and close 3 Cannulation and institution of cardiopulmonary bypass 2 Safe conduct of CPB - problem solving and troubleshooting 3 Weaning from bypass and decannulation 2 Femoral cannulation and decannulation 1 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 2 Relevant cannulation techniques and appropriate delivery of cardioplegia	Aortic Cannulation sim PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Myocardial Protection**	**Simulation**
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	Myocardial Protection	
Objective	*To manage with supervision the clinical and technical aspects of intraoperative myocardial protection.*	
Knowledge	BASIC KNOWLEDGE 3 Myocardial cellular physiology 3 Myocardial function and dysfunction 3 Haemodynamics and arrhythmias 3 Coronary arterial and venous anatomy SPECIFIC KNOWLEDGE 3 Scientific foundations of myocardial preservation 3 Principles and practice of myocardial preservation 3 Cardioplegia solutions and delivery modes. 3 Non-cardioplegic techniques of preservation	
Clinical Skills	PATIENT MANAGEMENT 2 Myocardial management throughout the peri-operative period 2 Ability to adapt preservation technique to clinical situation	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Median sternotomy open and close 3 Cannulation and institution of cardiopulmonary bypass 2 Safe conduct of CPB - problem solving and troubleshooting 3 Weaning from bypass and decannulation 2 Femoral cannulation and decannulation 1 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 2 Relevant cannulation techniques and appropriate delivery of cardioplegia	Aortic Cannulation sim PBA(essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Circulatory Support**	**Simulation**
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	Circulatory Support	
Objective	*To manage with supervision the clinical and technical aspects of circulatory support.*	
Knowledge	BASIC KNOWLEDGE 3 Haemodynamics: physiology and measurement 3 Cardiac arrhythmias 3 Haemostasis, thrombosis and bleeding 3 Anatomy of the femoral triangle and peripheral vascular system 3 Inotropes, vasodilators and vasoconstrictors 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs SPECIFIC KNOWLEDGE 3 Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods 3 Intra aortic balloon pump - indications for use, patient selection and complications 3 Physiology of the balloon pump 2 Understanding of relevant equipment and technology 2 Ventricular assist devices, indications for use, patient selection and complications	
Clinical Skills	PATIENT MANAGEMENT 2 Patient selection for mechanical circulatory	

	support 3 Insertion and positioning of the intra aortic balloon pump 3 Management of the balloon pump including timing and trouble shooting 2 Care of the patient with intra aortic balloon pump, including recognition and management of complications	Simulation on Balloons Bypass Circulatory support course(essential)
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Median sternotomy open and close 3 Cannulation and institution of cardiopulmonary bypass 2 Safe conduct of CPB - problem solving and troubleshooting 3 Weaning from bypass and decannulation 2 Femoral cannulation and decannulation 1 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 2 Relevant cannulation techniques and appropriate delivery of cardioplegia	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Ischaemic Heart Disease**	**Simulation**
Category	Ischaemic Heart Disease	
Sub-category:	None	
Objective	*To evaluate and manage with appropriate supervision the surgical aspects of a patient with ischaemic heart disease including the complications of ischaemic heart disease.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Myocardial cellular physiology 3 Haemodynamics; physiology and measurement 3 Electrophysiology, including conduction disorders 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Pulmonary physiology, ventilation and gas exchange 3 Metabolic response to trauma 3 Vascular biology and reactivity	

	Anatomy 3 Heart, pericardium and great vessels 3 Coronary anatomy and variants 3 Coronary angiography 3 Anatomy of the peripheral vascular system and vascular conduits Pathology 3 Inflammation and wound healing 3 Atheroma, medial necrosis and arteritis 3 Intimal hyperplasia and graft atherosclerosis 3 Myocardial infarction and complications 3 Systemic Inflammatory Response Syndrome Pharmacology 3 Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general Microbiology 3 Organisms involved in cardiorespiratory infection 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis CLINICAL KNOWLEDGE General 3 Diagnosis, investigation and treatment of heart disease 3 Risk assessment and stratification 3 Cardiopulmonary resuscitation 3 Cardiac arrhythmias 3 Complications of surgery 3 Renal dysfunction 3 Multiorgan failure 3 Cardiac rehabilitation 3 Blood transfusion and blood products 3 Wound infection and sternal disruption Specific 3 Diagnosis investigation and assessment of IHD 3 Operative treatment - Off pump and on pump surgery 3 Results of surgery, survival, graft patency, recurrence	

	3 Arterial revascularisation 3 Redo coronary artery surgery 3 Role of PCI and non operative treatment 3 Management of cardiovascular risk factors 3 Complications of myocardial infarction and ischaemic heart disease 3 VSD, mitral regurgitation, aneurysm.	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 3 Chest radiograph 3 ECG including exercise ECG 3 Coronary Angiography 3 Cardiac Catheterisation data 2 Echocardiography including 2D, Doppler and TOE and stress echo 2 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 3 Diagnosis and treatment of cardiac arrhythmias 3 Management of post cardiac surgical patient 3 Management of complications of surgery 3 Cardiac rehabilitation 3 Blood transfusion and blood products 2 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Saphenous vein harvest 3 Mammary artery/radial artery harvest 3 Preparation for and management of cardipulmonary bypass 3 Proximal coronary anastamosis 2 Distal coronary anastamosis	Core skills Cardiothoracic course(essential) CABG simulation PBA(essential)

	2 principles for establishment of safe conditions for off pump surgery	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Heart Valve Disease**	**Simulation**
Category	Heart Valve Disease	
Sub-category:	None	
Objective	*To evaluate and manage, with appropriate supervision, a patient with both uncomplicated heart valve disease, including operative management.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Cardiovascular physiology including valve physiology and haemodynamics 3 Electrophysiology, including conduction disorders 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Pulmonary physiology, ventilation and gas exchange 3 Metabolic response to trauma Anatomy 3 Cardiac chambers and valves, pericardium and great vessels 3 Anatomy of the conduction system Pathology 3 Pathophysiology of valve incompetence and stenosis. 3 Consequences of valve disease on cardiac function and morphology 3 Pathophysiology of mixed valve disease and combined valve pathology (eg aortic and mitral) 3 Combined valvular and ischaemic heart disease 3 Atrial fibrillation and other arrhythmias Pharmacology 3 Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general	

	Microbiology 3 Organisms involved in cardio respiratory infection 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis 3 Endocarditis and prosthetic valve endocarditis CLINICAL KNOWLEDGE General knowledge 3 Cardiopulmonary resuscitation 3 Care of the cardiac surgical patient 3 Complications of surgery 3 Risk assessment and stratification 3 Management of cardiovascular risk factors Specific Knowledge 3 agnosis investigation and assessment of valvular heart disease 3 ming of surgical intervention in valve disease 3 tions for operative management including: Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts) 3 Valve design: materials, configuration and biomechanics. 3 Results of surgery – survival, valve thrombosis, endocarditis, bleeding. 3 Interpretation of survival and follow up data 3 Cardiac performance and long term functional status 3 Surgery for conduction problems 3 Surgical treatment of arrhythmias	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including drug history, identification of co morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 3 Chest radiograph 3 ECG interpretation including exercise ECG 3 Coronary angiography 3 Cardiac catheterisation data including left and right heart data	

	3 Echocardiography (thoracic and transoesophageal) including 2D, Doppler and stress echo 2 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 3 Diagnosis and treatment of cardiac arrhythmias 3 Management of post cardiac surgical patient 3 Management of complications of surgery 3 Cardiac rehabilitation 3 Blood transfusion and blood products 2 Wound infection and sternal disruption 2 Non operative management of endocarditis 3 Valve selection 3 Anticoagulation management including complications.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Isolated, uncomplicated aortic valve replacement (stented biological or mechanical) 1 Isolated uncomplicated mitral valve replacement 1 Tricuspid valve surgery 1 Combined valve and graft surgery 1 Surgical strategies for managing the small aortic root 1 Aortic root surgery 1 Redo Valve surgery 1 Valve surgery for endocarditis 2 Techniques for surgical ablation of arrhythmias 1 Mitral valve repair 1 Alternative surgical approaches to valve surgery including thoracotomy, transseptal approaches, and minimal access surgery	Aortic valve simulation PBA(essential) Mitral valve replacement simulation PBA(essential) Aortic root replacement simulation PBA(essential) Mitral valve repair simulation PBA(essential)

Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Aortovascular Disease	Simulation
Category	Aortovascular Disease	
Sub-category:	None	
Objective	*To evaluate and manage uncomplicated surgical aspects of a patient with aortovascular disease, including operative management where appropriate and up to the defined competence. This module provides intermediate training in a complex subspeciality.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Vascular biology and reactivity 3 Haemodynamics; physiology and measurement 3 Rheology and arterial pressure regulation 3 Haemostasis, thrombosis and bleeding 3 Physiology of transfusion therapy 3 Principles of surgical infectious disease 3 Acid base balance 3 Metabolic response to trauma 3 Pathophysiology and of hypothermia including the effects upon 3 haemoglobin, metabolic rate and pH with their management Anatomy 3 Heart, pericardium and great vessels 3 Anatomy of the peripheral vascular system 3 Blood supply of the spinal cord Pathology 3 Inflammation and wound healing 3 Atheroma, medial necrosis and arthritis 3 Inherited disorders of vascular biology 3 Systemic Inflammatory Response Syndrome Pharmacology 3 Drugs used in the treatment of hypertension, heart failure and angina 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Anti-emetics 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general	

	Microbiology 3 Organisms involved in cardiorespiratory infection 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis CLINICAL KNOWLEDGE General 3 Risk assessment 3 Cardiopulmonary resuscitation 3 Cardiac arrhythmias 3 Complications of surgery 3 Renal dysfunction 3 Multiorgan failure 3 Blood transfusion and blood products 3 Wound infection and sternal disruption Specific 3 Natural history of aortic disease 3 Diagnosis, investigation and assessment of aortic disease 3 Knowledge of operative treatment including spinal cord and cerebral preservation strategies 3 Type A dissection 3 Type B dissection 3 Traumatic aortic rupture 3 Thoraco-abdominal aneurysm 3 Results of surgery – survival, complication rates 3 Non-surgical management including the role of endovascular stenting 3 Management of cardiovascular and non-cardiovascular risk factors	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including assessment of pre-operative complications, drug history, identification of co-morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 3 Chest radiograph 3 ECG including exercise ECG 3 Coronary Angiography 3 Aortography 3 Cardiac Catheterisation data	

	3 Echocardiography including 2D, doppler and TOE and stress echo 2 CT scanning 2 MRI scanning PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 3 Diagnosis and treatment of cardiac arrhythmias 3 Management of post cardiac surgical patient 3 Management of complications of surgery 3 Cardiac rehabilitation 3 Blood transfusion and blood products 2 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 1 Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery 1 Organ protection strategies including HCA, RCP and SACP 2 Femoral cannulation 1 Axillary cannulation 1 Surgery for acute dissection of the ascending aorta 1 Aortic root replacement for chronic aortic root disease 1 Complex aortic surgery including arch surgery, descending aortic and thoraco-abdominal aortic surgery	Aortic dissection course simulation(desireable)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Cardiothoracic Trauma**	**Simulation**
Category	Cardiothoracic Trauma	

Sub-category:	None	
Objective	*To evaluate and manage, including surgical management where appropriate, and as part of a multidisciplinary team, a patient with thoracic trauma.*	
Knowledge	BASIC KNOWLEDGE 4 Anatomy of the lungs, heart, chest wall, diaphragm and oesophagus 4 Anatomy of the larynx, trachea and bronchial tree 4 Physiology of breathing and its control 4 Physiology of the heart and circulation GENERAL TRAUMA MANAGEMENT 4 Principles of trauma management (as defined by ATLS) 4 Principles of emergency resuscitation following cardiac arrest SPECIFIC KNOWLEDGE 3 The mechanism and patterns of injury associated with blunt, penetrating, blast and deceleration injuries to the chest 3 The post-ATLS, definitive care of blunt, penetrating and deceleration injuries to the chest. 3 The indications and use of appropriate investigations in thoracic trauma management 3 Pain relief in chest trauma, including epidural anaesthesia. 3 Indications for immediate, urgent and delayed thoracotomy in trauma	
Clinical Skills	GENERAL TRAUMA MANAGEMENT (ATLS) 4 Assessment and management of airway, breathing and circulation 4 Maintenance of an adequate airway and respiratory support 4 Protection of the cervical spine 4 Circulatory resuscitation 4 Establishment of appropriate monitoring 4 Assessment and management of pain and	

	anxiety CARDIOTHORACIC TRAUMA MANAGEMENT 4 Examination and assessment of the of the chest, including respiratory cardiovascular and circulatory systems 4 Recognition and management of immediately life threatening situations: obstructed airway, tension pneumothorax, massive haemothorax, open chest wound, flail chest and cardiac tamponade 3 Recognition and management of potentially life threatening situations: lung contusion, bronchial rupture, blunt cardiac injury, intrathoracic bleeding, oesophageal injury, simple pneumothorax and major vascular injury 3 Recognition of potentially life threatening penetrating injuries to the chest and abdomen 3 Interpretation of chest x-ray, ECG, arterial blood gases and echocardiography 3 Detection and treatment of cardiac arrhythmias 2 Management of the widened mediastinum including appropriate investigations and multidisciplinary consultation	
Technical Skills and Procedures	PRACTICAL SKILLS 2 Establish an emergency airway (surgical and non-surgical) 4 Insertion and management of thoracic drains 2 Establish adequate venous access and monitoring. OPERATIVE MANAGEMENT OF THORACIC TRAUMA 2 Postero-lateral, thoracotomy, antero lateral thoracotomy and thoraco-laparotomy 2 Bilateral Anterior Thoracotomy 3 Median sternotomy and closure 2 Repair of cardiac injuries 1 Repair of pulmonary and bronchial injuries	DSTS course cadaveric simulation (desireable)

	1 Management of the complications of chest trauma including retained haemothorax and empyema 1 Repair of oesophageal injuries 1 Treatment of aortic transection	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**General Management of a Patient Undergoing Thoracic Surgery**	**Simulation**
Category	General Management of a Patient Undergoing Thoracic Surgery	
Sub-category:	None	
Objective	*To be competent in the evaluation and management of a patient undergoing thoracic surgery including operative management, with appropriate supervision. The knowledge and clinical skills are common to all thoracic surgical conditions, and should be read in conjunction with the curriculum for specific surgical conditions.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Pulmonary physiology, ventilation and gas exchange 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Metabolic response to trauma 3 Digestive, renal and hepatic physiology 3 Nutrition Anatomy 3 Tracheobronchial tree and lungs 3 Thoracic inlet, neck and mediastinum 3 Oesophagus and upper GI tract 3 Chest wall and diaphragm Pathology 3 Inflammation and wound healing 3 Bronchopulmonary infections 3 ARDS 3 Emphysema 3 Pulmonary fibrosis 3 Pulmonary manifestations of systemic disease 3 Systemic manifestations of pulmonary disease 3 Benign and malignant tumours of trachea, bronchus and lung parenchyma	

	3 Oesophagitis, columnar-lined oesophagus stricture 3 Oesophageal motility disorders 3 Malignant and benign tumours of the oesophagus and stomach 3 Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid Pharmacology 3 Bronchodilators 3 H2 antagonists and proton pump inhibitors 3 Haemostatic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general Microbiology 3 Organisms involved in respiratory infection including TB 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis 3 Management of intra pleural sepsis CLINICAL KNOWLEDGE Thoracic Incisions 3 Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches. Sternotomy 3 Difficult access and improving exposure. 3 Early and late complications of thoracic incisions 3 Analgesia including pharmacology, effectiveness, side effects and use in combination regimens 3 Post-operative analgesia, including epidural, PCAS and paravertebral catheter techniques. Bronchoscopy 3 The role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease. 3 The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy Mediastinal exploration 3 Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology.	

	3 Equipment for mediastinal exploration 3 Relevant imaging techniques, and influence on surgical approach.	
Clinical Skills	HISTORY AND EXAMINATION 4 System specific and general history and examination, including drug history, identification of comorbidity and functional status. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 3 Chest radiograph and ECG 2 CT, including contrast enhanced CT 2 Interpretation of imaging of the mediastinum. 2 MRI and PET 3 Respiratory function tests 2 Ventilation/perfusion scan 4 Blood gases 2 Oesophageal function tests and contrast studies PATIENT MANAGEMENT General 4 Cardiopulmonary resuscitation 3 Risk assessment, stratification and management 3 Management of patients making an uncomplicated or complicated recovery from thoracic operations. 3 Post-operative management of pain control, respiratory failure, sputum retention, haemodynamic instability and low urine output. 3 Treatment of cardiac arrhythmias 3 Pain control 2 Wound infection and disruption 3 Blood transfusion and blood products	

	2 Physiotherapy and rehabilitation 2 Palliative care	
Technical Skills and Procedures	PRACTICAL SKILLS 1 Tracheostomy 2 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 3 Chest drain management OPERATIVE MANAGEMENT <u>Incisions</u> 3 Correct positioning of patient for thoracic surgery 3 Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions. 2 Difficult access and improving exposure 3 Perform and close sternotomy incision OPERATIVE MANAGEMENT <u>Bronchoscopy</u> 3 Diagnostic bronchoscopy including biopsy - rigid and flexible. 3 Equipment, instrumentation and preparation 3 Perform rigid and flexible bronchoscopy 2 Airway and ventilatory management 3 Recognise normal and abnormal anatomy. 2 Identify common pathologies and the surgical relevance of the findings. 2 Take appropriate specimens for bacteriology, cytology and histology. 2 Management of moderate bleeding and other common complications. 3 To appropriately supervise the care of patients recovering from bronchoscopy. 2 Post-operative bronchoscopy: indications	Core skills Cardiothoracics chest drain simulation(essential) Lung resection simulation PBA(essential) Bronchoscopy simulation PBA(essential)

	and procedure 1 Tracheostomy and minitracheostomy Mediastinal Exploration 2 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Neoplasms of the Lung**	**Simulation**
Category	Neoplasms of the Lung	
Sub-category:	None	
Objective	*To assess and manage a patient with a neoplasm of the lung, including operative management and with appropriate supervision. Appreciation of the multidisciplinary, multimodality approach to the management of the condition.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery - general SPECIFIC KNOWLEDGE 3 Benign and malignant tumours of trachea, bronchus and lung parenchyma 3 Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases. 3 Neoadjuvant and adjuvant treatment of lung cancer 3 Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management. 3 Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse. 3 Knowledge of palliative care techniques. 3 Treatment of post-operative complications of pulmonary resection such as empyema and broncho-pleural fistula. 3 Role of repeat surgery in recurrent and second primary malignancies of the lung.	

	3 Medical and surgical options to deal with recurrent or problematic complications of pulmonary resection.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery - general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 2 Interpretation of endoscopic findings. 3 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Bronchoscopic assessment including biopsy 2 Endoscopic and surgical techniques of lung biopsy 2 Mediastinal assessment and biopsy 2 Intraoperative diagnosis and staging 1 Endoscopic management of tumours using laser and stenting 2 Surgery for benign and malignant conditions of the lungs 2 Segmentectomy and lobectomy for benign and malignant disease 1 Redo operations for lung metastases 1 Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm. 1 Management of post-operative complications such as empyema and broncho-pleural fistula.	Lung resection simulation PBA(essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Pleura**	**Simulation**
Category	Disorders of the Pleura	

Sub-category:	None	
Objective	*To evaluate and manage surgical conditions of the pleura and the pleural space, including operative management and with appropriate supervision*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 3 Anatomy and physiology of the pleura 3 Inflammatory, infective and malignant disease of the visceral and parietal pleura. 3 Pneumothorax 3 Pleural effusion 3 Empyema 3 Mesothelioma 3 Haemothorax 3 Chylothorax 3 Conditions of adjacent organs that affect the pleura 3 Medical and surgical management of pleural disease, including radiological, open and VATS techniques. 3 Techniques to deal with failures of primary treatment. 3 Advanced techniques for pleural space obliteration such as thoracoplasty and soft-tissue transfer	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 3 Interpretation of imaging of the pleura 4 Chest drains: insertion, management, removal and treatment of complications. 3 Management of patients making uncomplicated and complicated recovery from pleural interventions.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Open procedures for non-complex pleural problems 3 VATS procedures for non- complex pleural problems 1 Open and VATS procedures for empyema, including techniques for decortication.	

	1 Open and VATS procedures in complex cases. 1 Advanced techniques of pleural space obliteration.	VATS simulation PBA(essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Chest Wall**	**Simulation**
Category	Disorders of the Chest Wall	
Sub-category:	None	
Objective	*To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate and with appropriate supervision.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery - general SPECIFIC KNOWLEDGE 3 Anatomy of the chest wall 3 Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall. 3 Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology. 3 Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy. 3 Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction. 3 Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae. 3 Prosthetic materials used in chest wall surgery 3 The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery. 3 Techniques of complex chest wall reconstruction involving thoracoplasty or soft-tissue reconstruction	

Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery - general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 3 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Chest wall biopsy and choice of appropriate technique. 2 Open and excision biopsy and resection of the chest wall for benign and malignant conditions. 1 Chest wall resection in combination with resection of the underlying lung. 2 Selection and insertion of prosthetic materials, and selection of cases in which such materials are required 1 Pectus correction, by both open and minimally-invasive techniques, including post-operative care and complications 1 Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions. 1 Complex chest wall reconstruction	Chest wall reconstruction simulation on intermediate thoracic course(essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Diaphragm**	**Simulation**
Category	Disorders of the Diaphragm	
Sub-category:	None	
Objective	*To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate, and with appropriate supervision.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE	

	3 Anatomy and physiology of the diaphragm. 3 Pathology of the diaphragm. 3 Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities. 3 Physiological consequences of diaphragmatic herniation or paresis. 3 Surgical techniques used to biopsy and resect diaphragmatic tumours. 3 Situations in which replacement of the diaphragm is required, the materials used and their value and limitations. 3 Complications of diaphragmatic resection and their management. 3 Techniques used to electrically pace the diaphragm, and the conditions in which such treatment is appropriate.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general Specific Skills 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 3 Patient selection with assessment of function and risk. 3 Management of patients making an uncomplicated or complicated recovery from diaphragmatic resection.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 1 Resection and repair of the diaphragm and adjacent structures 1 Complications of diaphragmatic resection 1 Management of diaphragmatic trauma	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Emphysema and Bullae**	**Simulation**
Category	Emphysema and Bullae	
Sub-category:	None	
Objective	*To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate, and with appropriate supervision.*	

Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 3 Aetiology, pathology and physiology of chronic obstructive airways disease (COPD) 3 Epidemiology and public health issues 3 Smoking cessation measures. 3 Clinical, laboratory, physiological and imaging techniques. 3 Medical and surgical management of COPD and its complications 3 Selection criteria and pre-operative preparation 3 Surgical techniques used in the treatment of emphysema and bullae and the results of surgical treatment including relevant clinical trials. 3 Lung volume reduction surgery: techniques, complications and management of complications. 3 Experimental and developmental techniques in lung volume reduction surgery	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 3 Patient selection with assessment of function and risk. 3 Post-operative management of patients making an uncomplicated recovery from surgery for emphysema or the complications of such diseases. 3 Management of patients following lung volume reduction surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Procedures to deal with secondary pneumothorax and bullae by open	VATS simulation PBA(essential)

	techniques. 2 Procedures to deal with secondary pneumothorax and bullae by VATS techniques. 1 Lung volume reduction surgery using open and VATS techniques.	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Pericardium**	**Simulation**
Category	Disorders of the Pericardium	
Sub-category:	None	
Objective	*To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate, and with appropriate supervision.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 3 Anatomy of the pericardium. 3 Pathology of the pericardium. 3 Pathophysiological consequences of pericardial constriction and tamponade. 3 Clinical, echocardiographic and imaging techniques used to detect pericardial disease and assess its consequences. 3 Techniques for pericardial drainage using guided needle aspiration 3 Surgical drainage by sub-xiphoid, thoracotomy or VATS approaches. 3 Surgical techniques for pericardiectomy. 3 Materials used for pericardial replacement, their value and limitations and the situations in which used. 3 Post-operative complications following resection of the pericardium and its prosthetic replacement.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general	

	4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques, including echocardiography. 3 Recognition and assessment of pericardial tamponade and constriction. 3 Techniques for pericardial drainage using guided needle aspiration 3 Recognition of pericardial herniation and cardiac strangulation. 3 Patient selection with assessment of function and risk. 3 Management of patients making an uncomplicated or complicated recovery from pericardial surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Non-complex pericardial fenestration procedures 1 Pericardial fenestration in complex cases 1 Pericardiectomy for relief of constriction 1 Resection of the pericardium and replacement with prosthetic materials 1 Competence in dealing with the complications of pericardial resection and replacement	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Mediastinum**	**Simulation**
Category	Disorders of the Mediastinum	
Sub-category:	None	
Objective	*To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate, and with appropriate supervision.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 3 Anatomy of the mediastinum 3 Congenital, benign, infective and malignant	

	(primary and secondary) conditions of the mediastinum. 3 Systemic conditions associated with the mediastinum. 3 Clinical, laboratory, electromyographic and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease 3 Myasthenia gravis: medical, surgical and peri-operative management 3 Staging of thymoma and grading of myasthenia 3 Benign and malignant conditions, which do not require surgical biopsy or resection. 3 Oncological treatment of malignant diseases of the mediastinum, including multidisciplinary care. 3 Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumours, complications and results. 3 Retrosternal goitre and its management	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 3 Patient selection with assessment of function and risk. 3 Post-operative management of patients including recognition and management of post-operative complications .	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Biopsy of mediastinal masses using appropriate techniques 2 Excision of the thymus 2 Isolated resection of mediastinal cysts and tumours 1 Resection of mediastinal cysts and tumours, including extended resections	

	involving adjacent structures	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Disorders of the Airway	Simulation
Category	Disorders of the Airway	
Sub-category:	None	
Objective	*To assess and manage a patient with disease of the major airways, including surgical management where appropriate, and with appropriate supervision.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 3 Anatomy of the larynx, trachea and bronchus. 3 Physiology of the normal airway. 3 Pathophysiology of disease and its effects on lung function. 3 Endoscopic appearances in health and disease. 3 Congenital, inflammatory, infective, benign and neoplastic diseases of the airways. 3 Symptoms, signs of airway disease. 3 Clinical, physiological and imaging tests undertaken to diagnose and assess airway disease. 3 Techniques for surgical resection of the trachea. 3 Bronchoplastic procedures and the limitations of these techniques. 3 Medical and oncological treatments available to deal with airway diseases. 3 Endoscopic techniques used to deal with benign and malignant conditions, including disobliteration and stenting. 3 Presentation, investigation and management of anastamotic complications following airway surgery. 3 Presentation, evaluation and treatment of	

	fistulae in the aerodigestive tract, due to benign, malignant and iatrogenic causes. 3 Role of open and endoscopic procedures in dealing with problems.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 3 Recognition, diagnosis and assessment of airway obstruction. 3 Patient selection with assessment of function and risk. 3 Post-operative care of patients making an uncomplicated recovery from major airway surgery. 4 Post-operative care of patients making a complicated recovery from airway surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Endoscopic assessment of a patient with airways disease 1 Sleeve resection of the trachea for simple benign conditions 1 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease 1 Techniques for the relief of major airways obstruction including stenting 1 Airway resection for tumours and complex benign conditions and techniques for airway reconstruction, anastomosis and laryngeal release 1 Repeat resections for recurrence and the complications of prior resection. 1 Management of fistulae in the aerodigestive tract by surgical and endoscopic techniques	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Congenital Heart Disease	Simulation
Category	Congenital Heart Disease	
Sub-category:	None	
Objective	*To understand and gain experience in some of the aspects of children and adults with heart disease, including operative management where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.*	
Knowledge	BASIC KNOWLEDGE Physiology 2 Relevant general physiology of childhood 2 Fetal circulation and circulatory changes at birth 2 Haemodynamics; physiology and measurement including shunt calculations 2 Physiology of pulmonary vasculature 2 Myocardial cellular physiology in immature myocardium 3 Electrophysiology, including conduction disorders 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Pulmonary physiology, ventilation and gas exchange 3 Metabolic response to trauma 3 Vascular biology and reactivity 3 Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest. 3 Ph and alpha stat CPB management Anatomy 2 Embryology of the heart 3 Anatomy of the heart, pericardium and great vessels 3 Pulmonary anatomy 3 Coronary anatomy and variants	Congenital Cardiac Surgery RCS Course(desireable)

	3 Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts 2 Sequential cardiac analysis and terminology of cardiac malformations Pathology 3 Inflammation and wound healing 3 Systemic Inflammatory Response Syndrome 3 Effect of growth and pregnancy Pharmacology 2 Drugs used in the treatment of congenital heart disease 3 Inotropes 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general 3 Hypotensive agents (systemic and pulmonary). Microbiology 3 Organisms involved in cardiorespiratory infection 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis CLINICAL KNOWLEDGE General 2 Diagnosis, investigation and treatment of congenital heart disease 2 Results of surgery - survival, common complications and management. 2 Late complications of surgery for congenital heart disease	

	2 Role of interventional cardiology. 2 Role of mechanical assist (IABP, VAD and ECMO) 2 Indications for referral for transplantation 2 Risk assessment and stratification 3 Cardiopulmonary resuscitation 3 Cardiac arrhythmias 3 Renal dysfunction 3 Multiorgan failure 2 Cardiac rehabilitation 3 Blood transfusion and blood products 3 Wound infection and sternal disruption 3 Types of cardiac prosthesis and indications for use Specific Knowledge The anatomy, pathophysiology natural history and management of the following conditions or procedures 3 Patent ductus arteriosus 3 Atrial septal defect 3 Ventricular septal defect 3 Coarctation 3 PA banding and shunts 2 Transposition of the great arteries / switch procedure 2 Tetralogy of Fallot/Pulmonary atresia plus VSD 2 Fontan procedure 1 Rastelli procedure 1 Hypoplastic left heart 1 Norwood procedure 1 Truncus arteriosus 1 Double outlet right ventricle 1 Pulmonary atresia plus VSD and MAPCAs 1 Pulmonary atresia and intact septum 2 Single ventricle 2 Partial and complete atrioventricular septal defects 2 Aortic valve disease including Ross procedure 2 Mitral valve disease 2 Tricuspid valve disease including Ebstiens abnormality 2 Extra cardiac conduits 1 Interrupted aortic arch 2 Total anomalous pulmonary venous drainage	

	2 Extra Corporeal Membrane Oxygenation 2 Transplantation	
Clinical Skills	HISTORY AND EXAMINATION 2 Cardiovascular system and general history and examination of child or adult with congenital heart disease DATA INTERPRETATION 3 Routine haematology and biochemical investigations 3 Chest radiograph and ECG 2 Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations 2 Echocardiography in congenital heart disease, including 2D, doppler and TOE PATIENT MANAGEMENT 2 Principles of paediatric intensive care 2 Management of adults and children following congenital heart surgery 2 Management of complications of surgery 3 Cardiopulmonary resuscitation 3 Diagnosis and treatment of cardiac arrhythmias 3 Blood transfusion and blood products 3 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Sternotomy - open and close 2 Thoracotomy - open and close 2 Preparation for and management of cardiopulmonary bypass including partial bypass 1 Approaches for ECMO, cannulation and management Surgical management of the following common uncomplicated conditions: (level 1 - a higher level of operative competence is not required during this module) - 1 Patent ductus arteriosus	

	- 1 Atrial septal defect - 1 Ventricular septal defect - 1 Coarctation - 1 PA banding and shunts	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Intrathoracic transplantation and surgery for heart failure**	**Simulation**
Category	Intrathoracic Transplantation and Surgery for Heart Failure	
Sub-category:	None	
Objective	*To be able to evaluate and manage, with appropriate supervision, some of the aspects of patients with heart failure, including operative management where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.*	
Knowledge	BASIC KNOWLEDGE Pathophysiology 3 Haemodynamics of heart failure. 3 Molecular mechanisms underlying heart failure. 3 Mechanisms and outcomes of respiratory failure. 3 Causes of cardiac failure. 3 Causes of respiratory failure. Immunology 3 Major and minor histocompatability antigen systems. 3 Mechanisms of immune activation and pathological consequences for transplanted organs. Pharmacology 3 Modes of action of commonly used drugs in heart failure: CLINICAL KNOWLEDGE 3 Indications for, contraindications to and assessment for heart transplantation.	

	3 Indications for, contraindications to and assessment for lung and heart/lung transplantation. 3 Indications for ECMO 3 Indications for VAD 3 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient. 3 Management of patients after intrathoracic organ transplantation, including complications 3 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure. 2 Resynchronisation therapy: techniques and indications	Balloons, Bypass and Circ support course (essential)
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 3 ECG including exercise ECG 3 Coronary angiography 3 Cardiac catheterisation data 2 Echocardiography including 2D, Doppler and TOE and stress echo 2 MR assessment of ventricular function and viability 2 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 3 Management of brain-dead donor 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient	

	3 Management of complications of surgery 2 Management of rejection 3 Cardiac rehabilitation 4 Blood transfusion and blood products 3 Wound infection and sternal disruption 3 Diagnosis and treatment of cardiac arrhythmias	
Technical Skills and Procedures	OPERATIVE MANAGEMENT <u>Transplantation</u> 2 Donor Retrieval 2 Ex-vivo donor organ management 1 Implantation of heart 1 Implantation of lung 1 Implantation of heart/lung block <u>Surgery for heart failure</u> 2 Surgical revascularisation for ischaemic cardiomyopathy 1 Ventricular reverse remodelling surgery 1 Mitral valve repair for cardiac failure 2 Cannulation for ECMO 1 Implantation of epicardial electrodes for resynchronisation therapy 1 Implantation of extracorporeal VAD 1 Implantation of intracorporeal VAD	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Management of Benign Oesophageal Disorders**	
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage surgical aspects of benign oesophageal disorders. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an*	

	introduction to further advanced training in this area.	
Knowledge	BASIC KNOWLEDGE Physiology 3 Gastric and oesophageal cellular physiology 3 Mechanical and cellular defence mechanisms in oesophagus 3 Oesophageal mucosal injury and modulation 3 Effects of acid pepsin and biliary reflux 3 Oesophago-gastric physiology and assessment including pH monitoring 3 Oesophageal motility measurement in achalasia, diffuse spasm and non-specific motility syndromes Anatomy 3 Embryology of the foregut. 3 The oesophagus and its anatomical relationships from cricopharyngeus to cardia, including details of blood supply and lymphatic drainage. 3 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 3 Anatomy of the colon, including its anatomical relationships, blood supply and lymphatic drainage. Pathology 3 Inflammation and wound healing. 3 Oesophageal injury response and variations in response. 3 The inflammation, metaplasia, dysplasia cancer sequence. 3 Neurological deficits / aetiology of oesophageal dysmotility disorders. 3 Para-oesophageal hernias Pharmacology 3 Drugs used in the treatment of gastro-oesophageal reflux disorder and oesophageal dysmotility. Microbiology	

	3 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 3 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of benign oesophageal disorders. 4 Radiology, endoscopy, 24 hour pH monitoring and oesophageal function tests. 4 Risk assessment and stratification. 4 Open, laparoscopic and thoracoscopic surgery of the oesophagus. 4 Relative merits of conservative and operative treatment. 4 Alternative management of achalasia including dilatation and botox injection. 4 The indications for surgery in paraoesophageal hernia. 4 Endoscopic dilatation techniques	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigation 3 Interpretation of oesophageal motility and pH monitoring data 4 Chest radiograph and contrast imaging 4 Cardio-pulmonary assessment including exercise tests PATIENT MANAGEMENT 3 Management of post thoracotomy or laparotomy surgical patient 3 Management of complications of surgery 3 Diagnosis and management of oesophageal perforation or anastamotic leak. 4 Blood transfusion and blood products	

	3 Wound infection and wound disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Benign) 2 Oesophago-gastro-duodenoscopy 2 Rigid oesophagoscopy 2 Oesophageal dilatation 2 Open and laparoscopic fundoplication and cardiomyotomy 2 Mobilisation of oesophagus, stomach and colon 1 Oesophageal anastomosis 1 Management of oesophageal perforation: Boerhaave's or endoscopic	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Management of Oesophageal Neoplasia**	
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage aspects of a patient with oesophageal neoplasia, including operative intervention where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Gastric and oesophageal cellular physiology 3 Mechanical and cellular defence mechanisms in oesophagus 3 Oesophageal mucosal injury and modulation 3 Effects of acid pepsin and biliary reflux Anatomy 3 The oesophagus and its anatomical relationships from cricopharyngeus to cardia including details of blood supply and lymphatic drainage.	

	3 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 3 Anatomy of the colon, including its blood supply and its anatomical relationships 3 Pathology 3 Inflammation and wound healing. 3 Oesophageal injury response and variations in response. 3 The aetiology and epidemiology of oesophageal cancer 3 Metaplasia-dysplasia sequence. Pharmacology 3 Adjuvant and neoadjuvant chemotherapy. Microbiology 3 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 3 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of oesophageal disorders. 4 Radiology, endoscopy and oesophageal function tests. 4 Risk assessment and stratification. 4 Diagnostic tests, including contrast oesophageal imaging, CT Scanning, abdominal ultrasonography, endoscopic ultrasonography and PET scanning. 4 Treatment options and outcomes of treatment 4 Oesophageal resection 4 Palliative procedures 4 Other therapies including radiotherapy, laser, stent and photodynamic therapy 4 Screening and prevention.	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, and identification of comorbidity and	

	risk assessment. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 3 Interpretation of Chest radiograph, contrast swallow and CT Scan 4 Cardio-pulmonary assessment including exercise tests. PATIENT MANAGEMENT 3 Management of post thoracotomy or laparotomy surgical patient. 3 Management of complications of surgery 4 Blood transfusion and blood products 3 Wound infection and wound disruption 2 Diagnosis and management of oesophageal perforation or anastamotic leak.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Malignant) 2 Oesophago-gastro-duodenoscopy 2 Assessment by thoracoscopy laparoscopy and mediastinoscopy 2 Rigid oesophagoscopy and bronchoscopy 2 Oesophageal dilatation and stent placement 2 Mobilisation of oesophagus, stomach and colon 1 Oesophageal resection 1 Oesophageal reconstruction including interposition techniques	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Intermediate Stage II

Intermediate (II) Stage

Intermediate (II) Phase of training (ST5 &ST6)

The intermediate (II) phase of training will consist of an indicative period of two years. These two years should in turn consist of four modules, each of 6 months. By the end of this phase trainees will be expected to have completed at least one year in cardiac surgery and one year in thoracic surgery.

Whilst the emphasis remains on gaining experience and competence in the generality of cardiothoracic surgery, trainees may be starting to develop subspecialty interests and undertaking modules relevant to this.

The curriculum for each of the modules is defined (see syllabus). Aims and levels of competence to be attained within each module by the end of this stage are identified.

Intermediate (ll) modules:

- Critical Care and Postoperative Management
- Cardiopulmonary Bypass, Myocardial Protection, Circulatory Support
- Ischaemic Heart Disease
- Heart Valve Disease
- Aortovascular Disease
- Cardiothoracic Trauma
- General Management of a Patient Undergoing Thoracic Surgery
- Neoplasms of the Lung
- Disorders of the Pleura
- Disorders of the Chest Wall
- Disorders of the Diaphragm
- Emphysema and Bullae
- Disorders of the Pericardium
- Disorders of the Mediastinum
- Disorders of the Airway
- Congenital Heart Disease
- Intrathoracic transplantation and surgery for heart failure
- Disorders of the Oesophageal

Click on Workplace Based Assessments to view the assessment forms including DOPS and PBAs

Intermediate Stage II Topics

Topic	Critical Care and Post-operative Management	Simulation
Category	Critical Care and Post-operative Management	
Sub-category:	None	
Objective	*To be able to manage a post surgical patient on the critical care, high dependency and post operative wards. To work as part of a multiprofessional, multidisciplinary team in the management of a patient requiring complex critical care*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmia 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma and surgery 4 GIT, renal and hepatic physiology 4 Nutrition 4 Temperature regulation Anatomy 4 Heart, pericardium and great vessels 4 Mediastinum, thoracic inlet and neck 4 Tracheobronchial tree and lungs 4 Chest wall and diaphragm Pathology 4 Inflammation and wound healing 4 Myocardial infarction and complications 4 Endocarditis 4 Pericarditis 4 Systemic Inflammatory Response Syndrome	

	4 Bronchopulmonary infection 4 ARDS Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Antimicrobial treatment and policies CLINICAL KNOWLEDGE 4 Cardiopulmonary resuscitation 4 Management of cardiac surgical patient 4 Management of thoracic surgical patient 4 Treatment of cardiac arrhythmia 4 Management of complications of surgery 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 4 Neuropsychological consequences of surgery and critical care	
Clinical Skills	HISTORY AND EXAMINATION 4 History and examination of the post-operative and critically ill patient DATA INTERPRETATION 4 Analysis and interpretation of post operative and critical care charts and documentation	

	4 Routine haematology and biochemical investigations 4 Chest radiograph and ECG 3 Echocardiography including TOE PATIENT MANAGEMENT General management of surgical patient 4 Management of fluid balance and circulating volume 4 Pain control 4 Wound management 4 Management of surgical drains 4 Antimicrobial policy and prescribing 4 Management of post-operative haemorrhage 4 Cardiopulmonary resuscitation (ALS) 4 Management of complications of surgery 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Recognition, evaluation and treatment of haemodynamic abnormalities 4 Evaluation and interpretation of haemodynamic data 4 Practical use of inotropes and vasoactive drugs 4 Use of intra aortic balloon pump Recognition, evaluation and treatment of cardiac arrhythmias 4 Interpretation of ECG 4 Use of anti-arrhythmic drugs 4 Use of defibrillator 4 Understanding and use of cardiac pacing Recognition, evaluation and treatment of	ALS Moulage (essential) Advanced Cardiac Surgery scenarios (desireable) NOTTS assessment Simulation on Balloons Bypass Circulatory support course (essential) ACLS scenarios (essential)

	ventilatory abnormalities 4 Interpretation of blood gas results 4 Airway management 3 Understanding of ventilatory techniques and methods 3 Understanding of anaesthetic drugs and methods Recognition, evaluation and treatment of multiorgan dysfunction 3 Renal dysfunction and support 3 GIT dysfunction, feeding and nutrition 3 Recognition and evaluation of cerebral and neuropsychological problems	CALS Scenarios (essential)
Technical Skills and Procedures	PRACTICAL SKILLS 4 Arterial cannulation 4 Central venous cannulation 4 Intra aortic balloon pump insertion 4 Intra aortic balloon pump timing and management 2 Tracheostomy 3 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 4 Chest drain management 3 Establish an airway 3 Internal Cardiac Massage OPERATIVE MANAGEMENT 3 Re-exploration for bleeding / tamponade	Simulation on Balloons Bypass Circulatory support course (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Cardiopulmonary Bypass**	**Simulation**
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	

Sub-category:	Cardiopulmonary Bypass	
Objective	*To manage the clinical and technical aspects of cardiopulmonary bypass. During this module competence in the management of uncomplicated situations is obtained. Management of complex or difficult situations may require further training and supervision.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmias 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma and surgery 4 GIT, renal and hepatic physiology 4 Temperature regulation Anatomy 4 Heart, pericardium and great vessels 4 Mediastinum, thoracic inlet and neck 4 Chest wall and diaphragm 4 Femoral triangle and peripheral vascular system Pathology 4 Inflammation and wound healing 4 Systemic Inflammatory Response Syndrome 4 ARDS Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics	

	4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Antimicrobial treatment and policies SPECIFIC KNOWLEDGE 4 Principles and practice of CPB 4 Relevant equipment and technology and its application 4 Monitoring during CPB 4 Inflammatory and pathophysiological response to bypass 4 Pulsatile and non pulsatile flow 4 Effect of CPB on pharmacokinetics 4 Priming fluids and haemodilution 4 Acid base balance – pH and alpha stat 4 Neuropsychological consequences of CPB 4 Cell salvage and blood conservation	Aortic Cannulation sim PBA (essential)
Clinical Skills	N/A	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 3 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 2 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 3 Relevant cannulation techniques and appropriate delivery of cardioplegia	Aortic Cannulation sim PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Myocardial Protection	Simulation

Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	Myocardial Protection	
Objective	*To manage the clinical and technical aspects of intraoperative myocardial protection. Competence in the management of routine situations will be obtained in this module. Management of complex or difficult situations will require further training and supervision.*	
Knowledge	BASIC KNOWLEDGE 4 Myocardial cellular physiology 4 Myocardial function and dysfunction 4 Haemodynamics and arrhythmias 4 Coronary arterial and venous anatomy SPECIFIC KNOWLEDGE 4 Scientific foundations of myocardial preservation 4 Principles and practice of myocardial preservation 4 Cardioplegia solutions and delivery modes. 4 Non-cardioplegic techniques of preservation	
Clinical Skills	PATIENT MANAGEMENT 4 Myocardial management throughout the peri-operative period 3 Ability to adapt preservation technique to clinical situation	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 3 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 2 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation	Aortic Cannulation sim PBA (essential)

	3 Relevant cannulation techniques and appropriate delivery of cardioplegia	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Circulatory Support**	**Simulation**
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	Circulatory Support	
Objective	*To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support. Competence in the management of routine situations will be obtained in this module. Management of complex or difficult situations will require further training and supervision.*	
Knowledge	BASIC KNOWLEDGE 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmias 4 Haemostasis, thrombosis and bleeding 4 Anatomy of the femoral triangle and peripheral vascular system 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs SPECIFIC KNOWLEDGE 4 Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods 4 Intra aortic balloon pump - indications for use, patient selection and complications 4 Physiology of the balloon pump 3 Understanding of relevant equipment and technology 3 Ventricular assist devices: indications for use, patient selection and complications	Simulation on Balloons Bypass Circulatory support course (essential)

Clinical Skills	PATIENT MANAGEMENT 4 Patient selection for mechanical circulatory support 4 Insertion and positioning of the intra aortic balloon pump 4 Management of the balloon pump including timing and trouble shooting 4 Care of the patient with intra aortic balloon pump, including recognition and management of complications	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 3 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 2 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 3 Relevant cannulation techniques and appropriate delivery of cardioplegia	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Ischaemic Heart Disease**	**Specific**
Category	Ischaemic Heart Disease	
Sub-category:	None	
Objective	*To evaluate and manage the surgical aspects of a patient with ischaemic heart disease including the complications of ischaemic heart disease. Competence in the management of routine and uncomplicated situations will be obtained in this module. Management of complex or difficult situations will require further training or supervision*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Myocardial cellular physiology 4 Haemodynamics; physiology and measurement	

	4 Electrophysiology, including conduction disorders 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma 4 Vascular biology and reactivity Anatomy 4 Heart, pericardium and great vessels 4 Coronary anatomy and variants 4 Coronary angiography 4 Anatomy of the peripheral vascular system and vascular conduits Pathology 4 Inflammation and wound healing 4 Atheroma, medial necrosis and arteritis 4 Intimal hyperplasia and graft atherosclerosis 4 Myocardial infarction and complications 4 Systemic Inflammatory Response Syndrome Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Organisms involved in wound infection	

	4 Antibiotic usage and prophylaxis 4 Antisepsis CLINICAL KNOWLEDGE General 4 Diagnosis, investigation and treatment of heart disease 4 Risk assessment and stratification 4 Cardiopulmonary resuscitation 4 Cardiac arrhythmias 4 Complications of surgery 4 Renal dysfunction 4 Multiorgan failure 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Specific 4 Diagnosis investigation and assessment of IHD 4 Operative treatment - Off pump and on pump surgery 4 Results of surgery, survival, graft patency, recurrence 4 Arterial revascularisation 4 Redo coronary artery surgery 4 Role of PCI and non operative treatment 4 Management of cardiovascular risk factors 4 Complications of myocardial infarction and ischaemic heart disease VSD, mitral regurgitation, aneurysm.	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical	

	investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG including exercise ECG 4 Coronary Angiography 4 Cardiac Catheterisation data 4 Echocardiography including 2D, Doppler and TOE and stress echo 4 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Isolated, first time coronary artery surgery (May include both off pump and on pump options and arterial revascularisation strategies) 1 Repeat coronary artery surgery 1 Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm	CABG simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Heart Valve Disease**	**Simulation**
Category	Heart Valve Disease	
Sub-category:	None	

Objective	*To evaluate and manage a patient with heart valve disease, including operative management. Competence in the management of uncomplicated cases will be achieved by the end of this module. Management of complex or difficult situations will require further training and supervision*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Cardiovascular physiology including valve physiology and haemodynamics 4 Electrophysiology, including conduction disorders 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma Anatomy 4 Cardiac chambers and valves, pericardium and great vessels 4 Anatomy of the conduction system Pathology 4 Pathophysiology of valve incompetence and stenosis. 4 Consequences of valve disease on cardiac function and morphology 4 Pathophysiology of mixed valve disease and combined valve pathology (eg aortic and mitral) 4 Combined valvular and ischaemic heart disease 4 Atrial fibrillation and other arrhythmias Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics	

	4 Antibiotics 4 Anaesthetic agents, local and genera Microbiology 4 Organisms involved in cardio respiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis 4 Endocarditis and prosthetic valve endocarditis CLINICAL KNOWLEDGE General knowledge 4 Cardiopulmonary resuscitation 4 Care of the cardiac surgical patient 4 Complications of surgery 4 Risk assessment and stratification 4 Management of cardiovascular risk factors Specific Knowledge 4 Diagnosis investigation and assessment of valvular heart disease 4 Timing of surgical intervention in valve disease 4 Options for operative management including: Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts) 4 Valve design: materials, configuration and biomechanics. 4 Results of surgery - survival, valve thrombosis, endocarditis, bleeding. 4 Interpretation of survival and follow up data 4 Cardiac performance and long term functional status 4 Surgery for conduction problems 4 Surgical treatment of arrhythmias	
Clinical Skills	HISTORY AND EXAMINATION	

	4 Cardiovascular system and general history and examination including drug history, identification of co morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG interpretation including exercise ECG 4 Coronary angiography 4 Cardiac catheterisation data including left and right heart data 3 Echocardiography (thoracic and transoesophageal) including 2D, Doppler and stress echo 3 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 4 Non operative management of endocarditis 4 Valve selection 4 Anticoagulation management including complications.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Tricuspid valve surgery 1 Surgical strategies for managing the small aortic root 1 Aortic root surgery 1 Redo Valve surgery	Aortic root replacement simulation PBA (essential)

	1 Valve surgery for endocarditis 2 Mitral valve repair 1 Alternative surgical approaches to valve surgery including thoracotomy, transseptal approaches, and minimal access surgery 2 Combined valve and graft surgery 2 Techniques for surgical ablation of arrhythmias 3 Isolated, aortic valve replacement 2 Isolated mitral valve replacement	Mitral valve repair simulation PBA (essential) Aortic valve simulation PBA (essential) Mitral valve replacement simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Aortovascular Disease	Simulation
Category	Aortovascular Disease	
Sub-category:	None	
Objective	*To evaluate and manage uncomplicated surgical aspects of a patient with aortovascular disease, including operative management where appropriate and up to the defined competence. This module provides intermediate training in a complex subspeciality.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Vascular biology and reactivity 4 Haemodynamics; physiology and measurement 4 Rheology and arterial pressure regulation 4 Haemostasis, thrombosis and bleeding 4 Physiology of transfusion therapy 4 Principles of surgical infectious disease 4 Acid base balance 4 Metabolic response to trauma 4 Pathophysiology and of hypothermia including the effects upon haemoglobin, metabolic rate and pH with their management Anatomy 4 Heart, pericardium and great vessels 4 Anatomy of the peripheral vascular system 4 Blood supply of the spinal cord Pathology 4 Inflammation and wound healing 4 Atheroma, medial necrosis and arthritis 4 Inherited disorders of vascular biology 4 Systemic Inflammatory Response Syndrome Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina	

	4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Anti-emetics 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis CLINICAL KNOWLEDGE General 4 Risk assessment 4 Cardiopulmonary resuscitation 4 Cardiac arrhythmias 4 Complications of surgery 4 Renal dysfunction 4 Multiorgan failure 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Specific 4 Natural history of aortic disease 4 Diagnosis, investigation and assessment of aortic disease 4 Knowledge of operative treatment including spinal cord and cerebral preservation strategies • Type A dissection • Type B dissection • Traumatic aortic rupture • Thoraco-abdominal aneurysm 4 Results of surgery – survival, complication	

	rates 4 Non-surgical management including the role of endovascular stenting 4 Management of cardiovascular and non-cardiovascular risk factors	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including assessment of pre-operative complications, drug history, identification of co-morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG including exercise ECG 4 Coronary Angiography 4 Aortography 4 Cardiac Catheterisation data 4 Echocardiography including 2D, doppler and TOE and stress echo 4 CT scanning 4 MRI scanning PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Preparation for and management of cardiopulmonary bypass, including	

	alternative, non-bypass strategies for descending aortic surgery 2 Organ protection strategies including HCA, RCP and SACP 3 Femoral cannulation 2 Auxiliar cannulation 1 Surgery for acute dissection of the ascending aorta 2 Aortic root replacement for chronic aortic root disease 1 Complex aortic surgery including arch surgery, descending aortic and thoraco-abdominal aortic surgery	Aortic dissection course simulation (desirable)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Cardiothoracic Trauma**	**Simulation**
Category	Cardiothoracic Trauma	
Sub-category:	None	
Objective	*To evaluate and manage as part of a multidisciplinary team, a patient with thoracic trauma. To include appropriate surgical management*	
Knowledge	BASIC KNOWLEDGE 4 Anatomy of the lungs, heart, chest wall, diaphragm and oesophagus 4 Anatomy of the larynx, trachea and bronchial tree 4 Physiology of breathing and its control 4 Physiology of the heart and circulation GENERAL TRAUMA MANAGEMENT 4 Principles of trauma management (as defined by ATLS) 4 Principles of emergency resuscitation following cardiac arrest SPECIFIC KNOWLEDGE 4 The mechanism and patterns of injury associated with blunt, penetrating and deceleration injuries to the chest	

	4 The post-ATLS, definitive care of blunt, penetrating and deceleration injuries to the chest. 4 The indications and use of appropriate investigations in thoracic trauma management 4 Pain relief in chest trauma, including epidural anaesthesia. 4 Indications for immediate, urgent and delayed thoracotomy in trauma	
Clinical Skills	GENERAL TRAUMA MANAGEMENT (ATLS) 4 Assessment and management of airway, breathing and circulation 4 Maintenance of an adequate airway and respiratory support 4 Protection of the cervical spine 4 Circulatory resuscitation 4 Establishment of appropriate monitoring 4 Assessment and management of pain and anxiety CARDIOTHORACIC TRAUMA MANAGEMENT 4 Examination and assessment of the of the chest, including respiratory cardiovascular and circulatory systems 4 Recognition and management of immediately life threatening situations: obstructed airway, tension pneumothorax, massive haemothorax, open chest wound, flail chest and cardiac tamponade 4 Recognition and management of potentially life threatening situations: lung contusion, bronchial rupture, blunt cardiac injury, intrathoracic bleeding, oesophageal injury, simple pneumothorax and major vascular injury 4 Recognition of potentially life threatening penetrating injuries to the chest and abdomen 4 Interpretation of chest x-ray, ECG, arterial blood gases and echocardiography 4 Detection and treatment of cardiac arrhythmias	

	4 Management of the widened mediastinum including appropriate investigations and multidisciplinary consultation	
Technical Skills and Procedures	PRACTICAL SKILLS 3 Establish an emergency airway (surgical and non-surgical) 4 Insertion and management of thoracic drains 3 Establish adequate venous access and monitoring OPERATIVE MANAGEMENT OF CARDIOTHORACIC TRAUMA 3 Postero-lateral, thoracotomy, antero lateral thoracotomy and thoraco-laparotomy 3 Bilateral Anterior Thoracotomy 4 Median sternotomy and closure 3 Repair of cardiac injuries 3 Repair of pulmonary and bronchial injuries 2 Management of the complications of chest trauma including retained haemothorax and empyema 2 Repair of oesophageal injuries 2 Treatment of aortic transection	DSTS course cadaveric simulation (desirable)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**General Management of a Patient Undergoing Thoracic Surgery**	**Simulation**
Category	General Management of a Patient Undergoing Thoracic Surgery	
Sub-category:	None	
Objective	*To be competent in the evaluation and management of a patient undergoing thoracic surgery. The knowledge and clinical skills are common to all thoracic surgical conditions, and should be read in conjunction with the curriculum for specific surgical conditions.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Pulmonary physiology, ventilation and gas exchange	

	4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Metabolic response to trauma 4 Digestive, renal and hepatic physiology 4 Nutrition Anatomy 4 Tracheobronchial tree and lungs 4 Thoracic inlet, neck and mediastinum 4 Oesophagus and upper GI tract 4 Chest wall and diaphragm Pathology 4 Inflammation and wound healing 4 Bronchopulmonary infections 4 ARDS 4 Emphysema 4 Pulmonary fibrosis 4 Pulmonary manifestations of systemic disease 4 Systemic manifestations of pulmonary disease 4 Benign and malignant tumours of trachea, bronchus and lung parenchyma 4 Oesophagitis, columnar-lined oesophagus stricture 4 Oesophageal motility disorders 4 Malignant and benign tumours of the oesophagus and stomach 4 Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid Pharmacology 4 Bronchodilators 4 H2 antagonists and proton pump inhibitors 4 Haemostatic drugs 4 Analgesics	

	4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in respiratory infection including TB 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis 4 Management of intra pleural sepsis CLINICAL KNOWLEDGE Thoracic Incisions 4 Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches. Sternotomy 4 Difficult access and improving exposure. 4 Early and late complications of thoracic incisions 4 Analgesia including pharmacology, effectiveness, side effects and use in combination regimens 4 Post-operative analgesia, including epidural, PCAS and paravertebral catheter techniques. Bronchoscopy 4 The role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease. 4 The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy Mediastinal exploration 4 Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology. 4 Equipment for mediastinal exploration 4 Relevant imaging techniques, and influence on surgical approach.	

Clinical Skills	HISTORY AND EXAMINATION 4 System specific and general history and examination, including drug history, identification of comorbidity and functional status. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Chest radiograph and ECG 3 CT, including contrast enhanced CT 3 Interpretation of imaging of the mediastinum. 3 MRI and PET 4 Respiratory function tests 3 Ventilation/perfusion scan 4 Blood gases 3 Oesophageal function tests and contrast studies PATIENT MANAGEMENT General 4 Cardiopulmonary resuscitation 4 Risk assessment, stratification and management 4 Management of patients making an uncomplicated or complicated recovery from thoracic operations. 4 Post-operative management of pain control, respiratory failure, sputum retention, haemodynamic instability and low urine output. 4 Treatment of cardiac arrhythmias 4 Pain control 3 Wound infection and disruption 4 Blood transfusion and blood products 4 Physiotherapy and rehabilitation 2 Palliative care	

Technical Skills and Procedures	PRACTICAL SKILLS 2 Tracheostomy 3 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 4 Chest drain management <u>OPERATIVE MANAGEMENT</u> <u>Incisions</u> 4 Correct positioning of patient for thoracic surgery 4 Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions. 3 Difficult access and improving exposure 4 Perform and close sternotomy incision <u>Bronchoscopy</u> 4 Diagnostic bronchoscopy including biopsy - rigid and flexible. 4 Equipment, instrumentation and preparation 4 Perform rigid and flexible bronchoscopy 3 Airway and ventilatory management 4 Recognise normal and abnormal anatomy 4 Identify common pathologies and the surgical relevance of the findings 4 Take appropriate specimens for bacteriology, cytology and histology 4 Management of moderate bleeding and other common complications 4 To appropriately supervise the care of patients recovering from bronchoscopy 4 Post-operative bronchoscopy: indications and procedure 2Tracheostomy and minitracheostomy <u>Mediastinal Exploration</u>	Core skills Cardiothoracics chest drain simulation (essential) Lung resection simulation PBA (essential) Bronchoscopy simulation PBA (essential)

	4 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Neoplasms of the Lung**	**Simulation**
Category	Neoplasms of the Lung	
Sub-category:	None	
Objective	*To fully assess and manage an uncomplicated patient with a neoplasm of the lung, including operative management where appropriate. Appreciation of the multidisciplinary, multimodality approach to the management of the condition.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery - general SPECIFIC KNOWLEDGE 4 Benign and malignant tumours of trachea, bronchus and lung parenchyma 4 Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases. 4 Neoadjuvant and adjuvant treatment of lung cancer 4 Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management. 4 Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse. 4 Knowledge of palliative care techniques. 4 Treatment of post-operative complications of pulmonary resection such as empyema and broncho-pleural fistula. 4 Role of repeat surgery in recurrent and second primary malignancies of the lung. 4 Medical and surgical options to deal with recurrent or problematic complications of pulmonary resection.	
Clinical Skills	PATIENT MANAGEMENT	

	As for thoracic surgery - general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Interpretation of endoscopic findings. 4 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Bronchoscopic assessment including biopsy 3 Endoscopic and surgical techniques of lung biopsy 3 Mediastinal assessment and biopsy 3 Intraoperative diagnosis and staging 2 Endoscopic management of tumours using laser and stenting 3 Surgery for benign and malignant conditions of the lungs 3 Segmentectomy and lobectomy for benign and malignant disease 2 Redo operations for lung metastases 2 Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm 2 Management of post-operative complications such as empyema and broncho-pleural fistula	Lung resection simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Disorders of the Pleura	Simulation
Category	Disorders of the Pleura	
Sub-category:	None	
Objective	*To fully evaluate and manage uncomplicated surgical conditions of the pleura and the pleural space*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general	

	SPECIFIC KNOWLEDGE 4 Anatomy and physiology of the pleura 4 Inflammatory, infective and malignant disease of the visceral and parietal pleura. 4 Pneumothorax 4 Pleural effusion 4 Empyema 4 Mesothelioma 4 Haemothorax 4 Chylothorax 4 Conditions of adjacent organs that affect the pleura 4 Medical and surgical management of pleural disease, including radiological, open and VATS techniques. 4 Techniques to deal with failures of primary treatment. 4 Advanced techniques for pleural space obliteration such as thoracoplasty and soft-tissue transfer	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Interpretation of imaging of the pleura 4 Chest drains: insertion, management, removal and treatment of complications. 4 Management of patients making uncomplicated and complicated recovery from pleural interventions.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Open procedures for non-complex pleural problems 4 VATS procedures for non- complex pleural problems 2 Open and VATS procedures for empyema, including techniques for decortication. 2 Open and VATS procedures in complex cases 2 Advanced techniques of pleural space obliteration, with appropriate specialist assistance	VATS simulation PBA (essential)

Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Disorders of the Chest Wall	Simulation
Category	Disorders of the Chest Wall	
Sub-category:	None	
Objective	*To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the chest wall 4 Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall. 4 Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology. 4 Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy. 4 Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction. 4 Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae. 4 Prosthetic materials used in chest wall surgery 4 The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery. 4 Techniques of complex chest wall reconstruction involving thoracoplasty or soft-tissue reconstruction	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 4 Interpretation of laboratory, physiological	

	and imaging techniques. 4 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Chest wall biopsy and choice of appropriate technique 3 Open and excision biopsy and resection of the chest wall for benign and malignant conditions 2 Chest wall resection in combination with resection of the underlying lung 3 Selection and insertion of prosthetic materials, and selection of cases in which such materials are required 2 Pectus correction, by both open and minimally-invasive techniques, including post-operative care and complications 2 Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions 2 Complex chest wall reconstruction	Chest wall reconstruction simulation on intermediate thoracic course (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Diaphragm**	**Simulation**
Category	Disorders of the Diaphragm	
Sub-category:	None	
Objective	*To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy and physiology of the diaphragm. 4 Pathology of the diaphragm. 4 Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities.	

	4 Physiological consequences of diaphragmatic herniation or paresis. 4 Surgical techniques used to biopsy and resect diaphragmatic tumours. 4 Situations in which replacement of the diaphragm is required, the materials used and their value and limitations. 4 Complications of diaphragmatic resection and their management. 4 Techniques used to electrically pace the diaphragm, and the conditions in which such treatment is appropriate.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general Specific Skills 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Management of patients making an uncomplicated or complicated recovery from diaphragmatic resection.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 2 Resection and repair of the diaphragm and adjacent structures 2 Complications of diaphragmatic resection 2 Management of diaphragmatic trauma	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Emphysema and Bullae**	**Simulation**
Category	Emphysema and Bullae	
Sub-category:	None	
Objective	*To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE	

	As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Aetiology, pathology and physiology of chronic obstructive airways disease (COPD) 4 Epidemiology and public health issues 4 Smoking cessation measures. 4 Clinical, laboratory, physiological and imaging techniques. 4 Medical and surgical management of COPD and its complications 4 Selection criteria and pre-operative preparation 4 Surgical techniques used in the treatment of emphysema and bullae and the results of surgical treatment including relevant clinical trials. 4 Lung volume reduction surgery: techniques, complications and management of complications. 4 Experimental and developmental techniques in lung volume reduction surgery	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Post-operative management of patients making an uncomplicated recovery from surgery for emphysema or the complications of such diseases. 3 Management of patients following lung volume reduction surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Procedures to deal with secondary pneumothorax and bullae by open techniques 4 Procedures to deal with secondary pneumothorax and bullae by VATS techniques	VATS simulation PBA (essential)

	2 Lung volume reduction surgery using open and VATS techniques	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Disorders of the Pericardium	Simulation
Category	Disorders of the Pericardium	
Sub-category:	None	
Objective	*To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the pericardium. 4 Pathology of the pericardium. 4 Pathophysiological consequences of pericardial constriction and tamponade. 4 Clinical, echocardiographic and imaging techniques used to detect pericardial disease and assess its consequences. 4 Techniques for pericardial drainage using guided needle aspiration 4 Surgical drainage by sub-xiphoid, thoracotomy or VATS approaches. 4 Surgical techniques for pericardiectomy. 4 Materials used for pericardial replacement, their value and limitations and the situations in which used. 4 Post-operative complications following resection of the pericardium and its prosthetic replacement.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques, including echocardiography. 4 Recognition and assessment of pericardial tamponade and constriction. 4 Techniques for pericardial drainage using guided needle aspiration 4 Recognition of pericardial herniation and cardiac strangulation.	

	4 Patient selection with assessment of function and risk. 4 Management of patients making an uncomplicated or complicated recovery from pericardial surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Non-complex pericardial fenestration procedures 2 Pericardial fenestration in complex cases. 2 Pericardiectomy for relief of constriction 2 Resection of the pericardium and replacement with prosthetic materials. 2 Competence in dealing with the complications of pericardial resection and replacement.	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Mediastinum**	**Simulation**
Category	Disorders of the Mediastinum	
Sub-category:	None	
Objective	*To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the mediastinum 4 Congenital, benign, infective and malignant (primary and secondary) conditions of the mediastinum. 4 Systemic conditions associated with the mediastinum. 4 Clinical, laboratory, electromyographic and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease 4 Myasthenia gravis: medical, surgical and peri-operative management 4 Staging of thymoma and grading of	

	myasthenia 4 Benign and malignant conditions, which do not require surgical biopsy or resection. 4 Oncological treatment of malignant diseases of the mediastinum, including multidisciplinary care. 4 Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumours, complications and results. 4 Retrosternal goitre and its management	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Post-operative management of patients including recognition and management of post-operative complications .	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Biopsy of mediastinal masses using appropriate techniques 4 Excision of the thymus 4 Isolated resection of mediastinal cysts and tumours 3 Resection of mediastinal cysts and tumours, including extended resections involving adjacent structures	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Disorders of the Airway**	**Simulation**
Category	Disorders of the Airway	
Sub-category:	None	

Objective	*To assess and manage a patient with disease of the major airways, including surgical management where appropriate.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the larynx, trachea and bronchus. 4 Physiology of the normal airway. 4 Pathophysiology of disease and its effects on lung function. 4 Endoscopic appearances in health and disease. 4 Congenital, inflammatory, infective, benign and neoplastic diseases of the airways. 4 Symptoms, signs of airway disease. 4 Clinical, physiological and imaging tests undertaken to diagnose and assess airway disease. 4 Techniques for surgical resection of the trachea. 4 Bronchoplastic procedures and the limitations of these techniques. 4 Medical and oncological treatments available to deal with airway diseases. 4 Endoscopic techniques used to deal with benign and malignant conditions, including disobliteration and stenting. 4 Presentation, investigation and management of anastamotic complications following airway surgery. 4 Presentation, evaluation and treatment of fistulae in the aerodigestive tract, due to benign, malignant and iatrogenic causes. 4 Role of open and endoscopic procedures in dealing with problems.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 3 Interpretation of laboratory, physiological	

	and imaging techniques. 4 Recognition, diagnosis and assessment of airway obstruction. 4 Patient selection with assessment of function and risk. 4 Post-operative care of patients making an uncomplicated recovery from major airway surgery. 4 Post-operative care of patients making a complicated recovery from airway surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Endoscopic assessment of a patient with airways disease 2 Sleeve resection of the trachea for simple benign conditions 2 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease 2 Techniques for the relief of major airways obstruction including stenting 1 Airway resection for tumours and complex benign conditions, and techniques for airway reconstruction, anastamosis and laryngeal release 1 Repeat resections for recurrence and the complications of prior resection 1 Management of fistulae in the aerodigestive tract by surgical and endoscopic techniques	Tracheal resection simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	Congenital Heart Disease	Simulation
Category	Congenital Heart Disease	
Sub-category:	None	
Objective	*To be able to evaluate and manage, with appropriate supervision, some of the aspects of children and adults with heart disease, including operative management where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general*	

	cardiothoracic training or as an introduction to further advanced training in this area.	
Knowledge	BASIC KNOWLEDGE Physiology 3 Relevant general physiology of childhood 3 Fetal circulation and circulatory changes at birth 3 Haemodynamics; physiology and measurement including shunt calculations 3 Physiology of pulmonary vasculature 3 Myocardial cellular physiology in immature myocardium 3 Electrophysiology, including conduction disorders 3 Haemostasis, thrombosis and bleeding 3 Acid base balance 3 Pulmonary physiology, ventilation and gas exchange 3 Metabolic response to trauma 3 Vascular biology and reactivity 3 Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest. 3 Ph and alpha stat CPB management Anatomy 3 Embryology of the heart 3 Anatomy of the heart, pericardium and great vessels 3 Pulmonary anatomy 3 Coronary anatomy and variants 3 Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts 3 Sequential cardiac analysis and terminology of cardiac malformations Pathology 3 Inflammation and wound healing 3 Systemic Inflammatory Response Syndrome	Congenital Cardiac Surgery course RCSEng (desirable)

	3 Effect of growth and pregnancy Pharmacology 3 Drugs used in the treatment of congenital heart disease 3 Inotropes 3 Anti-arrhythmic drugs 3 Haemostatic drugs 3 Antiplatelet, anticoagulant and thrombolytic drugs 3 Analgesics 3 Antibiotics 3 Anaesthetic agents, local and general 3 Hypotensive agents (systemic and pulmonary). Microbiology 3 Organisms involved in cardiorespiratory infection 3 Organisms involved in wound infection 3 Antibiotic usage and prophylaxis 3 Antisepsis CLINICAL KNOWLEDGE General 3 Diagnosis, investigation and treatment of congenital heart disease 3 Results of surgery – survival, common complications and management. 3 Late complications of surgery for congenital heart disease 3 Role of interventional cardiology. 3 Role of mechanical assist (IABP, VAD and ECMO) 3 Indications for referral for transplantation 3 Risk assessment and stratification 3 Cardiopulmonary resuscitation 3 Cardiac arrhythmias 3 Renal dysfunction	

	3 Multiorgan failure 3 Cardiac rehabilitation 3 Blood transfusion and blood products 3 Wound infection and sternal disruption 3 Types of cardiac prosthesis and indications for use Specific Knowledge The anatomy, pathophysiology natural history and management of the following conditions or procedures 4 Patent ductus arteriosus 4 Atrial septal defect 4 Ventricular septal defect 4 Coarctation 3 PA banding and shunts 3 Transposition of the great arteries – switch procedure 3 Tetralogy of Fallot/Pulmonary atresia plus VSD 2 Fontan procedure 2 Rastelli procedure 2 Hypoplastic heart 2 Norwood procedure 2 Truncus arteriosus 2 Double outlet right ventricle 2 Pulmonary atresia plus VSD and MAPCAs 2 Single ventricle 2 Partial and complete atrioventricular septal defects 2 Valve lesions 2 Extra cardiac conduits 2 Interrupted aortic arch 2 Total anomalous pulmonary venous drainage 2 Extra Corporeal Membrane Oxygenation 2 Transplantation	
Clinical Skills	HISTORY AND EXAMINATION 3 Cardiovascular system and general history and examination of child or adult with congenital heart disease DATA INTERPRETATION 3 Routine haematology and biochemical investigations 2 Chest radiograph and ECG 2 Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations 2 Echocardiography in congenital heart disease, including 2D, doppler and TOE	

	PATIENT MANAGEMENT 2 Principles of paediatric intensive care 2 Management of adults and children following congenital heart surgery 2 Management of complications of surgery 3 Cardiopulmonary resuscitation 3 Diagnosis and treatment of cardiac arrhythmias 4 Blood transfusion and blood products 3 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Sternotomy – open and close 3 Thoracotomy – open and close 2 Preparation for and management of cardiopulmonary bypass including partial bypass 2 Approaches for ECMO, cannulation and management. Surgical management of the following common uncomplicated conditions: (level 2 - a higher level of operative competence is not required during this module) 2 Patent ductus arteriosus 2 Atrial septal defect 2 Ventricular septal defect 2 Coarctation 2 PA banding and shunts	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Intrathoracic transplantation and surgery for heart failure**	**Simulation**
Category	Intrathoracic transplantation and surgery for heart failure	
Sub-category:	None	
Objective	*To be able to evaluate and manage, with appropriate supervision, some of the aspects of patients with heart failure, including operative management where appropriate.*	

	This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.	
Knowledge	BASIC KNOWLEDGE Pathophysiology 3 Haemodynamics of heart failure. 3 Molecular mechanisms underlying heart failure. 3 Mechanisms and outcomes of respiratory failure. 3 Causes of cardiac failure. 3 Causes of respiratory failure. Immunology 3 Major and minor histocompatability antigen systems. 3 Mechanisms of immune activation and pathological consequences for transplanted organs. Pharmacology 3 Modes of action of commonly used drugs in heart failure: CLINICAL KNOWLEDGE 3 Indications for, contraindications to and assessment for heart transplantation. 3 Indications for, contraindications to and assessment for lung and heart/lung transplantation. 3 Indications for ECMO 3 Indications for VAD 3 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient. 3 Management of patients after intrathoracic organ transplantation, including complications 3 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure. 2 Resynchronisation therapy: techniques and indications	Balloons, Bypass and Circ support course (essential)

Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 3 ECG including exercise ECG 3 Coronary angiography 3 Cardiac catheterisation data 2 Echocardiography including 2D, Doppler and TOE and stress echo 2 MR assessment of ventricular function and viability 2 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 3 Management of brain-dead donor 4 Management of post cardiac surgical patient 3 Management of complications of surgery 2 Management of rejection 3 Cardiac rehabilitation 4 Blood transfusion and blood products 3 Wound infection and sternal disruption 3 Diagnosis and treatment of cardiac arrhythmias	
Technical Skills and Procedures	OPERATIVE MANAGEMENT <u>Transplantation</u> 3 Transvenous myocardial biopsy 2 Donor Retrieval 2 Ex-vivo donor organ management	

	1 Implantation of heart 1 Implantation of lung 1 Implantation of heart/lung block Surgery for heart failure 2 Surgical revascularisation for ischaemic cardiomyopathy 1 Ventricular reverse remodelling surgery 1 Mitral valve repair for cardiac failure 2 Cannulation for ECMO 1 Implantation of epicardial electrodes for resynchronisation therapy 1 Implantation of extracorporeal VAD 1 Implantation of intracorporeal VAD	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Management of Benign Oesophageal Disorders**	**Simulation**
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage surgical aspects of benign oesophageal disorders. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Gastric and oesophageal cellular physiology 3 Mechanical and cellular defence mechanisms in oesophagus 3 Oesophageal mucosal injury and modulation 3 Effects of acid pepsin and biliary reflux 3 Oesophago-gastric physiology and assessment including pH monitoring 3 Oesophageal motility measurement in achalasia, diffuse spasm and non-specific	

	motility syndromes Anatomy 3 Embryology of the foregut. 3 The oesophagus and its anatomical relationships from cricopharyngeus to cardia, including details of blood supply and lymphatic drainage. 3 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 3 Anatomy of the colon, including its anatomical relationships, blood supply and lymphatic drainage. Pathology 3 Inflammation and wound healing. 3 Oesophageal injury response and variations in response. 3 The inflammation, metaplasia, dysplasia cancer sequence. 3 Neurological deficits / aetiology of oesophageal dysmotility disorders. 3 Para-oesophageal hernias Pharmacology 3 Drugs used in the treatment of gastro-oesophageal reflux disorder and oesophageal dysmotility. Microbiology 3 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 3 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of benign oesophageal disorders. 4 Radiology, endoscopy, 24 hour pH monitoring and oesophageal function tests. 4 Risk assessment and stratification. 4 Open, laparoscopic and thoracoscopic surgery of the oesophagus. 4 Relative merits of conservative and operative treatment.	

	4 Alternative management of achalasia including dilatation and botox injection. 4 The indications for surgery in paraoesophageal hernia. 4 Endoscopic dilatation techniques	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigation 3 Interpretation of oesophageal motility and pH monitoring data 4 Chest radiograph and contrast imaging 4 Cardio-pulmonary assessment including exercise tests PATIENT MANAGEMENT 3 Management of post thoracotomy or laparotomy surgical patient 3 Management of complications of surgery 3 Diagnosis and management of oesophageal perforation or anastamotic leak. 4 Blood transfusion and blood products 3 Wound infection and wound disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Benign) 2 Oesophago-gastro-duodenoscopy. 2 Rigid oesophagoscopy 2 Oesophageal dilatation 2 Open and laparoscopic fundoplication and cardiomyotomy 2 Mobilisation of oesophagus, stomach and colon 1 Oesophageal anastomosis	

	2 Management of oesophageal perforation: Boerhaave's or endoscopic	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Topic	**Management of Oesophageal Neoplasia**	**Simulation**
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage aspects of a patient with oesophageal neoplasia, including operative intervention where appropriate. This module is intended for a trainee to gain initial exposure to this subspeciality either as part of general cardiothoracic training or as an introduction to further advanced training in this area.*	
Knowledge	BASIC KNOWLEDGE Physiology 3 Gastric and oesophageal cellular physiology 3 Mechanical and cellular defence mechanisms in oesophagus 3 Oesophageal mucosal injury and modulation 3 Effects of acid pepsin and biliary reflux Anatomy 3 The oesophagus and its anatomical relationships from cricopharyngeus to cardia including details of blood supply and lymphatic drainage. 3 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 3 Anatomy of the colon, including its blood supply and its anatomical relationships 3 Pathology 3 Inflammation and wound healing. 3 Oesophageal injury response and variations in response. 3 The aetiology and epidemiology of oesophageal cancer	

	3 Metaplasia-dysplasia sequence. Pharmacology 3 Adjuvant and neoadjuvant chemotherapy. Microbiology 3 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 3 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of oesophageal disorders. 4 Radiology, endoscopy and oesophageal function tests. 4 Risk assessment and stratification. 4 Diagnostic tests, including contrast oesophageal imaging, CT Scanning, abdominal ultrasonography, endoscopic ultrasonography and PET scanning. 4 Treatment options and outcomes of treatment 4 Oesophageal resection 4 Palliative procedures 4 Other therapies including radiotherapy, laser, stent and photodynamic therapy 4 Screening and prevention.	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, and identification of comorbidity and risk assessment. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 3 Interpretation of Chest radiograph, contrast swallow and CT Scan 4 Cardio-pulmonary assessment including exercise tests. PATIENT MANAGEMENT 3 Management of post thoracotomy or laparotomy surgical patient.	

	3 Management of complications of surgery 4 Blood transfusion and blood products 3 Wound infection and wound disruption 2 Diagnosis and management of oesophageal perforation or anastamotic leak.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Malignant) 2 Oesophago-gastro-duodenoscopy 2 Assessment by thoracoscopy laparoscopy and mediastinoscopy 2 Rigid oesophagoscopy and bronchoscopy 2 Oesophageal dilatation and stent placement 2 Mobilisation of oesophagus, stomach and colon 2 Oesophageal resection 2 Oesophageal reconstruction including interpostion techniques	
Professional Skills	Please see the Professional Skills and Behaviour » Intermediate section for these skills	

Final Stage

Final Stage

Final Phase of training (ST7 &ST8)

The final phase of training will consist of an indicative period of two years. These two years should in turn consist of four modules, each of 6 months. By the end of this phase trainees will have been successful in the intercollegiate examination. Trainees will have developed sufficient experience and competence in the generality of cardiothoracic surgery to be eligible for the award of a CCT. They may be provided with the opportunity to develop an area of special interest during this period through the selection of appropriate modules.

The curriculum for each of the modules is defined (see syllabus). Aims and levels of competence to be attained within each module by the end of this stage are identified.

The list of specialist index conditions is detailed below. This list defines the requirements for the award of a CCT and in cardiothoracic surgery. All trainees (including those who are developing additional special interests and those who are taking academic pathway) will be required to meet these standards.

- The management of critically ill cardiothoracic surgical patients in the pre and post operative periods.
- The management of a patient undergoing cardiopulmonary bypass
- The management of myocardial protection during cardiac surgery
- The management of a patient requiring circulatory support
- The assessment and management of patients with coronary heart disease, including elective and emergency presentations. To include competence in both primary and secondary procedures, and where appropriate to include off pump and on pump strategies and arterial revascularisation
- The preliminary assessment and initial management of patients with complications of myocardial infarction, including mitral regurgitation, aneurysm and septal defects. To include operative management in appropriate situations. Full competence in operative management of complex cases to be developed in the post CCT period
- The assessment and management of patients with valvular heart disease; including both isolated and combined aortic and mitral valve disease.
- The assessment and management of patients with combined coronary and valvular heart disease, including operative management.
- Full competence in operative management of complex cases including mitral valve repair and secondary procedures to be developed in the post CCT period.
- The preliminary assessment and initial management of patients with acute dissection of the ascending aorta. To include operative management in appropriate situations.
- Full competence in operative management of complex cases to be developed in the post CCT period
- The assessment and management of patients with minor and major cardiothoracic trauma. To include operative management in appropriate situations.
- Full competence in the operative management of complex cases including great vessel injury to be developed in the post CCT period
- Patient selection and determination of suitability for major thoracic surgery and the pre and postoperative management of a thoracic surgical patient.
- The assessment and management of a patient by bronchoscopy including foreign body retrieval
- The assessment and management of a patient by mediastinal exploration
- Competence in performing appropriate thoracic incisions
- The assessment and management of lung cancer, including the scientific basis of staging systems and techniques used in the determination of stage and fitness for surgery
- An understanding of the role of surgical treatment in the multidisciplinary management of lung cancer and other intrathoracic malignant diseases, including an appreciation of the principles of other treatment modalities and their outcomes
- The assessment and management of patients with pleural disease; including pneumothorax and empyema, and including both VATS and open strategies
- The assessment and management of patients with chest wall abnormalities, infections and tumours
- The assessment and management of patients disorders of the diaphragm, including trauma to the diaphragm
- The assessment and management of patients with emphysematous and bullous lung disease; including surgical management if appropriate and utilising both VATS and open strategies.
- Full competence in operative management of complex cases, including lung reduction surgery, to be developed in the post CCT period

- The assessment and management of patients with disorders of the pericardium and pericardial cavity; including surgical management if appropriate and utilising both VATS and open strategies
- The assessment and management of patients with mediastinal tumours and masses; including surgical management if appropriate and utilising both VATS and open strategies
- The assessment and management of patients with disorders of the major airways. Including operative management in suitable cases.
- Full competence in operative management of complex cases, including tracheal resection, to be developed in the post CCT period

The curriculum is flexible and can accommodate the needs of trainees following an academic pathway. This is achieved by having individualised learning agreements. Academic trainees will be expected to demonstrate that they have achieved all the essential requirements of the CCT, but may choose not to undertake any optional additional training in the final stage. It is however acknowledged that academic trainees will need longer training pathways to achieve the essential competencies.

Final Stage Topics

Topic	Critical Care and Post-operative Management	Simulation
Category	Critical Care and Post-operative Management	
Sub-category:	None	
Objective	*To be able to manage a post surgical patient on the critical care, high dependency and post operative wards. To work as part of a multiprofessional, multidisciplinary team in the management of a patient requiring complex critical care*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmia 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma and surgery 4 GIT, renal and hepatic physiology 4 Nutrition 4 Temperature regulation Anatomy 4 Heart, pericardium and great vessels 4 Mediastinum, thoracic inlet and neck 4 Tracheobronchial tree and lungs 4 Chest wall and diaphragm Pathology 4 Inflammation and wound healing 4 Myocardial infarction and complications 4 Endocarditis 4 Pericarditis 4 Systemic Inflammatory Response Syndrome 4 Bronchopulmonary infection 4 ARDS Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general	

	Microbiology 4 Organisms involved in cardiorespiratory infection 4 Antimicrobial treatment and policies CLINICAL KNOWLEDGE 4 Cardiopulmonary resuscitation 4 Management of cardiac surgical patient 4 Management of thoracic surgical patient 4 Treatment of cardiac arrhythmia 4 Management of complications of surgery 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 4 Neuropsychological consequences of surgery and critical care	
Clinical Skills	HISTORY AND EXAMINATION 4 History and examination of the post-operative and critically ill patient DATA INTERPRETATION 4 Analysis and interpretation of post operative and critical care charts and documentation 4 Routine haematology and biochemical investigations 4 Chest radiograph and ECG 3 Echocardiography including TOE PATIENT MANAGEMENT General management of surgical patient 4 Management of fluid balance and circulating volume 4 Pain control 4 Wound management 4 Management of surgical drains 4 Antimicrobial policy and prescribing 4 Management of post-operative haemorrhage 4 Cardiopulmonary resuscitation (ALS) 4 Management of complications of surgery 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Recognition, evaluation and treatment of haemodynamic abnormalities 4 Evaluation and interpretation of haemodynamic data 4 Practical use of inotropes and vasoactive drugs 4 Use of intra aortic balloon pump Recognition, evaluation and treatment of cardiac arrhythmias 4 Interpretation of ECG	ALS Moulage (essential) Advanced Cardiac Surgery scenarios (desirable) NOTTS assessment Simulation on Balloons Bypass Circulatory support course (essential) ACLS scenarios (essential)

	4 Use of anti-arrhythmic drugs 4 Use of defibrillator 4 Understanding and use of cardiac pacing Recognition, evaluation and treatment of ventilatory abnormalities 4 Interpretation of blood gas results 4 Airway management 3 Understanding of ventilatory techniques and methods 3 Understanding of anaesthetic drugs and methods Recognition, evaluation and treatment of multiorgan dysfunction 3 Renal dysfunction and support 3 GIT dysfunction, feeding and nutrition 3 Recognition and evaluation of cerebral and neuropsychological problems	CALS Scenarios (essential)
Technical Skills and Procedures	PRACTICAL SKILLS 4 Arterial cannulation 4 Central venous cannulation 4 IABP insertion 4 IABP timing and management 3 Tracheostomy 4 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 4 Chest drain management 4 Establish an airway 4 Internal Cardiac Massage OPERATIVE MANAGEMENT 4 Re-exploration for bleeding or tamponade	Simulation on Balloons Bypass Circulatory support course (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Cardiopulmonary Bypass**	**Simulation**
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	None	
Objective	*To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmias 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas	

	exchange 4 Metabolic response to trauma and surgery 4 GIT, renal and hepatic physiology 4 Temperature regulation Anatomy 4 Heart, pericardium and great vessels 4 Mediastinum, thoracic inlet and neck 4 Chest wall and diaphragm 4 Femoral triangle and peripheral vascular system Pathology 4 Inflammation and wound healing 4 Systemic Inflammatory Response Syndrome 4 ARDS Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Antimicrobial treatment and policies SPECIFIC KNOWLEDGE 4 Principles and practice of CPB 4 Relevant equipment and technology and its application 4 Monitoring during CPB 4 Inflammatory and pathophysiological	

	response to bypass 4 Pulsatile and non pulsatile flow 4 Effect of CPB on pharmacokinetics 4 Priming fluids and haemodilution 4 Acid base balance – pH and alpha stat 4 Neuropsychological consequences of CPB 4 Cell salvage and blood conservation	
Clinical Skills	N/A	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 4 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 4 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 4 Relevant cannulation techniques and appropriate delivery of cardioplegia	Aortic Cannulation sim PBA (essential) Aortic Cannulation sim PBA Aortic Cannulation sim PBA
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Myocardial Protection	Simulation
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	None	
Objective	*To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support.*	
Knowledge	BASIC KNOWLEDGE 4 Myocardial cellular physiology 4 Myocardial function and dysfunction 4 Haemodynamics and arrhythmias 4 Coronary arterial and venous anatomy SPECIFIC KNOWLEDGE 4 Scientific foundations of myocardial preservation 4 Principles and practice of myocardial preservation 4 Cardioplegia solutions and delivery modes. 4 Non-cardioplegic techniques of preservation	
Clinical Skills	PATIENT MANAGEMENT 4 Myocardial management throughout the peri-operative period 4 Ability to adapt preservation technique to clinical situation	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 4 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 4 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation	

	4 Relevant cannulation techniques and appropriate delivery of cardioplegia	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Circulatory Support	Simulation
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support	
Sub-category:	None	
Objective	*To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support.*	
Knowledge	BASIC KNOWLEDGE 4 Haemodynamics: physiology and measurement 4 Cardiac arrhythmias 4 Haemostasis, thrombosis and bleeding 4 Anatomy of the femoral triangle and peripheral vascular system 4 Inotropes, vasodilators and vasoconstrictors 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs SPECIFIC KNOWLEDGE 4 Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods 4 Intra aortic balloon pump – indications for use, patient selection and complications 4 Physiology of the balloon pump 4 Understanding of relevant equipment and technology 4 Ventricular assist devices – indications for use, patient selection and complications	
Clinical Skills	PATIENT MANAGEMENT 4 Patient selection for mechanical circulatory support 4 Insertion and positioning of the intra aortic balloon pump 4 Management of the balloon pump including timing and trouble shooting 4 Care of the patient with intra aortic balloon pump, including recognition and management of complications	Scenarios on BBC course Simulation on Balloons Bypass Circulatory support course (essential)

Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Median sternotomy open and close 4 Cannulation and institution of cardiopulmonary bypass 4 Safe conduct of CPB – problem solving and troubleshooting 4 Weaning from bypass and decannulation 4 Femoral cannulation and decannulation 4 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation 4 Relevant cannulation techniques and appropriate delivery of cardioplegia	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Ischaemic Heart Disease**	**Simulation**
Category	Ischaemic Heart Disease	
Sub-category:	None	
Objective	*To evaluate and manage all the surgical aspects of a patient with ischaemic heart disease including the complications of ischaemic heart disease.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Myocardial cellular physiology 4 Haemodynamics; physiology and measurement 4 Electrophysiology, including conduction disorders 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma 4 Vascular biology and reactivity Anatomy 4 Heart, pericardium and great vessels 4 Coronary anatomy and variants	

	4 Coronary angiography 4 Anatomy of the peripheral vascular system and vascular conduits Pathology 4 Inflammation and wound healing 4 Atheroma, medial necrosis and arteritis 4 Intimal hyperplasia and graft atherosclerosis 4 Myocardial infarction and complications 4 Systemic Inflammatory Response Syndrome Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis CLINICAL KNOWLEDGE General 4 Diagnosis, investigation and treatment of heart disease 4 Risk assessment and stratification 4 Cardiopulmonary resuscitation 4 Cardiac arrhythmias 4 Complications of surgery	

	4 Renal dysfunction 4 Multiorgan failure 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Specific 4 Diagnosis investigation and assessment of IHD 4 Operative treatment - Off pump and on pump surgery 4 Results of surgery - survival, graft patency, recurrence 4 Arterial revascularisation 4 Redo coronary artery surgery 4 Role of PCI and non operative treatment 4 Management of cardiovascular risk factors 4 Complications of myocardial infarction and ischaemic heart disease VSD, mitral regurgitation, aneurysm.	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG including exercise ECG 4 Coronary Angiography 4 Cardiac Catheterisation data 4 Echocardiography including 2D, Doppler and TOE and stress echo 4 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation	Scenario based teaching in introductory skills course Scenario teaching Intermediate course

	4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Isolated, first time coronary artery surgery (May include both off pump and on pump options and arterial revascularisation strategies) 3 Repeat coronary artery surgery 2 Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm	CABG simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Heart Valve Disease	Simulation
Category	Heart Valve Disease	
Sub-category:	None	
Objective	*To evaluate and manage a patient with both uncomplicated and complicated heart valve disease, including operative management.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Cardiovascular physiology including valve physiology and haemodynamics 4 Electrophysiology, including conduction disorders 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma Anatomy 4 Cardiac chambers and valves, pericardium and great vessels 4 Anatomy of the conduction system Pathology 4 Pathophysiology of valve incompetence and stenosis. 4 Consequences of valve disease on cardiac function and morphology 4 Pathophysiology of mixed valve disease and combined valve pathology (eg aortic and mitral) 4 Combined valvular and ischaemic heart disease 4 Atrial fibrillation and other arrhythmias Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic	

	drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardio respiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis 4 Endocarditis and prosthetic valve endocarditis CLINICAL KNOWLEDGE General knowledge 4 Cardiopulmonary resuscitation 4 Care of the cardiac surgical patient 4 Complications of surgery 4 Risk assessment and stratification 4 Management of cardiovascular risk factors Specific Knowledge 4 Diagnosis investigation and assessment of valvular heart disease 4 Timing of surgical intervention in valve disease 4 Options for operative management including: Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts) 4 Valve design: materials, configuration and biomechanics. 4 Results of surgery – survival, valve thrombosis, endocarditis, bleeding. 4 Interpretation of survival and follow up data 4 Cardiac performance and long term functional status 4 Surgery for conduction problems	

	4 Surgical treatment of arrhythmias	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including drug history, identification of co morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG interpretation including exercise ECG 4 Coronary angiography 4 Cardiac catheterisation data including left and right heart data 4 Echocardiography (thoracic and transoesophageal) including 2D, Doppler and stress echo 4 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 4 Non operative management of endocarditis 4 Valve selection 4 Anticoagulation management including complications.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Isolated, aortic valve replacement 3 Isolated mitral valve replacement	Aortic valve simulation PBA (essential)

	3 Tricuspid valve surgery 3 Combined valve and graft surgery 4 Surgical strategies for managing the small aortic root 3 Aortic root surgery 3 Redo Valve surgery 3 Valve surgery for endocarditis 4 Techniques for surgical ablation of arrhythmias 3 Mitral valve repair 2 Alternative surgical approaches to valve surgery including thoracotomy, transseptal approaches, and minimal access surgery	Mitral valve replacement simulation PBA (essential) Aortic root replacement simulation PBA (essential) Mitral valve repair simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Aortovascular Disease	Simulation
Category	Aortovascular Disease	
Sub-category:	None	
Objective	*To evaluate and manage uncomplicated surgical aspects of a patient with aortovascular disease, including operative management where appropriate and up to the defined competence. This level of competence is that required of a consultant cardiothoracic surgeon and is defined in the list of key conditions. It is expected that full competence in all aspects of aortovascular surgery would only be obtained in the post CCT period by those with a sub speciality interest*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Vascular biology and reactivity 4 Haemodynamics; physiology and measurement 4 Rheology and arterial pressure regulation 4 Haemostasis, thrombosis and bleeding 4 Physiology of transfusion therapy 4 Principles of surgical infectious disease 4 Acid base balance 4 Metabolic response to trauma 4 Pathophysiology and of hypothermia including the effects upon haemoglobin, metabolic rate and pH with their management Anatomy 4 Heart, pericardium and great vessels 4 Anatomy of the peripheral vascular system 4 Blood supply of the spinal cord Pathology 4 Inflammation and wound healing 4 Atheroma, medial necrosis and arthritis 4 Inherited disorders of vascular biology 4 Systemic Inflammatory Response Syndrome	

	4 Pharmacology 4 Drugs used in the treatment of hypertension, heart failure and angina 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Anti-emetics 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in cardiorespiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis CLINICAL KNOWLEDGE General 4 Risk assessment 4 Cardiopulmonary resuscitation 4 Cardiac arrhythmias 4 Complications of surgery 4 Renal dysfunction 4 Multiorgan failure 4 Blood transfusion and blood products 4 Wound infection and sternal disruption Specific 4 Natural history of aortic disease 4 Diagnosis, investigation and assessment of aortic disease 4 Knowledge of operative treatment including spinal cord and cerebral preservation strategies • Type A dissection • Type B dissection	

	• Traumatic aortic rupture • Thoraco-abdominal aneurysm 4 Results of surgery – survival, complication rates 4 Non-surgical management including the role of endovascular stenting 4 Management of cardiovascular and non-cardiovascular risk factors	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including assessment of pre-operative complications, drug history, identification of co-morbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG including exercise ECG 4 Coronary Angiography 4 Aortography 4 Cardiac Catheterisation data 4 Echocardiography including 2D, doppler and TOE and stress echo 4 CT scanning 4 MRI scanning PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery 3 Organ protection strategies including HCA, RCP and SACP 4 Femoral cannulation 3 Axillary cannulation 2 Surgery for acute dissection of the ascending aorta 3 Aortic root replacement for chronic aortic root disease 2 Complex aortic surgery including arch surgery, descending aortic and thoraco-abdominal aortic surgery	Aortic dissection course simulation (desirable)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Cardiothoracic Trauma	Simulation
Category	Cardiothoracic Trauma	
Sub-category:	None	
Objective	*To evaluate and manage, including surgical management where appropriate, and as part of a multidisciplinary team, a patient with thoracic trauma. Competence in operative management of thoracic trauma is required of all CCT holders in cardiothoraic surgery. All trainees should maintain their ATLS certification and senior trainees are encouraged to become ATLS instructors.*	
Knowledge	BASIC KNOWLEDGE 4 Anatomy of the lungs, heart, chest wall, diaphragm and oesophagus 4 Anatomy of the larynx, trachea and bronchial tree 4 Physiology of breathing and its control 4 Physiology of the heart and circulation GENERAL TRAUMA MANAGEMENT 4 Principles of trauma management (as defined by ATLS) 4 Principles of emergency resuscitation following cardiac arrest SPECIFIC KNOWLEDGE 4 The mechanism and patterns of injury associated with blunt, penetrating and deceleration injuries to the chest 4 The post-ATLS, definitive care of blunt, penetrating and deceleration injuries to the chest. 4 The indications and use of appropriate investigations in thoracic trauma management 4 Pain relief in chest trauma, including epidural anaesthesia. 4 Indications for immediate, urgent and delayed thoracotomy in trauma	
Clinical Skills	GENERAL TRAUMA MANAGEMENT (ATLS) 4 Assessment and management of airway, breathing and circulation 4 Maintenance of an adequate airway and	

	respiratory support 4 Protection of the cervical spine 4 Circulatory resuscitation 4 Establishment of appropriate monitoring 4 Assessment and management of pain and anxiety CARDIOTHORACIC TRAUMA MANAGEMENT 4 Examination and assessment of the of the chest, including respiratory cardiovascular and circulatory systems 4 Recognition and management of immediately life threatening situations: obstructed airway, tension pneumothorax, massive haemothorax, open chest wound, flail chest and cardiac tamponade 4 Recognition and management of potentially life threatening situations: lung contusion, bronchial rupture, blunt cardiac injury, intrathoracic bleeding, oesophageal injury, simple pneumothorax and major vascular injury 4 Recognition of potentially life threatening penetrating injuries to the chest and abdomen 4 Interpretation of chest x-ray, ECG, arterial blood gases and echocardiography 4 Detection and treatment of cardiac arrhythmias 4 Management of the widened mediastinum including appropriate investigations and multidisciplinary consultation	
Technical Skills and Procedures	PRACTICAL SKILLS 4 Establish an emergency airway (surgical and non-surgical) 4 Insertion and management of thoracic drains 4 Establish adequate venous access and monitoring <u>OPERATIVE MANAGEMENT OF THORACIC TRAUMA</u> 4 Postero-lateral, thoracotomy, antero lateral thoracotomy and thoraco-laparotomy	

	3 Bilateral Anterior Thoracotomy 4 Median sternotomy and closure 3 Repair of cardiac injuries 3 Repair of pulmonary and bronchial injuries 3 Management of the complications of chest trauma including retained haemothorax and empyema 3 Repair of oesophageal injuries 3 Treatment of aortic transection	DSTS course cadaveric simulation (desirable)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**General Management of a Patient Undergoing Thoracic Surgery**	**Simulation**
Category	General Management of a Patient Undergoing Thoracic Surgery	
Sub-category:	None	
Objective	*To be fully competent in the evaluation and management of a patient undergoing thoracic surgery. The knowledge and clinical skills are common to all thoracic surgical conditions, and should be read in conjunction with the curriculum for specific surgical conditions.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Pulmonary physiology, ventilation and gas exchange 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Metabolic response to trauma 4 Digestive, renal and hepatic physiology 4 Nutrition Anatomy 4 Tracheobronchial tree and lungs 4 Thoracic inlet, neck and mediastinum 4 Oesophagus and upper GI tract 4 Chest wall and diaphragm Pathology	

	4 Inflammation and wound healing 4 Bronchopulmonary infections 4 ARDS 4 Emphysema 4 Pulmonary fibrosis 4 Pulmonary manifestations of systemic disease 4 Systemic manifestations of pulmonary disease 4 Benign and malignant tumours of trachea, bronchus and lung parenchyma 4 Oesophagitis, columnar-lined oesophagus stricture 4 Oesophageal motility disorders 4 Malignant and benign tumours of the oesophagus and stomach 4 Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid Pharmacology 4 Bronchodilators 4 H2 antagonists and proton pump inhibitors 4 Haemostatic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general Microbiology 4 Organisms involved in respiratory infection including TB 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis 4 Management of intra pleural sepsis CLINICAL KNOWLEDGE Thoracic Incisions 4 Types of incisions and appropriate use,	

	including lateral, anterior, muscle sparing and video-assisted approaches. Sternotomy 4 Difficult access and improving exposure. 4 Early and late complications of thoracic incisions 4 Analgesia including pharmacology, effectiveness, side effects and use in combination regimens 4 Post-operative analgesia, including epidural, PCAS and paravertebral catheter techniques. Bronchoscopy 4 The role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease. 4 The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy Mediastinal exploration 4 Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology. 4 Equipment for mediastinal exploration 4 Relevant imaging techniques, and influence on surgical approach.	
Clinical Skills	HISTORY AND EXAMINATION 4 System specific and general history and examination, including drug history, identification of comorbidity and functional status. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Chest radiograph and ECG 4 CT, including contrast enhanced CT 4 Interpretation of imaging of the mediastinum. 4 MRI and PET 4 Respiratory function tests	

	4 Ventilation/perfusion scan 4 Blood gases 4 Oesophageal function tests and contrast studies PATIENT MANAGEMENT General 4 Cardiopulmonary resuscitation 4 Risk assessment, stratification and management 4 Management of patients making an uncomplicated or complicated recovery from thoracic operations. 4 Post-operative management of pain control, respiratory failure, sputum retention, haemodynamic instability and low urine output. 4 Treatment of cardiac arrhythmias 4 Pain control 4 Wound infection and disruption 4 Blood transfusion and blood products 4 Physiotherapy and rehabilitation 3 Palliative care	
Technical Skills and Procedures	PRACTICAL SKILLS 2 Tracheostomy 3 Fibreoptic bronchoscopy 4 Chest aspiration 4 Chest drain insertion 4 Chest drain management <u>OPERATIVE MANAGEMENT</u> <u>Incisions</u> 4 Correct positioning of patient for thoracic surgery 4 Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions. 4 Difficult access and improving exposure	Core skills Cardiothoracics chest drain simulation (essential)

	4 Perform and close sternotomy incision <u>Bronchoscopy</u> 4 Diagnostic bronchoscopy including biopsy - rigid and flexible. 4 Equipment, instrumentation and preparation 4 Perform rigid and flexible bronchoscopy 4 Airway and ventilatory management 4 Recognise normal and abnormal anatomy. 4 Identify common pathologies and the surgical relevance of the findings. 4 Take appropriate specimens for bacteriology, cytology and histology. 4 Management of moderate bleeding and other common complications. 4 To appropriately supervise the care of patients recovering from bronchoscopy. 4 Post-operative bronchoscopy: indications and procedure 3 Tracheostomy and minitracheostomy <u>Mediastinal Exploration</u> 4 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.	Lung resection simulation PBA (essential) Bronchoscopy simulation PBA (essential) Tracheostomy and mini trach simulation on boot camp course
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Neoplasms of the Lung**	**Simulation**
Category	Neoplasms of the Lung	
Sub-category:	None	
Objective	*To fully assess and manage a patient with a neoplasm of the lung, including operative management where appropriate and including complicated situations. Appreciation of the multidisciplinary, multimodality approach to the management of the condition.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery - general	

	SPECIFIC KNOWLEDGE 4 Benign and malignant tumours of trachea, bronchus and lung parenchyma 4 Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases. 4 Neoadjuvant and adjuvant treatment of lung cancer 4 Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management. 4 Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse. 4 Knowledge of palliative care techniques. 4 Treatment of post-operative complications of pulmonary resection such as empyema and broncho-pleural fistula. 4 Role of repeat surgery in recurrent and second primary malignancies of the lung. 4 Medical and surgical options to deal with recurrent or problematic complications of pulmonary resection.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery - general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Interpretation of endoscopic findings. 4 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Bronchoscopic assessment including biopsy 4 Endoscopic and surgical techniques of lung biopsy. 4 Mediastinal assessment and biopsy 4 Intraoperative diagnosis and staging 3 Endoscopic management of tumours using	

	laser and stenting 4 Surgery for benign and malignant conditions of the lungs, including uncomplicated lobectomy for lung cancer, wedge resection and metastasectomy. 4 Segmentectomy and lobectomy for benign and malignant disease. 3 Redo operations for repeat resections of lung metastases. 3 Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm. 3 Management of post-operative complications such as empyema and broncho-pleural fistula.	Lung resection simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Disorders of the Pleura**	**Simulation**
Category	Disorders of the Pleura	
Sub-category:	None	
Objective	*To fully evaluate and manage surgical conditions of the pleura and the pleural space, including complicated situations.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy and physiology of the pleura 4 Inflammatory, infective and malignant disease of the visceral and parietal pleura. 4 Pneumothorax 4 Pleural effusion 4 Empyema 4 Mesothelioma 4 Haemothorax 4 Chylothorax 4 Conditions of adjacent organs that affect the pleura 4 Medical and surgical management of	

	pleural disease, including radiological, open and VATS techniques. 4 Techniques to deal with failures of primary treatment. 4 Advanced techniques for pleural space obliteration such as thoracoplasty and soft-tissue transfer	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Interpretation of imaging of the pleura 4 Chest drains: insertion, management, removal and treatment of complications. 4 Management of patients making uncomplicated and complicated recovery from pleural interventions.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Open procedures for non-complex pleural problems 4 VATS procedures for non-complex pleural problems 3 Open and VATS procedures for empyema, including techniques for decortication. 3 Open and VATS procedures in complex cases. 3 Advanced techniques of pleural space obliteration, with appropriate specialist assistance.	VATS simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Disorders of the Chest Wall**	**Simulation**
Category	Disorders of the Chest Wall	
Sub-category:	None	
Objective	*To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate, and including complex cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the chest wall	

	4 Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall. 4 Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology. 4 Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy. 4 Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction. 4 Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae. 4 Prosthetic materials used in chest wall surgery 4 The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery. 4 Techniques of complex chest wall reconstruction involving thoracoplasty or soft-tissue reconstruction	Chest wall reconstruction simulation on intermediate thoracic course (essential)
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk.	
Technical Skills and Procedures	OPERAITVE MANAGEMENT 4 Chest wall biopsy and choice of appropriate technique. 4 Open and excision biopsy and resection of the chest wall for benign and malignant conditions. 3 Chest wall resection in combination with resection of the underlying lung. 4 Selection and insertion of prosthetic materials, and selection of cases in which such materials are required 3 Pectus correction, by both open and	

	minimally-invasive techniques, including post-operative care and complications 3 Surgery for the complications of chest wall resection and repeat surgery to resect recurrent chest wall conditions. 3 Complex chest wall reconstruction	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Disorders of the Diaphragm**	**Simulation**
Category	Disorders of the Diaphragm	
Sub-category:	None	
Objective	*To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate, and including complicated cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy and physiology of the diaphragm. 4 Pathology of the diaphragm. 4 Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities. 4 Physiological consequences of diaphragmatic herniation or paresis. 4 Surgical techniques used to biopsy and resect diaphragmatic tumours. 4 Situations in which replacement of the diaphragm is required, the materials used and their value and limitations. 4 Complications of diaphragmatic resection and their management. 4 Techniques used to electrically pace the diaphragm, and the conditions in which such treatment is appropriate.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general Specific Skills 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Management of patients making an uncomplicated or complicated recovery from diaphragmatic resection.	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 3 Resection and repair of the diaphragm and adjacent structures 3 Complications of diaphragmatic resection. 3 Management of diaphragmatic trauma	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Emphysema and Bullae	Simulation
Category	Emphysema and Bullae	
Sub-category:	None	
Objective	*To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate, and including complicated cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Aetiology, pathology and physiology of chronic obstructive airways disease (COPD) 4 Epidemiology and public health issues 4 Smoking cessation measures. 4 Clinical, laboratory, physiological and imaging techniques. 4 Medical and surgical management of COPD and its complications 4 Selection criteria and pre-operative preparation 4 Surgical techniques used in the treatment of emphysema and bullae and the results of surgical treatment including relevant clinical trials. 4 Lung volume reduction surgery: techniques, complications and management of complications. 4 Experimental and developmental techniques in lung volume reduction surgery	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination	

	4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Post-operative management of patients making an uncomplicated recovery from surgery for emphysema or the complications of such diseases. 4 Management of patients following lung volume reduction surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Procedures to deal with secondary pneumothorax and bullae by open techniques. 4 Procedures to deal with secondary pneumothorax and bullae by VATS techniques. 4 Lung volume reduction surgery, using open and VATS techniques.	VATS simulation on intermediate thoracic course (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Disorders of the Pericardium**	**Simulation**
Category	Disorders of the Pericardium	
Sub-category:	None	
Objective	*To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate, and including complicated cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the pericardium. 4 Pathology of the pericardium. 4 Pathophysiological consequences of pericardial constriction and tamponade. 4 Clinical, echocardiographic and imaging techniques used to detect pericardial disease and assess its consequences. 4 Techniques for pericardial drainage using guided needle aspiration	

	4 Surgical drainage by sub-xiphoid, thoracotomy or VATS approaches. 4 Surgical techniques for pericardiectomy. 4 Materials used for pericardial replacement, their value and limitations and the situations in which used. 4 Post-operative complications following resection of the pericardium and its prosthetic replacement.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques, including echocardiography. 4 Recognition and assessment of pericardial tamponade and constriction. 4 Techniques for pericardial drainage using guided needle aspiration 4 Recognition of pericardial herniation and cardiac strangulation. 4 Patient selection with assessment of function and risk. 4 Management of patients making an uncomplicated or complicated recovery from pericardial surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Non-complex pericardial fenestration procedures 3 Pericardial fenestration in complex cases. 3 Pericardiectomy for relief of constriction 3 Resection of the pericardium and replacement with prosthetic materials. 3 Competence in dealing with the complications of pericardial resection and replacement.	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Disorders of the Mediastinum**	**Simulation**
Category	Disorders of the Mediastinum	

Sub-category:	None	
Objective	*To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate, and including complicated cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the mediastinum 4 Congenital, benign, infective and malignant (primary and secondary) conditions of the mediastinum. 4 Systemic conditions associated with the mediastinum. 4 Clinical, laboratory, electromyographic and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease 4 Myasthenia gravis: medical, surgical and peri-operative management 4 Staging of thymoma and grading of myasthenia 4 Benign and malignant conditions, which do not require surgical biopsy or resection. 4 Oncological treatment of malignant diseases of the mediastinum, including multidisciplinary care. 4 Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumours, complications and results. 4 Retrosternal goitre and its management	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general 4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Patient selection with assessment of function and risk. 4 Post-operative management of patients including recognition and management of post-operative complications .	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Biopsy of mediastinal masses using appropriate techniques 4 Excision of the thymus 4 Isolated resection of mediastinal cysts and tumours 4 Resection of mediastinal cysts and tumours, including extended resections involving adjacent structures.	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Disorders of the Airway	Simulation
Category	Disorders of the Airway	
Sub-category:	None	
Objective	*To assess and manage a patient with disease of the major airways, including surgical management where appropriate, and including complicated cases.*	
Knowledge	GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE 4 Anatomy of the larynx, trachea and bronchus. 4 Physiology of the normal airway. 4 Pathophysiology of disease and its effects on lung function. 4 Endoscopic appearances in health and disease. 4 Congenital, inflammatory, infective, benign and neoplastic diseases of the airways. 4 Symptoms, signs of airway disease. 4 Clinical, physiological and imaging tests undertaken to diagnose and assess airway disease. 4 Techniques for surgical resection of the trachea. 4 Bronchoplastic procedures and the limitations of these techniques. 4 Medical and oncological treatments available to deal with airway diseases. 4 Endoscopic techniques used to deal with benign and malignant conditions, including disobliteration and stenting. 4 Presentation, investigation and management of anastamotic complications following airway surgery. 4 Presentation, evaluation and treatment of fistulae in the aerodigestive tract, due to benign, malignant and iatrogenic causes. 4 Role of open and endoscopic procedures in dealing with problems.	
Clinical Skills	PATIENT MANAGEMENT As for thoracic surgery – general	

	4 Clinical history and examination 4 Interpretation of laboratory, physiological and imaging techniques. 4 Recognition, diagnosis and assessment of airway obstruction. 4 Patient selection with assessment of function and risk. 4 Post-operative care of patients making an uncomplicated recovery from major airway surgery. 4 Post-operative care of patients making a complicated recovery from airway surgery.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Endoscopic assessment of a patient with airways disease 4 Sleeve resection of the trachea for simple benign conditions 4 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease 4 Techniques for the relief of major airways obstruction including stenting. 3 Airway resection for tumours and complex benign conditions and techniques for airway reconstruction, anastomosis and laryngeal release. 3 Repeat resections for recurrence and the complications of prior resection. 3 Management of fistulae in the aerodigestive tract by surgical and endoscopic techniques.	Tracheal resection simulation PBA (essential)
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Note
This topic has been replaced by the Congenital Cardiac Surgery sub-specialty 2012

Congenital Cardiac Surgery has been approved by the GMC as a sub-specialty from August 2012. All trainees beginning the final stage (ST7-ST8) and wishing to specialise in congenital heart disease should use the sub-specialty syllabus. Trainees who are already following the congenital heart disease topic in the final stage are encouraged to seek the support of their Programme Director to switch to the sub-specialty syllabus. The sub-specialty syllabus reflects the learning that was already included in the training programme with an extension of the topic content to clarify requirements and make learning objectives and levels of attainment more explicit.

Topic	Congenital Heart Disease	Simulation
Category	Congenital Heart Disease	
Sub-category:	None	
Objective	*This module is aimed at the trainee who has completed training in the generality of cardiothoracic surgery and wishes to specialise in congenital heart disease. Following completion of this module the trainee will be fully competent in the clinical and operative management of uncomplicated congenital heart disease. It is expected that subsequent professional development in the post CCT period will provide competence in all aspects of congenital heart disease, including complex problems.*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Relevant general physiology of childhood 4 Fetal circulation and circulatory changes at birth 4 Haemodynamics; physiology and measurement including shunt calculations 4 Physiology of pulmonary vasculature 4 Myocardial cellular physiology in immature myocardium 4 Electrophysiology, including conduction disorders 4 Haemostasis, thrombosis and bleeding 4 Acid base balance 4 Pulmonary physiology, ventilation and gas exchange 4 Metabolic response to trauma 4 Vascular biology and reactivity 4 Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest.	

	4 Ph and alpha stat CPB management Anatomy 4 Embryology of the heart 4 Anatomy of the heart, pericardium and great vessels 4 Pulmonary anatomy 4 Coronary anatomy and variants 4 Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts 4 Sequential cardiac analysis and terminology of cardiac malformations Pathology 4 Inflammation and wound healing 4 Systemic Inflammatory Response Syndrome 4 Effect of growth and pregnancy Pharmacology 4 Drugs used in the treatment of congenital heart disease 4 Inotropes 4 Anti-arrhythmic drugs 4 Haemostatic drugs 4 Antiplatelet, anticoagulant and thrombolytic drugs 4 Analgesics 4 Antibiotics 4 Anaesthetic agents, local and general 4 Hypotensive agents (systemic and pulmonary). Microbiology 4 Organisms involved in cardiorespiratory infection 4 Organisms involved in wound infection 4 Antibiotic usage and prophylaxis 4 Antisepsis	

	CLINICAL KNOWLEDGE General 4 Diagnosis, investigation and treatment of congenital heart disease 4 Results of surgery - common complications and management. 4 Late complications of surgery for congenital heart disease 4 Role of interventional cardiology. 4 Role of mechanical assist (IABP, VAD and ECMO) 4 Indications for referral for transplantation 4 Risk assessment and stratification 4 Cardiopulmonary resuscitation 4 Cardiac arrhythmias 4 Renal dysfunction 4 Multiorgan failure 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 4 Types of cardiac prosthesis and indications for use Specific Knowledge <u>Anatomy, pathophysiology natural history and management of the following conditions or procedures</u> 4 Patent ductus arteriosus 3 Aortopulmonary window 4 Atrial septal defect 4 Ventricular septal defect 4 Coarctation 3 PA banding 4 Aortopulmonary and venous shunts 3 Transposition of the great arteries - switch procedure 3 Congenitally corrected TGA 3 Single ventricle/univentricular heart 3 Tetralogy of Fallot/Pulmonary atresia plus VSD 3 Pulmonary atresia and intact septum 3 Hypoplastic left heart and Norwood procedure 3 Truncus arteriosus 3 Double outlet right ventricle	

	3 Pulmonary atresia plus VSD and MAPCAs 3 Partial and complete atrioventricular septal defects 3 Anomalies of the pulmonary venous drainage (partial and total) 3 Anomalies of systemic venous drainage 4 Congenital aortic valve disease (including supra-valve stenosis) 3 LV outflow tract obstruction 4 Sinus of valsalva aneurysm 3 Congenital mitral valve disease 3 Congenital tricuspid valve disease (including Ebsteins abnormality) 3 Anomalies of the coronary arteries (including ALCAPA) 3 Vascular rings 3 Cardiac tumours 4 Pericardial disease 3 Extra cardiac conduits 3 Interrupted aortic arch 3 Extra Corporeal Membrane Oxygenation and VAD 3 Transplantation for congenital heart disease	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination of child or adult with congenital heart disease DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Chest radiograph and ECG 3 Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations 3 Echocardiography in congenital heart disease, including 2D, doppler and TOE PATIENT MANAGEMENT 4 Principles of paediatric intensive care 4 Management of adults and children following congenital heart surgery 4 Management of complications of surgery 4 Cardiopulmonary resuscitation 4 Diagnosis and treatment of cardiac arrhythmias 4 Blood transfusion and blood products 4 Wound infection and sternal disruption	

Technical Skills and Procedures	OPERATIVE MANAGEMENT 4 Sternotomy - open and close, including resternotomy 4 Thoracotomy - open and close 3 Preparation for and management of cardiopulmonary bypass including partial bypass 3 Approaches for ECMO, cannulation and management. <u>Surgical management of the following common uncomplicated conditions:</u> 3 Patent ductus arteriosus 4 Atrial septal defect 3 Ventricular septal defect 3 Coarctation 2 Aortopulmonary window 3 Vascular ring 3 Aortopulmonary and venous shunts 3 PA banding <u>Surgical management of the following conditions requiring advanced procedures:</u> 3 Partial atrioventricular septal defect 2 Aortic and mitral valve surgery including Ross procedure 3 Open aortic valvotomy 3 Open pulmonary valvotomy 2 Tricuspid valve surgery including Ebsteins 2 Tetralogy of Fallot/Pulmonary atresia plus VSD 2 Fontan procedures 2 Extra cardiac conduits and their replacement 2 Complete atrioventricular septal defect <u>Surgical management of the following conditions requiring complex procedures:</u> 1 Interrupted aortic arch 1 Total anomalous pulmonary venous drainage 1 Transposition of the great arteries (switch procedure) 1 Rastelli procedure 1 Norwood procedure 1 Truncus arteriosus repair 1 Double outlet right ventricle 1 Pulmonary atresia plus VSD and MAPCAs	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Intrathoracic transplantation and surgery for heart failure**	**Simulation**

Category	Intrathoracic transplantation and surgery for heart failure	
Sub-category:	None	
Objective	*To be able to evaluate and manage patients with heart failure, including operative management where appropriate. This module is intended to be completed by the trainee who has developed a specific interest in this subspecialty, with a view to becoming a specialist transplant/heart failure surgeon.*	
Knowledge	BASIC KNOWLEDGE Pathophysiology 4 Haemodynamics of heart failure. 4 Molecular mechanisms underlying heart failure. 4 Mechanisms and outcomes of respiratory failure. 4 Causes of cardiac failure. 4 Causes of respiratory failure. Immunology 4 Major and minor histocompatability antigen systems. 4 Mechanisms of immune activation and pathological consequences for transplanted organs. Pharmacology 4 Modes of action of commonly used drugs in heart failure: CLINICAL KNOWLEDGE 4 Resynchronisation therapy: techniques and indications 4 Indications for, contraindications to and assessment for heart transplantation. 4 Indications for, contraindications to and assessment for lung and heart/lung transplantation. 4 Indications for ECMO 4 Indictations for VAD 4 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient. 4 Management of patients after intrathoracic	Balloons, Bypass and Circ support course (essential) Balloons, Bypass and Circ support course Balloons, Bypass and Circ support course

	organ transplantation, including complications 4 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure. 3 Resynchronisation therapy: techniques and indications	
Clinical Skills	HISTORY AND EXAMINATION 4 Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of haemodynamic data 4 Chest radiograph 4 ECG including exercise ECG 4 Coronary angiography 4 Cardiac catheterisation data 4 Echocardiography including 2D, Doppler and TOE and stress echo 3 MR assessment of ventricular function and viability 2 Nuclear cardiology PATIENT MANAGEMENT 4 Cardiopulmonary resuscitation 4 Management of brain-dead donor 4 Management of post cardiac surgical patient 4 Management of complications of surgery 4 Cardiac rehabilitation 4 Blood transfusion and blood products 4 Wound infection and sternal disruption 3 Diagnosis and treatment of cardiac arrhythmias	
Technical Skills and Procedures	OPERATIVE MANAGEMENT <u>Transplantation</u>	

	4 Transvenous myocardial biopsy 4 Donor Retrieval 4 Ex-vivo donor organ management 4 Implantation of heart 3 Implantation of lung 3 Implantation of heart/lung block Surgery for heart failure 4 Surgical revascularisation for ischaemic cardiomyopathy 4 Ventricular reverse remodelling surgery 4 Mitral valve repair for cardiac failure 4 Cannulation for ECMO 4 Implantation of epicardial electrodes for resynchronisation therapy 3 Implantation of extracorporeal VAD 3 Implantation of intracorporeal VAD	
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	**Management of Benign Oesophageal Disorders**	**Simulation**
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage all the surgical aspects of benign oesophageal disorders including the complications of benign oesophageal disorders. This module is intended to be completed by trainees with a subspeciality interest in oesophageal surgery*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Gastric and oesophageal cellular physiology 4 Mechanical and cellular defence mechanisms in oesophagus 4 Oesophageal mucosal injury and modulation 4 Effects of acid pepsin and biliary reflux	

	4 Oesophago-gastric physiology and assessment including pH monitoring 4 Oesophageal motility measurement in achalasia, diffuse spasm and non-specific motility syndromes Anatomy 4 Embryology of the foregut. 4 The oesophagus and its anatomical relationships from cricopharyngeus to cardia, including details of blood supply and lymphatic drainage. 4 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 4 Anatomy of the colon, including its anatomical relationships, blood supply and lymphatic drainage. Pathology 4 Inflammation and wound healing. 4 Oesophageal injury response and variations in response. 4 The inflammation, metaplasia, dysplasia cancer sequence. 4 Neurological deficits / aetiology of oesophageal dysmotility disorders. 4 Para-oesophageal hernias Pharmacology 4 Drugs used in the treatment of gastro-oesophageal reflux disorder and oesophageal dysmotility. Microbiology 4 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 4 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of benign oesophageal disorders. 4 Radiology, endoscopy, 24 hour pH monitoring and oesophageal function tests. 4 Risk assessment and stratification.	

	4 Open, laparoscopic and thoracoscopic surgery of the oesophagus. 4 Relative merits of conservative and operative treatment. 4 Alternative management of achalasia including dilatation and botox injection. 4 The indications for surgery in paraoesophageal hernia. 4 Endoscopic dilatation techniques	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, identification of comorbidity and risk assessment DATA INTERPRETATION 4 Routine haematology and biochemical investigation 4 Interpretation of oesophageal motility and pH monitoring data 4 Chest radiograph and contrast imaging 4 Cardio-pulmonary assessment including exercise tests PATIENT MANAGEMENT 4 Management of post thoracotomy or laparotomy surgical patient 4 Management of complications of surgery 4 Diagnosis and management of oesophageal perforation or anastamotic leak. 4 Blood transfusion and blood products 4 Wound infection and wound disruption	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Benign) 4 Oesophago-gastro-duodenoscopy. 4 Rigid oesophagoscopy 4 Oesophageal dilatation 4 Open and laparoscopic fundoplication and cardiomyotomy 4 Mobilisation of oesophagus, stomach and	 Optional ST6-8 Optional ST6-8

	colon 4 Oesophageal anastomosis 4 Management of Oesophageal perforation: Boerhaave's or endoscopic	Desirable ST3-8
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Topic	Management of Oesophageal Neoplasia	Simulation
Category	Disorders of the Oesophagus	
Sub-category:	None	
Objective	*To evaluate and manage all the aspects of a patient with oesophageal neoplasia, including operative intervention where appropriate. This module is intended to be completed by trainees with a subspeciality interest in oesophageal surgery*	
Knowledge	BASIC KNOWLEDGE Physiology 4 Gastric and oesophageal cellular physiology 4 Mechanical and cellular defence mechanisms in oesophagus 4 Oesophageal mucosal injury and modulation 4 Effects of acid pepsin and biliary reflux Anatomy 4 The oesophagus and its anatomical relationships from cricopharyngeus to cardia including details of blood supply and lymphatic drainage. 4 Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage. 4 Anatomy of the colon, including its blood supply and its anatomical relationships Pathology 4 Inflammation and wound healing. 4 Oesophageal injury response and variations in response. 4 The aetiology and epidemiology of	

	oesophageal cancer 4 Metaplasia-dysplasia sequence. Pharmacology 4 Adjuvant and neoadjuvant chemotherapy. Microbiology 4 The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder. 4 The rationale of bacterial eradication treatment CLINICAL KNOWLEDGE 4 Diagnosis, investigation and treatment of oesophageal disorders. 4 Radiology, endoscopy and oesophageal function tests. 4 Risk assessment and stratification. 4 Diagnostic tests, including contrast oesophageal imaging, CT Scanning, abdominal ultrasonography, endoscopic ultrasonography and PET scanning. 4 Treatment options and outcomes of treatment 4 Oesophageal resection 4 Palliative procedures 4 Other therapies including radiotherapy, laser, stent and photodynamic therapy 4 Screening and prevention.	
Clinical Skills	HISTORY AND EXAMINATION 4 General and specific history and examination including previous surgery, drug history, and identification of comorbidity and risk assessment. DATA INTERPRETATION 4 Routine haematology and biochemical investigations 4 Interpretation of Chest radiograph, contrast swallow and CT Scan 4 Cardio-pulmonary assessment including exercise tests. PATIENT MANAGEMENT 4 Management of post thoracotomy or	

	laparotomy surgical patient. 4 Management of complications of surgery 4 Blood transfusion and blood products 4 Wound infection and wound disruption 4 Diagnosis and management of oesophageal perforation or anastamotic leak.	
Technical Skills and Procedures	OPERATIVE MANAGEMENT (Malignant) 4 Oesophago-gastro-duodenoscopy 4 Assessment by thoracoscopy laparoscopy and mediastinoscopy 4 Rigid oesophagoscopy and bronchoscopy 4 Oesophageal dilatation and stent placement 4 Mobilisation of oesophagus, stomach and colon 4 Oesophageal resection 4 Oesophageal reconstruction including interposition techniques	Optional ST6-8
Professional Skills	Please see the Professional Skills and Behaviour » Final section for these skills	

Congenital Cardiac Surgery Sub-specialty

Overview of Sub-Specialty training in Congenital Cardiac Surgery

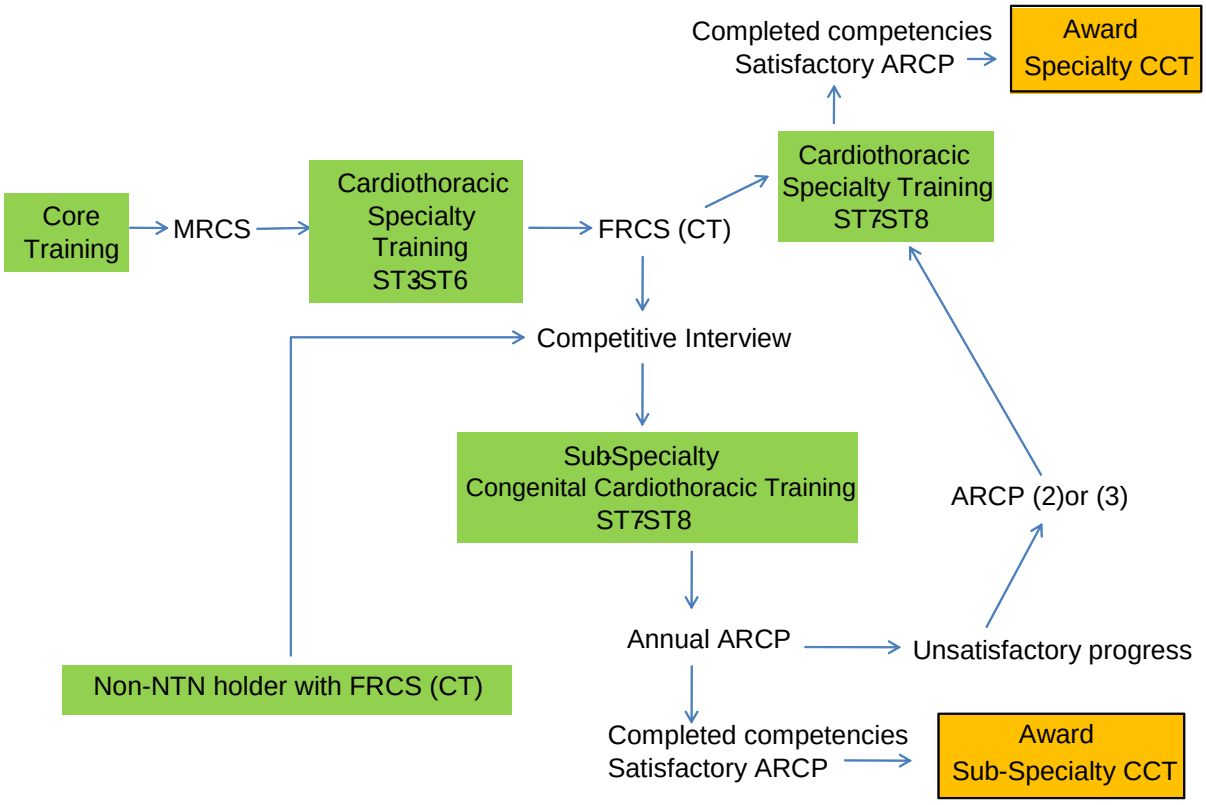
Cardiothoracic training begins at ST3 level, having completed two years of Core Surgical training and obtained the MRCS examination (or equivalent). Trainees then enter generic cardiothoracic training programmes at the intermediate I and then intermediate II levels, covering all aspects of the curriculum in the generality of cardiothoracic surgery.

Trainees are eligible to sit the Intercollegiate Specialty Examination in Cardiothoracic Surgery during the ST6 year and above if they have achieved the necessary competencies as defined by the curriculum. The examination is in the generality of the specialty and trainees are expected to demonstrate a level of knowledge equivalent to that of a day 1 consultant.

The final two years of Cardiothoracic training (ST7-8) are designed to allow trainees to develop areas of special interest. Trainees wishing to pursue a career in congenital cardiac surgery will undertake a two-year sub-specialty training programme. Entry will be by competitive interview and candidates will need to have passed the Intercollegiate Specialty Examination in Cardiothoracic Surgery exam to be eligible.

The curriculum in congenital cardiac surgery covers all aspects of neonatal, infant and paediatric cardiac surgery as well as surgery for adult congenital heart disease. The syllabus covers all emergency and elective conditions as well as transplantation, mechanical circulatory support and hybrid technology. In addition, the syllabus covers a general understanding of specific medical, physiological, technical and legal aspects of working with children.

The curriculum also allows for a degree of flexibity to accommodate technological advances and the changing needs of our patients.



Introduction

Although there are many areas of 'special interest' within the field of cardiothoracic surgery, Congenital Cardiac Surgery is the first to exist as a Sub-Specialty in its own right. This demands a dedicated two-year syllabus that covers all aspects of paediatric and adult congenital cardiac surgery. Successful completion would lead to the award of CCT in Cardiothoracic Surgery *and* in the Sub-Specialty of Congenital Cardiac Surgery.

The main areas covered in the syllabus are:

- Anatomy & Physiology of Congenital Heart Disease
- Patient Assessment & Decision Making
- Professional and Legal issues of working with children and families
- Neonatal Cardiac Surgery
- Infant & Paediatric Cardiac Surgery
- Transplantation & Mechanical Support
- Adult Congenital Heart Surgery
- Tracheal Surgery

The Training Pathway in the Sub- Specialty of Congenital Cardiothoracic Surgery

Entry into the sub-specialty will be by competitive interview at the level of ST7 and dependent on the attainment of the part III exam in the generality of cardiothoracic surgery. Training is also available to post-CCT holders in cardiothoracic surgery who wish to obtain sub-specialist training.

The standards and the delivery of training are overseen by the Specialist Advisory Committee (SAC) in Cardiothoracic Surgery. The SAC has a consultant member nominated by the trainees (the Cardiothoracic Dean) who is responsible for direct contact with trainees and who is available to deal with problems or questions trainees may have.

The objective of the training programme is to produce trained congenital cardiothoracic surgeons, who will have the clinical knowledge, the surgical expertise and the professional skills necessary for consultant practice in paediatric and adult congenital cardiac surgery.

The syllabus, therefore, defines the requirements of the training programme in congenital cardiothoracic surgery. It identifies distinct topics within the specialty and defines the requirements or competences within each of these areas, at each stage of training.

Within each module, the levels of competence are further defined in the following domains:

- **Knowledge:** e.g. basic scientific knowledge; clinical knowledge
- **Clinical skills:** e.g. history, examination, data interpretation, patient management
- **Technical skills and procedures:** e.g. technical procedures, operative management
- **Professional behaviour and leadership skills:** transferable or generic, professional skills, expected of all surgeons

The curriculum also identifies the tools that will be used to assess competence and monitor progress. Cardiothoracic training is now to be seen as competence based rather than, as in the past, determined solely by the number of years in training or by the numbers of procedures performed.

Upon successful completion of the programme the Cardiothoracic Trainee will be able to demonstrate competence in all aspects of the management (including operative management) of Congenital Cardiac Surgery.

The Configuration and Delivery of Congenital Cardiothoracic Surgical Services

Congenital Cardiothoracic surgery is concentrated into large regional or teaching hospitals, where there is easy access to all medical and support facilities. There will usually be somewhere between 4 and 5 consultant surgeons in each unit, each unit performing approximately 400 open heart operations each year.

Training programmes will consist of two linked centres that, together, cover the compete syllabus and provide joint assessment of trainees at ARCP. Programmes that do not provide exposure to highly specialised areas such as transplantation and tracheal surgery will incorporate a dedicated module in which the trainee is accommodated in one of the two national centres (GOSH and Freeman Hospital, Newcastle).
Programmes will be assessed and accredited by the SAC. The ARCP process will be attended by trainers from both of the contributing institutions as well as by the SAC liaison member for that programme *and* an external congenital surgeon approved by the SAC.

Summary of the Topics Congenital Heart Disease

Objective

This module is aimed at the trainee who has completed training in the generality of cardiothoracic surgery and wishes to specialise in congenital heart disease. Following completion of this module the trainee will be fully competent in the clinical and operative management of uncomplicated congenital heart disease. It is expected that subsequent professional development in the post CCT period will provide competence in all aspects of congenital heart disease, including complex problems.

During Sub-Specialty training the trainee will be expected to have reached level 4 across the full range of basic knowledge in Congenital Heart Disease:

BASIC KNOWLEDGE

Physiology

4 Relevant general physiology of childhood
4 Fetal circulation and circulatory changes at birth
4 Haemodynamics; physiology and measurement including shunt calculations
4 Physiology of pulmonary vasculature
4 Myocardial cellular physiology in immature myocardium
4 Electrophysiology, including conduction disorders
4 Haemostasis, thrombosis and bleeding
4 Acid base balance
4 Pulmonary physiology, ventilation and gas exchange
4 Metabolic response to trauma
4 Vascular biology and reactivity
4 Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest.
4 pH and alpha stat CPB management

Anatomy

4 Embryology of the heart
4 Anatomy of the heart, pericardium and great vessels
4 Pulmonary anatomy
4 Coronary anatomy and variants
4 Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts
4 Sequential cardiac analysis and terminology of cardiac malformations

Pathology

4 Inflammation and wound healing
4 Systemic Inflammatory Response Syndrome
4 Effect of growth and pregnancy

Pharmacology

4 Drugs used in the treatment of congenital heart disease
4 Inotropes
4 Anti-arrhythmic drugs
4 Haemostatic drugs
4 Antiplatelet, anticoagulant and thrombolytic drugs
4 Analgesics
4 Antibiotics
4 Anaesthetic agents, local and general
4 Hypotensive agents (systemic and pulmonary).

Microbiology

4 Organisms involved in cardiorespiratory infection
4 Organisms involved in wound infection
4 Antibiotic usage and prophylaxis
4 Antisepsis

CLINICAL KNOWLEDGE

General

4 Diagnosis, investigation and treatment of congenital heart disease
4 Results of surgery - common complications and management.
4 Late complications of surgery for congenital heart disease
4 Role of interventional cardiology.
4 Role of mechanical assist (IABP, VAD and ECMO)
4 Indications for referral for transplantation
4 Risk assessment and stratification
4 Cardiopulmonary resuscitation
4 Cardiac arrhythmias
4 Renal dysfunction
4 Multiorgan failure
4 Cardiac rehabilitation
4 Blood transfusion and blood products
4 Wound infection and sternal disruption
4 Types of cardiac prosthesis and indications for use

Management of the Paediatric Patient

Physiological and metabolic response to injury and surgery

- Fluid and electrolyte balance
- Thermoregulation Safe prescribing in children
- Principles of vascular access in children
- Working knowledge of trust and Local Safeguarding Children Boards (LSCBs) and Child Protection

Procedures

- Basic understanding of child protection law
- Understanding of Children's rights
- Working knowledge of types and categories of child maltreatment; presentations, signs and other features (primarily physical, emotional, sexual, neglect, professional)
- Understanding of ones personal role, responsibilities and appropriate referral patterns in child protection
- Understanding of the challenges of working in partnership with children and families
- Recognise the possibility of abuse or maltreatment
- Recognise limitations of own knowledge and experience and seek appropriate expert advice
- Urgently consult immediate senior in surgery to enable referral to paediatricians
- Keep appropriate written documentation relating to child protection matters
- Communicate effectively with those involved with child protection, including children and their families

Sub-Specialty Topics

AREAS OF SPECIALIST KNOWLEDGE AND SKILLS

FETAL CIRCULATION & CHANGES AFTER BIRTH

OBJECTIVE

Understand physiology of fetal circulation, normal values and the clinical relevance to neonatal surgery and preoperative management.

KNOWLEDGE	**ST7**	**ST8**
Physiology of fetal circulation and changes at birth	3	4
Normal values in neonatal life	3	4
Manipulation of neonatal circulation in congenital heart disease	3	4
Diagnosis and Management of Persistent Fetal Circualtion	3	4
CLINICAL SKILLS		
Stabilisation of the newborn with congenital heart disease	3	4
Interpretation of echo findings	3	4
Manipulation of the newborn circulation on the PICU	3	4
Management of Persistent Fetal Circulation	3	4

NEONATAL AND INFANT PHYSIOLOGY

OBJECTIVE

Understand fundamental neonatal physiology and the differences from older children and adults

KNOWLEDGE	**ST7**	**ST8**
Biochemical, Haematological and immunological Characteristics	3	4
Normal circulatory physiology (values, volumes etc)	4	4
Nutritional and thermoregulatory requirements	3	4
Neurodevelopment and brain protection	3	4
Changes in all the above during infancy	3	4
Pharmacology in neonates and infants	3	4
CLINICAL SKILLS		
Interpretation of clinical signs and lab tests	3	4
Stabilisation of the newborn circulation	3	4
Safe prescribing, drug dosing and infusion rates	3	4

PAEDIATRIC INTENSIVE CARE

OBJECTIVE

To have a broad understanding of the differences between paediatric and adult intensive care. Understand the principles of PICU management in congenital heart disease.

KNOWLEDGE	**ST7**	**ST8**
Differences between paediatric and adult intensive care	4	4
Stabilisation of the sick child	3	4
Ventilation of neonates and children	3	4
Invasive and non-invasive monitoring	3	4
Management of fluid balance and nutrition including TPN	3	4
Pharmacology	3	4
Resuscitation of neonates and children	3	4
CLINICAL SKILLS		
Indications and referral to PICU	3	4
Stabilisation of the sick child	3	4
Interpretation of invasive monitoring	3	4
Basic Life Support – neonates and children	3	4
Fluid management, nutrition and prescribing	3	4
Management of parents and families in the PICU	3	4
TECHNICAL SKILLS		
Arterial and central venous access	3	4
Intercostal drainage	4	4
Peritoneal dialysis	3	4
Emergency chest opening post-op	4	4

MORHOLOGY AND SEQUENTIAL SEGMENTAL ANALYSIS

OBJECTIVE

Comprehensive understanding of the morphology of congenital heart disease and the principle of sequential segmental analysis

KNOWLEDGE	**ST7**	**ST8**
Detailed anatomy of the normal heart	3	4
Morphology of congenital heart disease	3	4
Principal of Sequential Segmental Analysis	3	4
Concepts of isomerism, situs and topology	3	4
CLINICAL SKILLS		
Application of morphology and classification in the interpretation of echo, angiography and CT/MRI	3	4

RISK STRATIFICATION AND DATA COLLECTION

OBJECTIVE

Understand risk stratification systems in congenital heart disease, national requirements for data collection, validation and quality assurance.

KNOWLEDGE	**ST7**	**ST8**
Minimum data sets.	3	4
Nationally collected and reported data	3	4
Common risk assessment systems – RACHS and ARISTOTLE	3	4
Problems of risk stratification in congenital heart disease	3	4
Standard setting, quality assurance systems and mechanisms of managing poor performance	3	4
CLINCIAL SKILLS		
Familiarity with data collection systems	3	4
Interpretation of risk	4	4
Interpretation of CUSUM analysis	4	4

ATRIAL SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage atrial septal defects in children, including all aspects of operative repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of the atrial septum	4	4
Classification of septal defects and associated lesions	4	4
Physiological implications of septal defects	4	4
Natural history and complications	4	4
Indications for surgical and interventional defect repair	4	4
Current methods for surgical repair including techniques for sinus venous defects, management of bilateral SVC, unroofed SVC and coronary sinus defects. Minimally invasive techniques and alternative surgical incisions and approaches.	3	4
CLINICAL SKILLS		
Diagnose and assess a patient with atrial septal defect	4	4
Interpret echocardiographic and CT/MRI assessment of the anatomy	3	4
Manage postoperative course, recognise and manage common complications	3	4
TECHNICAL SKILLS		
Repair of Secundum ASD	4	4
Repair of Sinus Venosus ASD & correction of Partial Anomalous Pulmonary Venous Drainage	3	4
Repair of Coronary Sinus ASD	3	4
Management of Unroofed Coronary Sinus	2	3
Retrieval of dislodged ASD device	3	4

Note: Management of Primum ASD is covered under 'Atrio-ventricular septal defect'

PATENT DUCTUS ARTERIOSUS

OBJECTIVE

Understand fetal circulation and the physiological consequences of persistent PDA and associated lesions. Understand neonatal and infant management including medical treatment and indications for surgery. Surgical techniques and approaches.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and physiology of PDA	4	4
Medical management including management of the premature newborn	4	4
Indications and timing of surgical closure	4	4
CLINICAL SKILLS		
Diagnose and assess patents with PDA	3	4
Assessment of the premature newborn and definition of failed medical management	3	4
Interpret echo and angiographic findings	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Ligation of PDA via thoracotomy in premature infants	3	4
Ligation/division of PDA via thoracotomy in older infants	4	4
Ligation of PDA via sternotomy	3	4

COARCTATION AND INTERRUPTED AORTIC ARCH

OBJECTIVE

Understand morphology of coarction, hypoplastic aortic arch, interrupted arch and associated conditions. Physiology of the condition, age at presentation and pre-operative assessment and stabilisation. Management, including role of interventional cardiology and surgical repair techniques.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and physiology of CoA, Hypoplastic aortic arch and Interruption	3	4
Spectrum of presentation and preoperative management and stabilisation	3	4
Associated conditions	3	4
Indications for catheter and surgical intervention	3	4
Surgical techniques	3	4
Management of post-operative course and common complications	3	4
CLINCICAL SKILLS		
Daignose and assess patients with CoA, Hypoplastic arch and Interruption	3	4
Interpret echo, angiographic and CT/MRI findings	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
CoA repair via thoracotmy	3	4
Extended end to end anastomosis	3	4
Subclavian flap repair	3	4
Repair of hypoplastic arch via sternotomy	2	3
Repair of Aortic Interruption	2	3
Repair of CoA in children and adults (interposition graft and patch techniques)	3	4
Late complications of CoA repair (false aneurysm and aorto-bronchial/enteric fistulae)	2	3

AORTIC VALVE DISEASE

OBJECTIVE

Understand morphology and physiology of aortic valve disease in neonates, infants and children. Role of cardiological intervention and surgical repair. Treatment of aortic valve disease including surgical repair and replacement techniques

KNOWLEDGE	**ST7**	**ST8**
Morphology and classification of aortic valve disease	4	4
Spectrum of presentation and clinical assessment	4	4
Associated conditions	3	4
Indications for trans-catheter and surgical intervention	3	4
Range of surgical repair and replacement techniques	3	4
Management of operative course and common complications	3	4
CLINCIAL SKILLS		
Diagnose and assess patients with aortic valve disease	3	4
Interpret echo and angiographic findings	3	4
Assess operative and interventional options and timing of intervention	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Aortic valvotomy	3	4
Prosthetic aortic valve replacement	3	4
Ross Procedure (pulmonary autograft)	2	3
Aortic valve repair	2	3
Valve Sparing Root Procedure	2	3
Aortic Root Replacement	2	3

SUB-AORTIC STENOSIS

OBJECTIVE

Understand morphological spectrum of Sub-Aortic Stenosis and associated conditions. Indications for intervention and the timing and application of surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and classification of Sub-Aortic Stenosis	3	4
Spectrum of presentation and indication for intervention	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
CLINCIAL SKILLS		
Diagnose and assess patients with Sub-Aortic Stenosis	3	4
Interpret echo and angiographic findings	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Sub-Aortic resection	3	4
Morrow Procedure	3	4
Konno and Ross-Konno techniques	2	3

SUPRA-AORTIC STENOSIS

OBJECTIVE

Understand morphology and spectrum of Supra-Aortic stenosis. Indications and surgical techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and physiology of Supra-Aortic Stenosis	3	4
Indications for intervention and surgical techniques	3	4
Management of operative course and common complications	3	4
CLINCIAL SKILLS		
Diagnose and assess patients with Supra-Aortic Stenosis	3	4
Interpret echo and angiographic findings	3	4
Application of surgical techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Y-Shaped Patch Repair of Supra-Aortic Stenosis	3	4
Brom Repair (three patch technique)	2	3

CONGENITAL MITRAL VALVE DISEASE

OBJECTIVE

Diagnose and manage the complete range of congenital MV anomalies and dysplasia. Understand assessment and associated lesions. Role and indications for intervention.

KNOWLEDGE	**ST7**	**ST8**
Range of anatomical variants and associated conditions	3	4
Modes and age of presentation	3	4
Assessment and indications for intervention	3	4
Choice of valve repairs and replacements	3	4
Post-operative management and follow-up	3	4
CLINCAL SKILLS		
Diagnose and assess patients Mitral disease	3	4
Interpret echo and angiographic findings	3	4
Management of associated conditions	3	4
Application of surgical repair techniques	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Mitral valvotomy	3	4
Supra-mitral membrane resection	2	3
Mitral valve repair techniques	2	3
Mitral valve replacement	3	4

TOTAL ANOMALOUS PULMONARY VENOUS DRAINAGE

OBJECTIVE

Diagnose, manage and treat all forms of TAPVD. Understand principles of assessment and preoperative stabilisation. Indications and Operative techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and pathophysiology	3	4
Assessment and diagnosis. Associated conditions.	3	4
Pre-operative stabilisation.	3	4
Indications and timing of surgery	3	4
Post-operative management	3	4
Follow-up and late complications	3	4
CLINCICAL SKILLS		
Interpretation of echo and CT/MRI findings	3	4
Pre-operative stabilisation and management	3	4
Choices and timing of surgical repair	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Repair of Supra-cardiac TAPVD	3	4
Repair of Cardiac TAPVD	3	4
Repair of Infra-cardiac TAPVD	2	3
Sutureless techniques	2	3
Redo-TAPVD repair	2	3

VENTRICULAR SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage ventricular septal defects in children, including all aspects of operative repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of the ventricular septum	4	4
Classification of VSDs and associated lesions	4	4
Physiological implications of VSDs	4	4
Natural History and Complications	4	4
Indications for surgical and interventional repair	4	4
Current methods for repair, materials and surgical approaches, including techniques for multiple VSDs	3	4
CLINICAL SKILLS		
Diagnose and assess patients of different ages with VSD	3	4
Interpret echo and angiographic assessment	3	4
Manage postoperative course, recognise and mange common complications	3	4
TECHNICAL SKILLS		
Repair of Perimembranous VSDs	3	4
Repair of muscular VSDs	3	4
Repair of Doubly-Committed VSDs	3	4
Repair of Multiple VSDs	2	3

ATRIO-VENTRICULAR SEPTAL DEFECTS

OBJECTIVE

To diagnose, treat and manage all variants of Atrioventricular Septal defect (AVSD) including operative techniques.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and common variants	3	4
Natural history and timing of intervention	3	4
Physiology and associated conditions	3	4
Indications for surgical repair	3	4
Methods of repair, choice of technique and repair materials	3	4
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all varieties of AVSD	3	4
Interpret echo and angiographic findings	3	4
Manage post-operative course, recognise and manage common complication	3	4
TECHINCAL SKILLS		
Repair of partial AVSD	3	4
Repair of intermediate AVSD	3	4
Repair of Complete AVSD (two-patch technique)	3	3
Repair of Complete AVSD (one-patch technique)	3	3
AV valve repair techniques	3	3

FALLOT'S TETRALOGY

OBJECTIVE

To diagnose, treat and manage all variants of Fallot's Tetralogy including operative techniques and staged approach.

KNOWLEDGE	**ST7**	**ST8**
Morphology and anatomy including common variants	4	4
Natural history and timing of intervention	3	4
Neonatal management of cyanosis	3	4
Physiology and morphological correlates	3	4
Indications for interventional and surgical treatment	3	4
Peri-operative management including restrictive physiology	3	4
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all varieties of Fallot's tetralogy	3	4
Interpret echo and angiographic findings	3	4
Plan appropriate intervention	3	4
Manage post-operative course, recognise and manage common complications	3	4
TECHNICAL SKILLS		
Blalock-Taussig Shunt and Central shunts	3	4
Repair of Tetralogy of Fallot	3	4
Management of anomalous LAD	2	3
Creation of monocusp valve	3	3

PULMONARY ATRESIA WITH VSD

OBJECTIVE

Understand the morphology and physiology of pulmonary atresia VSD including complex variants with major aorto-pulmonary collaterals (MAPCAs). Management of all aspects of the condition including indications for surgery and operative techniques

KNOLWEDGE	**ST7**	**ST8**
Morphology and associated conditions	3	4
Physiology and pre-operative assessment	3	4
Timing of intervention and early palliation	3	4
Surgical techniques	3	4
Management of post-operative care, recognise and manage complications	3	4
Staged repair and follow-up surveillance	3	4
CLINICAL SKILLS		
Diagnose and assess patients with PA/VSD	3	4
Assess pre-operative investigations including assessment of MAPCAs	2	3
Surgical techniques and perioperative strategies	3	4
Management of post-operative care and common complications#	3	4
TECHNICAL SKILLS		
Palliative shunts	3	4
Direct PA- Aortic shunts (Mee Procedure)	2	3
Surgical repair of PA/VSD	3	3
Unifocalisation of MAPCAs	2	3
Complete repair of PA/VSD/MAPCAs	2	2

PULMONARY ATRESIA WITH INTACT VENTRICULAR SEPTUM

OBJECTIVE

Understand morphology and spectrum of the condition with emphasis on the assessment for biventricular, 1 ½ and Fontan-type repair. Indications and timing of intervention and the techniques of surgical repair and palliation.

KNOWLEGDE	**ST7**	**ST8**
Morphology and spectrum of the condition and the physiological correlates	3	4
Timing of intervention and management strategies	3	4
Management of the newborn and palliative strategies	3	4
Relevance of RV-dependent coronary circulation	3	4
Post-operative management and common complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all variants of PA/IVS	3	4
Interpret echo and angiographic findings	3	4
Surgical techniques and operative strategies	3	4
Management of post-operative care and common complications	3	4
TECHNICAL SKILLS		
Shunt procedures	3	4
RV-Overhaul procedure	2	3
1 ½ -type Repair	3	4
Biventricular Repair	3	4

TRANSPOSITION OF THE GREAT ARTERIES

OBJECTIVE

Understand morphology and physiology of common (d-) transposition of the great arteries (TGA) and associated lesions. Management of all aspects of the condition including preoperative stabilisation and techniques for surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and associated conditions	3	4
Physiology and pre-operative stabilisation	3	4
Timing of intervention and management of late presentation	3	4
Investigation and diagnosis	3	4
Surgical techniques	3	4
Management of post-operative course, recognise and mange complications	3	4
Follow-up and late complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with all variants of d-TGA	3	4
Interpret echo and angiographic findings	3	4
Surgical techniques and operative strategies	3	4
Management of post-operative care and common complications	3	4
TECHNICAL SKILLS		
Balloon atrial septostomy	2	3
Arterial switch procedure	3	3
Arterial switch and VSD closure	3	3
Arterial switch, VSD and arch repair	2	3
Management of intramural coronaries	2	3

TRANSPOSITION OF THE GREAT ARTERIES WITH VSD AND PULMONARY STENOSIS/ATRESIA

OBJECTIVE

Understand morphology and physiology of TGA/VSD/PS or PA and associated lesions. Management of all aspects of the condition including preoperative stabilisation and techniques for surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Morphology and timing of intervention	3	4
Physiology and pre-operative stabilisation	3	4
Timing of intervention	3	4
Investigation and diagnosis	3	4
Surgical techniques for repair	3	4
Management of post-operative course, recognise and manage complications	3	4
CLINICAL SKILLS		
Diagnose and assess patients with TGA/VSD/PS or PA	3	4
Interpret echo, angiographic and CT/MRI investigations	3	4
Plan operative strategies	3	4
Applications of Surgical techniques	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Arterial shunts and RV-PA conduits	3	4
Rastelli procedure	2	3
REV procedure	2	3
Nikaidoh Procedure	2	3
Reoperations for conduit replacement	2	3

DOUBLE-OUTLET RIGHT VENTRICLE (DORV)

OBJECTIVE

Understand morphology and physiology of DORV and associated conditions including relationship with spectrum of Fallot's tetralogy. Interpret intra-cardiac anatomy and strategies of surgical repair.

KNOWLEGE	**ST7**	**ST8**
Morphology and spectrum of anatomical sub-types	3	4
Physiology and indication for repair/palliation	3	4
Recognition of morphology inappropriate for biventricular repair	3	4
Timing of intervention	3	4
Surgical techniques for repair	3	4
Management of post-operative course, recognise and manage complications	3	4
CLINCIAL SKILLS		
Diagnose and assess patients with DORV	3	4
Interpret echo, angiographic and CT/MRI investigations	3	4
Applications of Surgical techniques	3	4
Manage post-operative course and common complications	3	4
TECHNICAL SKILLS		
Repair of DORV and DORV/Fallot spectrum	3	3
Trans-ventricular repair with or without conduit	3	3
Kawashima repair	2	3
REV repair	2	3

VASCULAR RINGS

OBJECTIVE

To diagnose, treat and manage all types of vascular ring and recognise associated oesophageal and airway problems.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of vascular rings	4	4
Classification and associated lesions	4	4
Modes of presentation & diagnosis	3	4
Indications & methods for surgical repair	3	4
Management of associated airway problems	3	4
CLINICAL SKILLS		
Diagnosis and assessment	3	4
Interpretation of CT/MRI, Ba swallow, bronchoscopy and angiography	3	4
Manage postoperative course, recognise and manage complications	3	4
TECHNICAL SKILLS		
Division of Double Aortic Arch	3	4
Correction of Pulmonary artery sling	3	3
Aortopexy and tracheopexy procedures	3	4

ARTERIAL SHUNTS

OBJECTIVE

Understand indications and management of all types of systemic-pulmonary artery shunts, including surgical approaches and techniques.

KNOWLEDGE	**ST7**	**ST8**
Types of shunt and surgical approaches	3	4
Choice of size, position and open vs closed	3	4
Understand alternative strategies and the staged nature of managing the underlying condition	3	4
Management of post-operative physiology	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic findings	3	4
Management of post-operative physiology	3	4
TECHNICAL SKILLS		
Modified Blalock-Taussig Shunt via sternotomy	3	4
Modified Blalock-Taussig Shunt via thoracotomy	3	4
Central shunt	3	4
Taking down shunts at reoperation	3	4

CAVO-PULMONARY SHUNT

OBJECTIVE

Understand indications and management of cavo-pulmonary (Glenn) shunts including surgical approaches and techniques.

KNOWLEDGE	**ST7**	**ST8**
Physiology of the cavo-pulmonary circulation	4	4
Indications and morphological correlates	3	4
Different techniques and surgical strategies	3	4
Management of post-operative physiology	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
TECHNICAL SKILLS		
Bidirectional Glenn (cavo-pulmonary shunt)	3	4
Bilateral shunts	3	4
Hemi-Fontan	3	4

FONTAN CIRCULATION

OBJECTIVE

Understand physiology of the Fontan circulation, anatomical and haemodynamic indications. Familiarity with surgical variants, bypass techniques, post-operative management and late problems of the Fontan physiology.

KNOWLEDGE	**ST7**	**ST8**
Physiology of the Fontan circulation	4	4
Indications and morphological correlates	3	4
Different techniques and surgical strategies	3	4
Pre-operative assessment	3	4
Post-operative management and common complications	3	4
Physiology of the Fontan state and natural history	3	4
CLINICAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
Management of early and late complications	3	4
TECHNICAL SKILLS		
Bypass strategies and cannulation	3	4
Extracardiac Total Cavo-Pulmoanry Connection (TCPC)	3	4
Lateral tunnel TCPC	3	4
Conversion Fontan-TCPC	2	3

HYPOPLASTIC LEFT HEART SYNDROME

OBJECTIVE

Diagnose, treat and manage HLHS and its anatomical variants. Understand stabilisation, pre- and post-operative management of the Norwood procedure. Surgical techniques and options.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of HLHS and anatomical variants including borderline left ventricle	3	4
Physiology of post-natal stabilisation	3	4
Pre-operative management	3	4
Role and indications for hybrid procedures	3	4
Post-operative management of the Norwood physiology	3	4
Timing and plan of staged repair and inter-stage monitoring	3	4
CLINCIAL SKILLS		
Assessment of the newborn with HLHS	3	4
Echo interpretation and assessment of borderline LV	3	4
Pre-operative intervention and stabilisation	3	4
Post-operative management, manipulation of the Norwood circulation on PICU and management of common complications	3	4
TECHNICAL SKILLS		
Atrial septectomy	3	4
Classical Norwood Procedure	2	3
Norwood procedure with RV-PA conduit	2	3
Hybrid Norwood Procedure	2	3
Comprehensive stage II Hybrid procedure	2	3

AORTO-PULMONARY WINDOW

OBJECTIVE

Understand morphological classification and underlying physiology. Recognise associated lesions. Clinical management including pre-operative stabilisation and operative techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and associated conditions	3	4
Physiology and indications for intervention	3	4
Stabilisation of the neonate	3	4
Operative strategy and repair technique	3	4
Management of operative course and common complications	3	4
CLINCIAL SKILLS		
Indications and decision making	3	4
Interpretation of echo and angiographic data	3	4
Management of post-operative physiology	3	4
Management of operative course and common complications	3	4
TECHNICAL SKILLS		
Repair of Aorto-Pulmonary Window	3	4
Management of Associated Lesions	3	3

TRUNCUS ARTERIOSUS

OBJECTIVE

To diagnose, treat and manage the condition, recognise the common morphological variants and associated lesions. Understand concepts and techniques of surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy of the lesion, Van Praagh and Collis/Edwards classifications	3	4
Pathophysiology and preoperative stabilisation	3	4
Strategies and techniques of surgical repair including choice or use of conduit	3	4
Management of post-operative physiology	3	4
Late management of conduit replacement and the truncal valve.	3	4
CLINICAL SKILLS		
Interpret echo findings	3	4
Preoperative assessment and stabilisation	3	4
Operative techniques and bypass strategies	3	4
TECHNICAL SKILLS		
Bypass Strategy	3	4
Repair of Truncus Arteriosus	2	3
Repair of Truncus/Interruption	2	2
Repair of Truncus/Non-confluent PAs	2	2
Repair of Truncal Valve	2	3

ANOMALOUS LEFT CORONARY ARTERY FROM PULMONARY ARTERY (ALCAPA)

OBJECTIVE

To diagnose, treat and manage the condition. Understand physiology and age at presentation. Techniques and timing of surgical repair.

KNOWLEDGE	**ST7**	**ST8**
Anatomy and common variants	3	4
Physiology and influence on age and mode of presentation	3	4
Pathophysiology and preoperative stabilisation	3	4
Management of post-operative course and common complications	3	4
Late management and follow-up	3	4
CLINCICAL SKILLS		
Interpret echo findings and conformation of diagnosis	3	4
Preoperative assessment and stabilisation	3	4
Use and indications of ECLS	3	4
Application of Operative techniques and cardioplegia strategy	3	4
TECHNICAL SKILLS		
Myocardial protection	3	4
ALCAPA repair by coronary transfer	3	3
Tacheuchi procedure	2	3
Coronary grafting in children	2	3

EXTRA CORPOREAL MEMBRANE OXYGENATION (ECMO)

OBJECTIVE

Understand principles of ECMO, indications and management in neonates and children

KNOWLEDGE	**ST7**	**ST8**
Indications and physiology	3	4
Alternatives to ECMO and conventional PICU management	3	4
Principles of ECMO circuit, components and design	3	4
Options and choice of cannulation	3	4
Differences and Indications of VA and VV ECMO	3	4
Management of the circuit and trouble-shooting	3	4
Management of complications	3	4
Indications and management of weaning	3	4
CLINICAL SKILLS		
Clinical assessment and decision making for VV and VA ECMO	3	4
Choice of cannulation and circuit design	3	4
Management of the neonate and child on ECMO	3	4
Circuit trouble-shooting and daily management	3	4
Indications and Supervision of weaning	3	4
Transport on ECMO	2	3
TECHNICAL SKILLS		
ECMO Specialist training course desirable		
Construction of ECMO circuit	3	4
Cannulation for VV and VA in neonate and child	3	4
Conversion of VV to VA and vice versa	3	4
Open chest cannulation	3	4
Change of Oxygenator	3	4
Decannulation	3	4

EXTRA CORPOREAL LIFE SUPPORT (ECLS)

OBJECTIVE

Understand indications for ECLS, strategies for cannulation and management of the circuit and weaning.

KNOWLEDGE	**ST7**	**ST8**
Indications and physiology	3	4
Difference between failure to separate from bypass and PICU cannulation	3	4
Principles of the ECLS circuit	3	4
Options and choice of cannulation	3	4
Management of the circuit and trouble-shooting	3	4
Management of complications	3	4
Indications and management of weaning	3	4
CLINICAL SKILLS		
Clinical assessment and decision making for ECLS	3	4
Choice of cannulation and circuit design	3	4
Management of the neonate and child on ECLS	3	4
Circuit trouble-shooting and daily management	3	4
Indications and Supervision of weaning	3	4
TECHINICAL SKILLS		
ECMO Specialist training course desirable		
Construction of ECLS circuit	3	4
Cannulation in neonate and child	3	4
Change of Oxygenator	3	4
Decannulation	3	4

MECAHNICAL CIRCUALTORY ASSIST (LVAD/RVAD/BIVAD)

OBJECTIVE

Understand indications for mechanical circulatory assist as a salvage procedure, pre-operative stabilisation and as a bridge to transplantation. Understand principles of commonly used devices and indications for each. Routine management of patients supported by these devices and common complications.

KNOWLEDGE	**ST7**	**ST8**
Basic and applied physiology of ventricular assist	3	4
Varieties and options available for LVAD or BiVAD	3	4
Indications for use of VAD	3	4
Management of patient on VAD and common complications	3	4
Role of bridge to transplant and recovery	3	4
Awareness of new devices and devices under trial	3	3
CLINCIAL SKILLS		
Application of criteria and indications for VAD	3	4
Choice of device and circuit design	3	4
Management of the patient on VAD	3	4
Conversion of LVAD to BiVAD or ECLS	3	4
Device trouble-shooting and management of complications	3	4
Bridging to transplantation and recovery	3	4
TECHNICAL SKILLS		
Implantation of VAD	2	3
Implantation of BiVAD	2	3
Explantation of VAD	2	3

TRANSPLANTATION - Optional Module

By the end of sub-specialty training the trainee will be able to:

- *Apply the principles of heart and lung transplantation in children including indications, assessment, operative procedures and post-operative management including immunosuppression*
- *Describe the specific issues of transplantation in Adults with Congenital Heart Disease (ACHD)*

KNOWLEDGE

	ST7	ST8
Describe		
Indications for heart, lung and heart-lung transplantation	3	4
Assess		
Retrieval and donor assessment	3	4
Manage		
Management and stabilisation of severe heart failure in children	3	4
Selection and listing for transplantation. Pre transplant work-up.	3	4
Operative planning and procedures	3	4
Post-operative management and immunosuppression	3	4
Late complications, chronic rejection and re-transplantation	3	4
Psychological issues in children and adolescents	3	4
MECAHNICAL CIRCUALTORY ASSIST (LVAD/RVAD/BIVAD)		
Role of bridge to transplant and recovery	3	4

Learning opportunities

- Postgraduate teaching and discussion sessions
- Multi-disciplinary meetings
- External conferences and seminars

Sources of evidence
CBD
PBA
Audit / Research / Project

CLINICAL SKILLS

	ST7	ST8
Manage:		
Management and stabilisation of acute and chronic heart failure	3	4
Assessment for listing	3	4
Application of bridging devices	3	4
Immunosuppression protocols and regimens	3	4
Coordination of retrieval and list management	3	4
Post-operative management and common complications	3	4
MECAHNICAL CIRCUALTORY ASSIST (LVAD/RVAD/BIVAD)		
Bridging to transplantation and recovery	3	4

Learning opportunities
- Supervised clinical practice, primarily in a hospital, wards, clinics or theatre.
- Management of specific clinical cases
- Assessment of new patients and review/follow up existing patients

Sources of evidence
PBA
MSF

TECHNICAL SKILLS

	ST7	ST8
Assess		
Retrieval and donor organ assessment	3	4
Manage		
Orthotopic heart transplantation	3	3
Single lung and double-lung transplantation	2	3
Heart-lung transplantation	2	3

Learning opportunities

- Supervised theatre training lists on selected patients covering consent, pre-operative planning and preparation, operative sills and post operative management, adhering to protocols and patient-safety.
- Intensive Care

Sources of evidence

PBA
MSF

* Transplantation is covered in the general syllabus and examination and trainees should already have a strong basic level of knowledge. Further experience in such a super-specialised area is optional rather than mandatory.

TRACHEAL SURGERY

OBJECTIVE

Understand the spectrum of congenital tracheal anomalies and associated conditions. Diagnose and manage each condition. Indications and techniques of repair.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification and associated conditions	3	4
Diagnosis and investigation	3	4
Indications for intervention and surgery	3	4
Pre-operative stabilisation	3	4
Role of bronchoscopy and bronchography	3	4
Choice of operative techniques	3	4
Role of stem-cell technology	3	3
CLINICAL SKILLS		
Interpretation of investigations	3	4
Indication and planning of interventions	3	4
Role of functional assessment and stenting	3	4
Repair of associated lesions	3	4
Post-operative management and common complications	3	4
Long-term follow-up and assessment	3	4
TECHNICAL SKILLS		
Local Resection and anastomosis	2	3
Slide Tracheal Repair	2	3
Patch Repair Techniques and tracheoplasty	2	3
Bronchoplasty	2	3
Reoperations	2	3

PRINCIPLES OF ADULT CONGENITAL HEART DISEASE

OBJECTIVE

Understand the spectrum of conditions in Adult Congenital Heart Disease Surgery and the physiological implications of the residua and sequelae of previous surgery. Understand the issues of multiple redo surgery, implications of surgery in young adults and natural history of underlying conditions.

KNOWLEDGE	**ST7**	**ST8**
Physiology of Congenital Heart Disease presenting in adulthood	3	4
Residua and Sequelae of surgery in childhood	3	4
Investigation of adults with congenital heart disease	3	4
Choice of procedures and conduits/prostheses in young adults	3	4
Role of interventional cardiology	3	4
Indications for surgery	3	4
CLINICAL SKILLS		
Assessment of the young adult	3	4
Interpretation of echo, CT and MRI in congenital heart disease	3	4
Post-operative management in adult intensive care	3	4

PULMONARY VALVE REPLACEMENT

OBJECTIVE

Understand the aetiology of pulmonary regurgitation in adult congenital heart disease. Assessment of the right ventricle, indications for surgery and the timing and choice of valve replacement.

KNOWLEDGE	**ST7**	**ST8**
Physiology of pulmonary regurgitation and sequelae of Fallot repair and pulmonary valvotomy in childhood	3	4
Assessment of the right ventricle and indications for intervention	3	4
Role and indications of percutaneous valve replacement	3	4
Timing of valve replacement and choice of prosthesis	3	4
Management of associated lesions including arrhythmias	3	4
CLINICAL SKILLS		
Assessment of pulmonary regurgitation	3	4
Interpretation of echo and MRI findings	3	4
Use and Interpretation of exercise testing	3	4
Management of post-operative course and common complications	3	4
TECHNICAL SKILLS		
Redo sternotomy with a dilated Right Ventricle	3	4
Pulmonary Valve Replacement	3	4
RVOT patching and placation of the dilated RVOT	3	4
Concomitant Tricuspid Valve Repair	3	3

RIGHT VENTRICLE-PULMONARY ARTERY CONDUIT REPLACEMENT IN THE ADULT

OBJECTIVE

Understand the underlying morphology and indications for original conduit. Assessment of conduit degeneration and indications for replacement. Techniques for replacement and choice of conduit.

KNOWLEDGE	**ST7**	**ST8**
Underlying morphology and conduit type used in childhood	3	4
Assessment of conduit deterioration	3	4
Indications for re-intervention and surgery	3	4
Choice of conduit and procedure	3	4
Management of associated lesions	3	4
Post-operative management and common complications	3	4
CLINICAL SKILLS		
Interpretation of echo, angio and MRI/CT	3	4
Apply indications for surgery and role of catheter intervention	3	4
Assessment of associated conditions	3	4
Choice of conduit	3	4
Management of post-operative course and common complications	3	4
TECHNICAL SKILLLS		
Redo sternotomy and femoral cannulation	3	4
Conduit replacement	3	4
Repair of associated conditions (branch pulmonary artery stenosis)	3	4

ASD CLOSURE IN THE ADULT

OBJECTIVE

Understand assessment of the adult with atrial septal defect, morphological subtypes and indications for surgical and interventional closure. Focus on concomitant arrhythmia management and assessment of the right ventricle and tricuspid valve.

KNOWLEDGE	**ST7**	**ST8**
Morphological classification	3	4
Clinical and physiological assessment	3	4
Indications for surgical and interventional closure	3	4
Associated right heart failure, tricuspid regurgitation and arrhythmias	3	4
Post-operative management and common complications	3	4
CLINICAL SKILLS		
Interpretation of echo, angio and MRI	3	4
Pre-operative assessment	3	4
Operative techniques and choice of patch material	3	4
Management of post-operative course and common complications	3	4
TECHNICAL SKILLS		
Repair of secundum ASD in the adult	4	4
Repair of Sinus Venosus ASD	3	4
Management of Partial Anomalous Pulmonary Venous Drainage	3	4
Repair of Coronary Sinus ASD +/- Unroofed Coronary Sinus	3	4
Repair of Partial AVSD	3	4

FONTAN CONVERSION SURGERY

OBJECTIVE

Understand the history of the Fontan procedure and the late complications of the atrio-pulmonary connection. Patient assessment and indications for conversion to TCPC. Operative technique and importance of arrhythmia management.

KNOWLEDGE	**ST7**	**ST8**
Iterations of the Fontan circulation	4	4
Complications of the APC and indications for conversion	3	4
Operative techniques and arrhythmia management	3	4
Post-operative course and common complications	3	4
CLINICAL SKILLS		
Interpretation of echo, angio and MRI	3	4
Planning operative strategy	3	4
Management of post-operative course	3	4
TECHNICAL SKILLS		
Redo Sternotomy in the Fontan	2	3
Fontan Conversion	2	3
Maze technique and epicardial pacing	2	3

TRANSPLANTATION IN ADULTS WITH CONGENTITAL HEART DISEASE

OPTIONAL MODULE

OBJECTIVE

Understand specific issues of transplantation in ACHD.

KNOWLEDGE	**ST7**	**ST8**
Underlying conditions and physiologies associated with heart failure in ACHD	3	4
Issues of reoperation and antigen load	3	4
Outcomes compared to non-ACHD	3	4
Management of pulmonary hypertension pre and post transplant	3	4
Anatomical considerations in complex conditions	3	4
Psychological issues in transplant in young adults	3	4
CLINCIAL SKILLS		
Assessment of heart failure	3	4
Criteria and indication for listing	3	4
Pre-operative planning	3	4
Management of immunosuppression and pulmonary hypertension	3	4
Post-operative management and common complications	3	4
TECHNICAL SKILLS		
Donor management and retrieval	3	4
Orthotopic Heart transplantation	2	3
Anatomical techniques for abnormal venous anatomy	2	3

Professional Behaviour & Leadership Syllabus

Professional Behaviour and Leadership Syllabus

The Professional Behaviour and leadership elements are mapped to the leadership curriculum as laid out by the Academy of Medical Royal Colleges. The assessment of these areas is a thread running through the curriculum and this makes them common to all of the disciplines of surgery. For this reason, assessment techniques for this element of the curriculum are summarised in the 4th column.

Simulation

Simulation based learning has been mapped to the categories in the last column and would run as a common thread through all the specialty curricula.

In summary we are proposing the following:

1. That the following courses are **essential** for all trainees during their training from August 2013:
- Attendance at a *Training the Trainers* course which uses simulation to achieve the objectives within the curriculum
- Attendance at a *Patient Safety* course which uses simulation to achieve the objectives described in the curriculum and particularly those related to patient safety in the operating theatre

2. That the following courses are currently **desirable** and should be available for all trainees during their training by August 2015:
- Attendance at a *Communication Skills* course which uses simulation to achieve the objectives described in the curriculum
- Attendance at a course to understand training and assessment in clinical practise which uses simulation to achieve the objectives within the curriculum

3. That simulation also be used in the workplace to support the development of the human factor skills. We feel that such training is valuable, but at this stage is **optional**.
- In addition we envisage the development of course designed to simulate so called "Human factors" (which would include communication skills, situational judgement and decision making) and their effect upon team working, leadership and performance in clinical practise, but most notably within the operating theatre. At this stage we would envisage attendance at such courses as being optional.

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Category	**Good Clinical Care**, to include: • History taking (GMP Domains: 1, 3, 4) • Physical examination (GMP Domains: 1, 2,4) • Time management and decision making (GMP Domains: 1,2,3) • Clinical reasoning (GMP Domains: 1,2, 3, 4) • Therapeutics and safe prescribing (GMP Domains: 1, 2, 3) • Patient as a focus of clinical care (GMP Domains: 1, 3, 4) • Patient safety (GMP Domains: 1, 2, 3) • Infection control (GMP Domains: 1, 2, 3)	**Area 4.1**		
Objective	To achieve an excellent level of care for the individual patient		Mini CEX, CBD, Mini PAT, MRCS and Specialty FRCS	**Essential:** Patient safety course to achieve the objectives described in the curriculum and particularly those related to patient

	• To elicit a relevant focused history (See modules 2, 3, 4,5) • To perform focused, relevant and accurate clinical examination (See modules 2,3,4,5) • To formulate a diagnostic and therapeutic plan for a patient based upon the clinic findings (See modules 2,3,4,5) • To prioritise the diagnostic and therapeutic plan (See modules 2,3,4,5) • To communicate a diagnostic and therapeutic plan appropriately (See modules 2,3,4,5) To produce timely, complete and legible clinical records to include case-note records, handover notes, and operation notes To prescribe, review and monitor appropriate therapeutic interventions relevant to clinical practice including non – medication based therapeutic and preventative indications (See module 1,2,3,4,5) To prioritise and organise clinical and clerical duties in order to optimise patient care To make appropriate clinical and clerical decisions in order to optimise the effectiveness of the clinical team resource. To prioritise the patient's agenda encompassing their beliefs, concerns expectations and needs To prioritise and maximise patient safety: • To understand that patient safety depends on o The effective and efficient organisation of care o Health care staff working well together o Safe systems, individual competency and safe practice • To understand the risks of treatments and to discuss these honestly and openly with patients • To systematic ways of assessing and minimising risk • To ensure that all staff are aware of risks and work together to minimise risk To manage and control infection in patients, including: • Controlling the risk of cross-infection • Appropriately managing infection in individual patients • Working appropriately within the wider community to manage the risk posed by communicable diseases	**Area 4.1**		safety in the operating theatre **Desirable:** Nil **Optional:** Simulated patients Virtual patients Scenarios and role play Human factors course to achieve the objectives described in the curriculum

Knowledge	**Patient assessment** • Knows likely causes and risk factors for conditions relevant to mode of presentation • Understands the basis for clinical signs and the relevance of positive and negative physical signs • Recognises constraints and limitations of physical examination • Recognises the role of a chaperone is appropriate or required • Understand health needs of particular populations e.g. ethnic minorities • Recognises the impact of health beliefs, culture and ethnicity in presentations of physical and psychological conditions **Clinical reasoning** • Interpret history and clinical signs to generate hypothesis within context of clinical likelihood • Understands the psychological component of disease and illness presentation • Test, refine and verify hypotheses • Develop problem list and action plan • Recognise how to use expert advice, clinical guidelines and algorithms • Recognise and appropriately respond to sources of information accessed by patients • Recognises the need to determine the best value and most effective treatment both for the individual patient and for a patient cohort **Record keeping** • Understands local and national guidelines for the standards of clinical record keeping in all circumstances, including handover • Understanding of the importance of high quality and adequate clinical record keeping and relevance to patient safety and to litigation • Understand the primacy for confidentiality **Time management** • Understand that effective organisation is key to time management • Understand that some tasks are more urgent and/or more important than others • Understand the need to prioritise work according to urgency and importance • Maintains focus on individual patient needs whilst balancing multiple competing pressures • Outline techniques for improving time management **Patient safety** • Outline the features of a safe working environment • Outline the hazards of medical equipment in common use	**Area 4.1**		

	• Understand principles of risk assessment and management • Understanding the components of safe working practice in the personal, clinical and organisational settings • Outline local procedures and protocols for optimal practice e.g. GI bleed protocol, safe prescribing • Understands the investigation of significant events, serious untoward incidents and near misses **Infection control** • Understand the principles of infection control • Understands the principles of preventing infection in high risk groups • Understand the role of Notification of diseases within the UK • Understand the role of the Health Protection Agency and Consultants in Health Protection			

Skills	**Patient assessment** • Takes a history from a patient with appropriate use of standardised questionnaires and with appropriate input from other parties including family members, carers and other health professionals • Performs an examination relevant to the presentation and risk factors that is valid, targeted and time efficient and which actively elicits important clinical findings • Give adequate time for patients and carers to express their beliefs ideas, concerns and expectations • Respond to questions honestly and seek advice if unable to answer • Develop a self-management plan with the patient • Encourage patients to voice their preferences and personal choices about their care **Clinical reasoning** • Interpret clinical features, their reliability and relevance to clinical scenarios including recognition of the breadth of presentation of common disorders • Incorporates an understanding of the psychological and social elements of clinical scenarios into decision making through a robust process of clinical reasoning • Recognise critical illness and respond with due urgency • Generate plausible hypothesis(es) following patient assessment • Construct a concise and applicable problem list using available information • Construct an appropriate management plan in conjunction with the patient, carers and other members of the clinical team and communicate this effectively to the patient, parents and carers where relevant **Record keeping** • Producing legible, timely and comprehensive clinical notes relevant to the setting • Formulating and implementing care plans appropriate to the clinical situation, in collaboration with members of an interdisciplinary team, incorporating assessment, investigation, treatment and continuing care • Presenting well documented assessments and recommendations in written and/or verbal form **Time management** • Identifies clinical and clerical tasks requiring attention or predicted to arise	**Area 4.1**		

	• Group together tasks when this will be the most effective way of working • Organise, prioritise and manage both team-members and workload effectively and flexibly **Patient safety** • Recognise and practise within limits of own professional competence • Recognise when a patient is not responding to treatment, reassess the situation, and encourage others to do so • Ensure the correct and safe use of medical equipment • Improve patients' and colleagues' understanding of the side effects and contraindications of therapeutic intervention • Sensitively counsel a colleague following a significant untoward event, or near incident, to encourage improvement in practice of individual and unit • Recognise and respond to the manifestations of a patient's deterioration or lack of improvement (symptoms, signs, observations, and laboratory results) and support other members of the team to act similarly **Infection control** • Recognise the potential for infection within patients being cared for • Counsel patients on matters of infection risk, transmission and control • Actively engage in local infection control procedures • Prescribe antibiotics according to local guidelines and work with microbiological services where appropriate • Recognise potential for cross-infection in clinical settings • Practice aseptic technique whenever relevant			
Behaviour	• Shows respect and behaves in accordance with Good Medical Practice • Ensures that patient assessment, whilst clinically appropriate considers social, cultural and religious boundaries • Support patient self-management • Recognise the duty of the medical professional to act as patient advocate • Ability to work flexibly and deal with tasks in an effective and efficient fashion • Remain calm in stressful or high pressure situations and adopt a timely, rational approach • Show willingness to discuss intelligibly with a patient the notion and difficulties of prediction of future events, and benefit/risk balance of therapeutic intervention			

	• Show willingness to adapt and adjust approaches according to the beliefs and preferences of the patient and/or carers • Be willing to facilitate patient choice • Demonstrate ability to identify one's own biases and inconsistencies in clinical reasoning • Continue to maintain a high level of safety awareness and consciousness • Encourage feedback from all members of the team on safety issues • Reports serious untoward incidents and near misses and co-operates with the investigation of the same. • Show willingness to take action when concerns are raised about performance of members of the healthcare team, and act appropriately when these concerns are voiced to you by others • Continue to be aware of one's own limitations, and operate within them • Encourage all staff, patients and relatives to observe infection control principles • Recognise the risk of personal ill-health as a risk to patients and colleagues in addition to its effect on performance			

Examples and descriptors for Core Surgical Training	**Patient assessment**
	• Obtains, records and presents accurate clinical history and physical examination relevant to the clinical presentation, including an indication of patient's views
	• Uses and interprets findings adjuncts to basic examination appropriately e.g. internal examination, blood pressure measurement, pulse oximetry, peak flow
	• Responds honestly and promptly to patient questions
	• Knows when to refer for senior help
	• Is respectful to patients by
	  ○ Introducing self clearly to patients and indicates own place in team
	  ○ Checks that patients comfortable and willing to be seen
	  ○ Informs patients about elements of examination and any procedures that the patient will undergo
	
	Clinical reasoning
	• In a straightforward clinical case develops a provisional diagnosis and a differential diagnosis on the basis of the clinical evidence, institutes an appropriate investigative and therapeutic plan, seeks
		Area 4.1		

	appropriate support from others and takes account of the patients wishes **Record keeping** • Is able to format notes in a logical way and writes legibly • Able to write timely, comprehensive, informative letters to patients and to GPs **Time management** • Works systematically through tasks and attempts to prioritise • Discusses the relative importance of tasks with more senior colleagues. • Understands importance of communicating progress with other team members **Patient safety** • Participates in clinical governance processes • Respects and follows local protocols and guidelines • Takes direction from the team members on patient safety • Discusses risks of treatments with patients and is able to help patients make decisions about their treatment • Ensures the safe use of equipment • Acts promptly when patient condition deteriorates • Always escalates concerns promptly **Infection control** • Performs simple clinical procedures whilst maintaining full aseptic precautions • Follows local infection control protocols • Explains infection control protocols to students and to patients and their relatives • Aware of the risks of nosocomial infections.			

Examples and descriptors for CCT	**Patient assessment**
	• Undertakes patient assessment (including history and examination) under difficult circumstances. Examples include:
	  ○ Limited time available (Emergency situations, Outpatients, ward referral),
	  ○ Severely ill patients
	  ○ Angry or distressed patients or relatives
	• Uses and interprets findings adjuncts to basic examination appropriately e.g. electrocardiography, spirometry, ankle brachial pressure index, fundoscopy, sigmoidoscopy
	• Recognises and deals with complex situations of communication, accommodates disparate needs and develops strategies to cope
	• Is sensitive to patients cultural concerns and norms
	• Is able to explain diagnoses and medical procedures in ways that enable patients understand and make decisions about their own health care.
	
	Clinical reasoning
	• In a complex case, develops a provisional diagnosis and a differential diagnosis on the basis of the clinical evidence, institutes an appropriate investigative and therapeutic plan, seeks appropriate
		Area 4.1		

	support from others and takes account of the patients wishes **Record keeping** • Produces comprehensive, focused and informative records which summarise complex cases accurately **Time management** • Organises, prioritises and manages daily work efficiently and effectively • Works with, guides, supervises and supports junior colleagues • Starting to lead and direct the clinical team in effective fashion **Patient safety** • Leads team discussion on risk assessment, risk management, clinical incidents • Works to make organisational changes that will reduce risk and improve safety • Promotes patients safety to more junior colleagues • Recognises and reports untoward or significant events • Undertakes a root cause analysis • Shows support for junior colleagues who are involved in untoward events **Infection control** • Performs complex clinical procedures whilst maintaining full aseptic precautions • Manages complex cases effectively in collaboration with infection control specialists			

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Category	**Being a good communicator** To include: • Communication with patients (GMP Domains: 1, 3, 4) • Breaking bad news (GMP Domains: 1, 3, 4) • Communication with colleagues (GMP Domains: 1, 3)	N/A		
Objective	**Communication with patients** • To establish a doctor/patient relationship characterised by understanding, trust, respect, empathy and confidentiality • To communicate effectively by listening to patients, asking for and respecting their views about their health and responding to their concerns and preferences • To cooperate effectively with healthcare professionals involved in patient care • To provide appropriate and timely information to patients and their families		PBA, DOPS, Mini CEX, Mini PAT and CBD	**Essential**: Nil **Desirable**: Communication skills course to achieve the objectives described in the curriculum **Optional:**

	Breaking bad news • To deliver bad news according to the needs of individual patients **Communication with Colleagues** • To recognise and accept the responsibilities and role of the doctor in relation to other healthcare professionals. • To communicate succinctly and effectively with other professionals as appropriate • To present a clinical case in a clear, succinct and systematic manner			Simulated patients Virtual patients Scenarios and role play Human factors course to achieve the objectives described in the curriculum
Knowledge	**Communication with patients** • Understands questioning and listening techniques • Understanding that poor communication is a cause of complaints/ litigation **Breaking bad news** • In delivering bad news understand that: o The delivery of bad news affects the relationship with the patient o Patient have different responses to bad news o Bad news is confidential but the patient may wish to be accompanied o Once the news is given, patients are unlikely to take in anything else o Breaking bad news can be extremely stressful for both parties o It is important to prepare for breaking bad news **Communication and working with colleagues** • Understand the importance of working with colleagues, in particular: o The roles played by all members of a multi-disciplinary team o The features of good team dynamics o The principles of effective inter-professional collaboration o The principles of confidentiality			

Skills	**Communication with patients** • Establish a rapport with the patient and any relevant others (e.g. carers) • Listen actively and question sensitively to guide the patient and to clarify information • Identify and manage communication barriers, tailoring language to the individual patient and others and using interpreters when indicated • Deliver information compassionately, being alert to and managing their and your emotional response (anxiety, antipathy etc.) • Use, and refer patients to appropriate written and other evidence based information sources • Check the patient's understanding, ensuring that all their concerns/questions have been covered • Make accurate contemporaneous records of the discussion • Manage follow-up effectively and safely utilising a variety if methods (e.g. phone call, email, letter) • Provide brief advice on health and self care e.g. use of alcohol and drugs. • Ensure appropriate referral and communications with other healthcare professional resulting from the consultation are made accurately and in a timely manner **Breaking bad news** • Demonstrate to others good practice in breaking bad news • Recognises the impact of the bad news on the patient, carer, supporters, staff members and self • Act with empathy, honesty and sensitivity avoiding undue optimism or pessimism **Communication with colleagues** • Communicate with colleagues accurately, clearly and promptly • Utilise the expertise of the whole multi-disciplinary team • Participate in, and co-ordinate, an effective hospital at night or hospital out of hours team • Communicate effectively with administrative bodies and support organisations • Prevent and resolve conflict and enhance collaboration			

Behaviour	**Communication with patients** • Approach the situation with courtesy, empathy, compassion and professionalism • Demonstrate and inclusive and patient centred approach with respect for the diversity of values in patients, carers and colleagues **Breaking bad news** • Behave with respect, honest ant empathy when breaking bad news • Respect the different ways people react to bad news **Communication with colleagues** • Be aware of the importance of, and take part in, multi-disciplinary teamwork, including adoption of a leadership role • Foster an environment that supports open and transparent communication between team members • Ensure confidentiality is maintained during communication with the team • Be prepared to accept additional duties in situations of unavoidable and unpredictable absence of colleagues Act appropriately on any concerns about own or colleagues' health e.g. use of alcohol and/or other drugs.			
Examples and descriptors for Core Surgical Training	• Conducts a simple consultation with due empathy and sensitivity and writes accurate records thereof • Recognises when bad news must be imparted. • Able to break bad news in planned settings following preparatory discussion with seniors • Accepts his/her role in the healthcare team and communicates appropriately with all relevant members thereof			
Examples and descriptors for CCT	• Shows mastery of patient communication in all situations, anticipating and managing any difficulties which may occur • Able to break bad news in both unexpected and planned settings • Fully recognises the role of, and communicates appropriately with, all relevant team members • Predicts and manages conflict between members of the healthcare team • Beginning to take leadership role as appropriate, fully respecting the skills, responsibilities and viewpoints of all team members			

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Category	**Teaching and Training** (GMP Domains: 1, 3)	N/A		

Objective	• To teach to a variety of different audiences in a variety of different ways • To assess the quality of the teaching • To train a variety of different trainees in a variety of different ways • To plan and deliver a training programme with appropriate assessments		Mini PAT, Portfolio assessment at ARCP	**Essential:** Attendance at a Training the Trainers Course to achieve the objectives within the curriculum **Desirable:** Attendance at a course to understand training and assessment in clinical practise to achieve the objectives within the curriculum **Optional** Presentation skills training Attendance at a course to develop small group teaching Reflective practice and writing workshop
Knowledge	• Understand relevant educational theory and principles relevant to medical education • Understand the structure of an effective appraisal interview • Understand the roles to the bodies involved in medical education • Understand learning methods and effective learning objectives and outcomes • Differentiate between appraisal, assessment and performance review • Differentiate between formative and summative assessment • Understand the role, types and use of workplace-based assessments • Understand the appropriate course of action to assist a trainee in difficulty			

Skills	• Critically evaluate relevant educational literature • Vary teaching format and stimulus, appropriate to situation and subject • Provide effective feedback and promote reflection • Conduct developmental conversations as appropriate eg: appraisal, supervision, mentoring • Deliver effective lecture, presentation, small group and bed side teaching sessions • Participate in patient education • Lead departmental teaching programmes including journal clubs • Recognise the trainee in difficulty and take appropriate action • Be able to identify and plan learning activities in the workplace			
Behaviour	• In discharging educational duties respect the dignity and safety of patients at all times • Recognise the importance of the role of the physician as an educator • Balances the needs of service delivery with education • Demonstrate willingness to teach trainees and other health workers • Demonstrates consideration for learners • Acts to endure equality of opportunity for students, trainees, staff and professional colleagues • Encourage discussions with colleagues in clinical settings to share understanding • Maintains honesty, empathy and objectivity during appraisal and assessment			
Examples and descriptors for Core Surgical Training	• Prepares appropriate materials to support teaching episodes • Seeks and interprets simple feedback following teaching • Supervises a medical student, nurse or colleague through a simple procedure • Plans, develops and delivers small group teaching to medical students, nurses or colleagues			
Examples and descriptors for CCT	• Performs a workplace based assessment including giving appropriate feedback • Devises a variety of different assessments (eg MCQs, WPBAs) • Appraises a medical student, nurse or colleague • Acts as a mentor to a medical student, nurses or colleague • Plans, develops and delivers educational programmes with clear objectives and outcomes • Plans, develops and delivers an assessment programme to support educational activities			

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Category	**Keeping up to date and understanding how to analyse information** Including • *Ethical research* (GMP Domains: 1) • Evidence and guidelines (GMP Domains: 1) • Audit (GMP Domains: 1, 2) • Personal development	**Area 1.3**		
Objective	• To understand the results of research as they relate to medical practise • To participate in medical research • To use current best evidence in making decisions about the care of patients • To construct evidence based guidelines and protocols • To complete an audit of clinical practice • At actively seek opportunities for personal development • To participate in continuous professional development activities	**Area 1.3** **Area 1.3**	Mini PAT, CBD, Portfolio assessment at ARCP, MRCS and specialty FRCS	**Essential:** Nil **Desirable:** Nil **Optional:** Nil
Knowledge	• Understands GMC guidance on good practice in research • Understands the principles of research governance • Understands research methodology including qualitative, quantitative, bio-statistical and epidemiological research methods • Understands of the application of statistics as applied to medical practise • Outline sources of research funding • Understands the principles of critical appraisal • Understands levels of evidence and quality of evidence • Understands guideline development together with their roles and limitations • Understands the different methods of obtaining data for audit • Understands the role of audit in improving patient care and risk management • Understands the audit cycle • Understands the working and uses of national and local databases used for audit such as specialty data collection systems, cancer registries etc • To demonstrate knowledge of the importance of best practice, transparency and consistency	**Area 1.3**		

Skills	• Develops critical appraisal skills and applies these when reading literature • Devises a simple plan to test a hypothesis • Demonstrates the ability to write a scientific paper • Obtains appropriate ethical research approval • Uses literature databases • Contribute to the construction, review and updating of local (and national) guidelines of good practice using the principles of evidence based medicine • Designs, implements and completes audit cycles • Contribute to local and national audit projects as appropriate • To use a reflective approach to practice with an ability to learn from previous experience • To use assessment, appraisal, complaints and other feedback to discuss and develop an understanding of own development needs	**Area 1.3** **Area 1.3**		
Behaviour	• Follows guidelines on ethical conduct in research and consent for research • Keep up to date with national reviews and guidelines of practice (e.g. NICE) • Aims for best clinical practice at all times, responding to evidence based medicine while recognising the occasional need to practise outside clinical guidelines • Recognise the need for audit in clinical practice to promote standard setting and quality assurance • To be prepared to accept responsibility • Show commitment to continuing professional development	**Area 1.3** **Area 1.3**		
Examples and descriptors for Core Surgical Training	• Defines ethical research and demonstrates awareness of GMC guidelines • Differentiates audit and research and understands the different types of research approach e.g. qualitative and quantitative • Knows how to use literature databases • Demonstrates good presentation and writing skills • Participates in departmental or other local journal club • Critically reviews an article to identify the level of evidence • Attends departmental audit meetings • Contributes data to a local or national audit • Identifies a problem and develops standards for a local audit • Describes the audit cycle and take an audit through the first steps • Seeks feedback on performance from clinical supervisor/mentor/patients/carers/service users	**Area 1.3** **Area 1.3**		

Examples and descriptors for CCT	• Demonstrates critical appraisal skills in relation to the published literature • Demonstrates ability to apply for appropriate ethical research approval • Demonstrates knowledge of research organisation and funding sources • Demonstrates ability to write a scientific paper • Leads in a departmental or other local journal club • Contributes to the development of local or national clinical guidelines or protocols • Organise or lead a departmental audit meeting • Lead a complete clinical audit cycle including development of conclusions, the changes needed for improvement, implementation of findings and re-audit to assess the effectiveness of the changes • Seeks opportunity to visit other departments and learn from other professionals	**Area 1.3** **Area 1.3**		

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Sub-category:	**Manager** including • Self Awareness and self management (GMP Domains: 1) • Team-working (GMP Domains: 1, 3) • Leadership (GMP Domains: 1, 2, 3) • Principles of quality and safety improvement (GMP Domains: 1, 3, 4) • Management and NHS structure (GMP Domains: 1)	**Area 1.1 and 1.2 Area 2** **Area 4.2, 4.3, 4.4 Area 3**		
Objective	**Self awareness and self management** • To recognise and articulate one's own values and principles, appreciating how these may differ from those of others • To identify one's own strengths, limitations and the impact of their behaviour • To identify their own emotions and prejudices and understand how these can affect their judgement and behaviour • To obtain, value and act on feedback from a variety of sources • To manage the impact of emotions on behaviour and actions • To be reliable in fulfilling responsibilities and commitments to a consistently high standard • To ensure that plans and actions are flexible, and take into account the needs and requirements of others	**Area 1.1 and 1.2**	Mini PAT and CBD	**Essential:** Nil **Desirable:** Patient safety course to achieve the objectives described in the curriculum and particularly those related to patient safety in the

	• To plan workload and activities to fulfil work requirements and commitments with regard to their own personal health **Team working** • To identify opportunities where working with others can bring added benefits • To work well in a variety of different teams and team settings by listening to others, sharing information, seeking the views of others, empathising with others, communicating well, gaining trust, respecting roles and expertise of others, encouraging others, managing differences of opinion, adopting a team approach **Leadership** • To develop the leadership skills necessary to lead teams effectively. These include: • Identification of contexts for change • Application of knowledge and evidence to produce an evidence based challenge to systems and processes • Making decision by integrating values with evidence • Evaluating impact of change and taking corrective action where necessary **Principles of quality and safety improvement** • To recognise the desirability of monitoring performance, learning from mistakes and adopting no blame culture in order to ensure high standards of care and optimise patient safety • To critically evaluate services • To identify where services can be improved • To support and facilitate innovative service improvement **Management and NHS culture** • To organise a task where several competing priorities may be involved • To actively contribute to plans which achieve service goals • To manage resources effectively and safely • To manage people effectively and safely • To manage performance of themselves and others • 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	**Area 2** **Area 5** **Area 4.2, 4.3 and 4.4** **Area 3**	Mini PAT, CBD and Portfolio assessment during ARCP Mini PAT, CBD and Portfolio assessment during ARCP Mini PAT, CBD and Portfolio assessment during ARCP Mini PAT, CBD and Portfolio assessment during ARCP	operating theatre **Optional:** Team based working scenarios Decision making scenarios- online, table top etc. Human factors course to achieve the objectives described in the curriculum

Knowledge	**Self awareness and self management** • Demonstrate knowledge of ways in which individual behaviours impact on others; • Demonstrate knowledge of personality types, group dynamics, learning styles, leadership styles • Demonstrate knowledge of methods of obtaining feedback from others • Demonstrate knowledge of tools and techniques for managing stress • Demonstrate knowledge of the role and responsibility of occupational health and other support networks • Demonstrate knowledge of the limitations of self professional competence	**Areas 1.1 and 1.2**		
	Team working • Outline the components of effective collaboration and team working • Demonstrate knowledge of specific techniques and methods that facilitate effective and empathetic communication • Demonstrate knowledge of techniques to facilitate and resolve conflict • Describe the roles and responsibilities of members of the multidisciplinary team • Outline factors adversely affecting a doctor's and team performance and methods to rectify these • Demonstrate knowledge of different leadership styles	**Area 2**		
	Leadership • Understand the responsibilities of the various Executive Board members and Clinical Directors or leaders • Understand the function and responsibilities of national bodies such as DH, HCC, NICE, NPSA, NCAS; Royal Colleges and Faculties, specialty specific bodies, representative bodies; regulatory bodies; educational and training organisations • Demonstrate knowledge of patient outcome reporting systems within surgery, and the organisation and how these relate to national programmes. • Understand how decisions are made by individuals, teams and the organisation • Understand effective communication strategies within organisations • Demonstrate knowledge of impact mapping of service change, barriers to change, qualitative methods to gather the experience of patients and carers	**Area 5**		
	Quality and safety improvement • Understand the elements of clinical governance and its relevance to clinical care • Understands significant event reporting systems relevant to surgery • Understands the importance of evidence-based practice in relation to clinical effectiveness	**Area 4.2, 4.3, 4.4**		

	• Understand risks associated with the surgery including mechanisms to reduce risk
	• Outline the use of patient early warning systems to detect clinical deterioration
	• Keep abreast of national patient safety initiatives including National Patient Safety Agency , NCEPOD reports, NICE guidelines etc
	• Understand quality improvement methodologies including feedback from patients, public and staff
	• Understand the role of audit, research, guidelines and standard setting in improving quality of care
	• Understand methodology of creating solutions for service improvement
	• Understand the implications of change
	
	Management and NHS Structure
	• Understand the guidance given on management and doctors by the GMC
	• Understand the structure of the NHS and its constituent organisation
	• Understand the structure and function of healthcare systems as they apply to surgery
	• Understand the principles of:
	  • Clinical coding
	  • Relevant legislation including Equality and Diversity, Health and Safety, Employment law, European Working Time Regulations
	  • National Service Frameworks
	  • Health regulatory agencies (e.g., NICE, Scottish Government)
	  • NHS Structure and relationships
	  • NHS finance and budgeting
	  • Consultant contract
	  • Commissioning, funding and contracting arrangements
	  • Resource allocation
	  • The role of the independent sector as providers of healthcare
	  • Patient and public involvement processes and role
	  • Understand the principles of recruitment and appointment procedures
	• Understand basic management techniques
		Area 3		

Skills	**Self awareness and self management** • Demonstrate the ability to maintain and routinely practice critical self awareness, including able to discuss strengths and weaknesses with supervisor, recognising external influences and changing behaviour accordingly • Demonstrate the ability to show awareness of and sensitivity to the way in which cultural and religious beliefs affect approaches and decisions, and to respond respectfully • Demonstrate the ability to recognise the manifestations of stress on self and others and know where and when to look for support • Demonstrate the ability to□□alance personal and professional roles and responsibilities, prioritise tasks, having realistic expectations of what can be completed by self and others **Team working** • Preparation of patient lists with clarification of problems and ongoing care plan • Detailed hand over between shifts and areas of care • Communicate effectively in the resolution of conflict, providing feedback • Develop effective working relationships with colleagues within the multidisciplinary team • Demonstrate leadership and management in the following areas: ○ Education and training of junior colleagues and other members of the team ○ Deteriorating performance of colleagues (e.g. stress, fatigue) ○ Effective handover of care between shifts and teams • Lead and participate in interdisciplinary team meetings • Provide appropriate supervision to less experienced colleagues • Timely preparation of tasks which need to be completed to a deadline **Leadership** • Discuss the local, national and UK health priorities and how they impact on the delivery of health care relevant to surgery • Identify trends, future options and strategy relevant to surgery • Compare and benchmark healthcare services • Use a broad range of scientific and policy publications relating to delivering healthcare services • Prepare for meetings by reading agendas, understanding minutes, action points and background research on agenda items • Work collegiately and collaboratively with a wide range of people outside the immediate clinical setting • Evaluate outcomes and re-assess the solutions through research, audit and quality assurance activities	**Area 1.2 and 1.2** **Area 2** **Area 5**		

	• Understand the wider impact of implementing change in healthcare provision and the potential for opportunity costs
	
	Quality and safety improvement
	• Adopt strategies to reduce risk e.g. Safe surgery
	• Contribute to quality improvement processes e.g.
	  ○ Audit of personal and departmental performance
	  ○ Errors / discrepancy meetings
	  ○ Critical incident and near miss reporting
	  ○ Unit morbidity and mortality meetings
	  ○ Local and national databases
	• Maintenance of a personal portfolio of information and evidence
	• Creatively question existing practise in order to improve service and propose solutions
	
	Management and NHS Structures
	• Manage time and resources effectively
	• Utilise and implement protocols and guidelines
	• Participate in managerial meetings
	• Take an active role in promoting the best use of healthcare resources
	• Work with stakeholders to create and sustain a patient-centred service
	• Employ new technologies appropriately, including information technology
	• Conduct an assessment of the community needs for specific health improvement measures
		Area 4.2, 4.3, 4.4
		
		Area 3		

Behaviour	**Self awareness and self management** • To adopt a patient-focused approach to decisions that acknowledges the right, values and strengths of patients and the public • To recognise and show respect for diversity and • differences in others • To be conscientious, able to manage time and delegate • To recognise personal health as an important issue	**Area 1.1 and 1.2**		
	Team working • Encourage an open environment to foster and explore concerns and issues about the functioning and safety of team working • Recognise limits of own professional competence and only practise within these. • Recognise and respect the skills and expertise of others • Recognise and respect the request for a second opinion • Recognise the importance of induction for new members of a team • Recognise the importance of prompt and accurate information sharing with Primary Care team following hospital discharge	**Area 2**		
	Leadership • Demonstrate compliance with national guidelines that influence healthcare provision • Articulate strategic ideas and use effective influencing skills • Understand issues and potential solutions before acting • Appreciate the importance of involving the public and communities in developing health services • Participate in decision making processes beyond the immediate clinical care setting • Demonstrate commitment to implementing proven improvements in clinical practice and services	**Area 5**		
	• Obtain the evidence base before declaring effectiveness of changes	**Area 4.2, 4.3, 4.4**		
		Area 3		

	Quality and safety improvement • Participate in safety improvement strategies such as critical incident reporting • Develop reflection in order to achieve insight into own professional practice • Demonstrates personal commitment to improve own performance in the light of feedback and assessment • Engage with an open no blame culture • Respond positively to outcomes of audit and quality improvement • Co-operate with changes necessary to improve service quality and safety **Management and NHS Structures** • Recognise the importance of equitable allocation of healthcare resources and of commissioning • Recognise the role of doctors as active participants in healthcare systems • Respond appropriately to health service objectives and targets and take part in the development of services • Recognise the role of patients and carers as active participants in healthcare systems and service planning • Show willingness to improve managerial skills (e.g. management courses) and engage in management of the service			

Examples and descriptors for Core Surgical Training	**Self awareness and self management** • Obtains 360° feedback as part of an assessment • Participates in peer learning and explores leadership styles and preferences • Timely completion of written clinical notes • Through feedback discusses and reflects on how a personally emotional situation affected communication with another person • Learns from a session on time management **Team working** • Works well within the multidisciplinary team and recognises when assistance is required from the relevant team member • Invites and encourages feedback from patients • Demonstrates awareness of own contribution to patient safety within a team and is able to outline the roles of other team members. • Keeps records up-to-date and legible and relevant to the safe progress of the patient. • Hands over care in a precise, timely and effective manner • Supervises the process of finalising and submitting operating lists to the theatre suite **Leadership** • Complies with clinical governance requirements of organisation • Presents information to clinical and service managers (eg audit) • Contributes to discussions relating to relevant issues e.g. workload, cover arrangements using clear and concise evidence and information **Quality and safety improvement** • Understands that clinical governance is the over-arching framework that unites a range of quality improvement activities • Participates in local governance processes • Maintains personal portfolio • Engages in clinical audit • Questions current systems and processes **Management and NHS Structures** • Participates in audit to improve a clinical service • Works within corporate governance structures • Demonstrates ability to manage others by teaching and mentoring juniors, medical students and others, delegating work effectively, • Highlights areas of potential waste	**Area 1.1 and 1.2** **Area 2** **Area 5** **Area 4.2, 4.3, 4.4** **Area 3**		

Examples and descriptors for CCT	**Self awareness and self management** • Participates in case conferences as part of multidisciplinary and multi agency team • Responds to service pressures in a responsible and considered way • Liaises with colleagues in the planning and implementation of work rotas **Team working** • Discusses problems within a team and provides an analysis and plan for change • Works well in a variety of different teams • Shows the leadership skills necessary to lead the multidisciplinary team • Beginning to leads multidisciplinary team meetings o Promotes contribution from all team members o Fosters an atmosphere of collaboration o Ensures that team functioning is maintained at all times. o Recognises need for optimal team dynamics o Promotes conflict resolution • Recognises situations in which others are better equipped to lead or where delegation is appropriate **Leadership** • Shadows NHS managers • Attends multi-agency conference • Uses and interprets departments performance data and information to debate services • Participates in clinical committee structures within an organisation **Quality and safety improvement** • Able to define key elements of clinical governance • Demonstrates personal and service performance • Designs audit protocols and completes audit cycle • Identifies areas for improvement and initiates improvement projects • Supports and participates in the implementation of change • Leads in review of patient safety issue • Understands change management **Management and NHS Structure** • Can describe in outline the roles of primary care, including general practice, public health, community, mental health, secondary and tertiary care services within healthcare • Participates fully in clinical coding arrangements and other relevant local activities • Can describe the relationship between PCTs/Health Boards, General Practice and Trusts	**Area 1.1 and 1.2** **Area 2** **Area 5** **Area 4.2, 4.3, 4.4** **Area 3**		

	including relationships with local authorities and social services • Participate in team and clinical directorate meetings including discussions around service development • Discuss the most recent guidance from the relevant health regulatory agencies in relation to the surgical specialty • Describe the local structure for health services and how they relate to regional or devolved administration structures • Discusses funding allocation processes from central government in outline and how that might impact on the local health organisation			

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	**Simulation**
Sub-category:	**P*romoting good health*** (GMP Domains: 1, 2, 3)			
Objective	• To demonstrate an understanding of the determinants of health and public policy in relation to individual patients • To promote supporting people with long term conditions to self-care • To develop the ability to work with individuals and communities to reduce levels of ill health and to remove inequalities in healthcare provision • To promote self care	N/A	MRCS, specialty FRCS, CBD, Mini PAT	**Essential:** Nil **Desirable:** Nil **Optional:** Nil
Knowledge	• Understand guidance documents relevant to the support of self care • Recognises the agencies that can provide care and support out with the hospital • Understand the factors which influence the incidence and prevalence of common conditions including psychological, biological, social, cultural and economic factors • Understand the screening programmes currently available within the UK • Understand the possible positive and negative implications of health promotion activities • Demonstrate knowledge of the determinants of health worldwide and strategies to influence policy relating to health issues • Outline the major causes of global morbidity and mortality and effective, affordable interventions to reduce these			
Skills	• Adapts assessment and management accordingly to the patients social circumstances • Assesses patient's ability to access various services in the health and social system and offers appropriate assistance • Ensures appropriate equipment and devices are discussed and where appropriate puts the patient in touch with the relevant agency			

	• Facilitating access to appropriate training and skills to develop the patients' confidence and competence to self care • Identifies opportunities to promote change in lifestyle and to prevent ill health • Counsels patients appropriately on the benefits and risks of screening and health promotion activities			
Behaviour	• Recognises the impact of long term conditions on the patient, family and friends • Put patients in touch with the relevant agency including the voluntary sector from where they can access support or equipment relevant to their care • Show willingness to maintain a close working relationship with other members of the multi-disciplinary team, primary and community care • Recognise and respect the role of family, friends and carers in the management of the patient with a long term condition • Encourage where appropriate screening to facilitate early intervention			
Examples and descriptors for Core Surgical Training	• Understands that "quality of life" is an important goal of care and that this may have different meanings for each patient • Promotes patient self care and independence • Helps the patient to develop an active understanding of their condition and how they can be involved in self management • Discusses with patients those factors which could influence their health			
Examples and descriptors for CCT	• Demonstrates awareness of management of long term conditions • Develops management plans in partnership with the patient that are pertinent to the patients long term condition • Engages with relevant external agencies to promote improving patient care • Support small groups in a simple health promotion activity • Discuss with small groups the factors that have an influence on their health and describe steps they can undertake to address these • Provide information to an individual about a screening programme offering specific guidance in relation to their personal health and circumstances concerning the factors that would affect the risks and benefits of screening to them as an individual.			

	Professional Behaviour and Leadership	Mapping to Leadership Curriculum	Assessment technique	Simulation
Sub-category:	**Probity and Ethics** To include • Acting with integrity • Medical Error • Medical ethics and confidentiality (GMP Domains: 1, 2, 3, 4)	Area 1.4		

	• Medical consent (GMP Domains: 1, 3, 4) • Legal framework for medical practise (GMP Domains: 1, 2, 3)			
Objective	• To uphold personal, professional ethics and values, taking into account the values of the organisation and the culture and beliefs of individuals • To communicate openly, honestly and inclusively • To act as a positive role model in all aspects of communication • To take appropriate action where ethics and values are compromised • To recognise and respond the causes of medical error • To respond appropriately to complaints • To know, understand and apply appropriately the principles, guidance and laws regarding medical ethics and confidentiality as they apply to surgery • To understand the necessity of obtaining valid consent from the patient and how to obtain • To understand the legal framework within which healthcare is provided in the UK • To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations • Understand ethical obligations to patients and colleagues • To appreciate an obligation to be aware of personal good health	Area 1.4	Mini PAT and CBD, PBA, DOPS, MRCS, specialty FRCS	**Essential:** Nil **Desirable:** Nil **Optional:** Simulated patients Human factors course to achieve the objectives described in the curriculum
Knowledge	• Understand local complaints procedure • Recognise factors likely to lead to complaints • Understands the differences between system and individual errors • Outline the principles of an effective apology • Knows and understand the professional, legal and ethical codes of the General Medical Council and any other codes to which the physician is bound • Understands of the principles of medical ethics • Understands the principles of confidentiality • Understands the Data Protection Act and Freedom of Information Act • Understands the principles of Information Governance and the role of the Caldicott Guardian • Understands the legal framework for patient consent in relation to medical practise • Recognises the factors influencing ethical decision making including religion, personal and moral beliefs, cultural practices • Understands the standards of practice defined by the GMC when deciding to withhold or withdraw life-prolonging treatment • Understands the UK legal framework and GMC guidelines for taking and using informed consent for invasive procedures including issues of patient incapacity	Area 1.4		

Skills	• To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice taking into account local and national regulations • To create open and nondiscriminatory professional working relationships with colleagues awareness of the need to prevent bullying and harassment • Contribute to processes whereby complaints are reviewed and learned from • Explains comprehensibly to the patient the events leading up to a medical error or serious untoward incident, and sources of support for patients and their relatives • Deliver an appropriate apology and explanation relating to error • Use and share information with the highest regard for confidentiality both within the team and in relation to patients • Counsel patients, family, carers and advocates tactfully and effectively when making decisions about resuscitation status, and withholding or withdrawing treatment • Present all information to patients (and carers) in a format they understand, checking understanding and allowing time for reflection on the decision to give consent • Provide a balanced view of all care options • Applies the relevant legislation that relates to the health care system in order to guide one's clinical practice including reporting to the Coroner's/Procurator Officer, the Police or the proper officer of the local authority in relevant circumstances • Ability to prepare appropriate medical legal statements for submission to the Coroner's Court, Procurator Fiscal, Fatal Accident Inquiry and other legal proceedings • Be prepared to present such material in Court	Area 1.4 Area 1.4		
Behaviour	• To demonstrate acceptance of professional regulation • To promote professional attitudes and values • To demonstrate probity and the willingness to be truthful and to admit errors • Adopt behaviour likely to prevent causes for complaints • Deals appropriately with concerned or dissatisfied patients or relatives • Recognise the impact of complaints and medical error on staff, patients, and the National Health Service • Contribute to a fair and transparent culture around complaints and errors • Recognise the rights of patients to make a complaint • Identify sources of help and support for patients and yourself when a complaint is made about yourself or a colleague	Area 1.4 Area 1.4 Area 1.4		

	• Show willingness to seek advice of peers, legal bodies, and the GMC in the event of ethical dilemmas over disclosure and confidentiality
	• Share patient information as appropriate, and taking into account the wishes of the patient
	• Show willingness to seek the opinion of others when making decisions about resuscitation status, and withholding or withdrawing treatment
	• Seeks and uses consent from patients for procedures that they are competent to perform while
	  ○ Respecting the patient's autonomy
	  ○ Respecting personal, moral or religious beliefs
	  ○ Not exceeding the scope of authority given by the patient
	  ○ Not withholding relevant information
	• Seeks a second opinion, senior opinion, and legal advice in difficult situations of consent or capacity
	• Show willingness to seek advice from the employer, appropriate legal bodies (including defence societies), and the GMC on medico-legal matters			

Examples and descriptors for Core Surgical Training	• Reports and rectifies an error if it occurs • Participates in significant event audits • Participates in ethics discussions and forums • Apologises to patient for any failure as soon as an error is recognised • Understands and describes the local complaints procedure • Recognises need for honesty in management of complaints • Learns from errors • Respect patients' confidentiality and their autonomy • Understand the Data Protection Act and Freedom of Information Act • Consult appropriately, including the patient, before sharing patient information • Participate in decisions about resuscitation status, withholding or withdrawing treatment • Obtains consent for interventions that he/she is competent to undertake • Knows the limits of their own professional capabilities	Area 1.4 Area 1.4 Area 1.4		

The Assessment System

Assessment and feedback

Overview of the assessment system

The curriculum adopts the following GMC definitions:

Assessment

A systematic procedure for measuring a trainee's progress or level of achievement, against defined criteria to make a judgement about a trainee.

Assessment system

An integrated set of assessments which is in place for the entire postgraduate training programme and which is blueprinted against and supports the approved curriculum.

Purpose of the assessment system

The purpose of the assessment system is to:

- Determine whether trainees are meeting the standards of competence and performance specified at various stages in the curriculum for surgical training.
- Provide systematic and comprehensive feedback as part of the learning cycle.
- Determine whether trainees have acquired the common and specialty-based knowledge, clinical judgement, operative and technical skills, and generic professional behaviour and leadership skills required to practise at the level of Certification in the designated surgical specialty.
- Address all the domains of Good Medical Practice and conform to the principles laid down by the GMC.

Components of the assessment system

The individual components of the assessment system are:

- Workplace-based assessments covering knowledge, clinical judgement, technical skills and professional behaviour and attitudes. These are complemented by the surgical logbook of procedures to support the assessment of operative skills
- Examinations held at key stages; during the early years of training and towards the end of specialty training
- The Learning Agreement and the Assigned Educational Supervisors' report
- An Annual Review of Competence Progression (ARCP)

In order to be included in the assessment system, the assessments methods selected have to meet the following criteria.

- **Valid** - To ensure face validity, the workplace based assessments comprise direct observations of workplace tasks. The complexity of the tasks increases in line with progression through the training programme. To ensure content validity all the assessment instruments have been blueprinted against all the standards of Good Medical Practice.
- **Reliable** - In order to increase reliability, there will be multiple measures of outcomes. ISCP assessments make use of several observers' judgements, multiple assessment methods (triangulation) and take place frequently. The planned, systematic and permanent programme of assessor training for trainers and Assigned Educational Supervisors (AESs) through the postgraduate deaneries/LETBs is intended to gain maximum reliability of placement reports.
- **Feasible** - The practicality of the assessments in the training and working environment has been taken into account. The assessment should not add a significant amount of time to the workplace task being assessed and assessors should be able to complete the scoring and feedback part of the assessment in 5-10 minutes.

- **Cost-effectiveness** – Once staff have been trained in the assessment process and are familiar with the ISCP website, the only significant additional costs should be any extra time taken for assessments and feedback and the induction of new Assigned Educational Supervisors. The most substantial extra time investment will be in the regular appraisal process for units that did not previously have such a system.
- **Opportunities for feedback –** All the assessments, both those for learning and of learning, include a feedback element. Structured feedback is a fundamental component of high quality assessment and should be incorporated throughout workplace based assessments.
- **Impact on learning** - The workplace-based assessments are all designed to include immediate feedback as part of the process. A minimum number of three appraisals with the AES per clinical placement are built into the training system. The formal examinations all provide limited feedback as part of the summative process. The assessment process thus has a continuous developmental impact on learning. The emphasis given to reflective practice within the portfolio also impacts directly on learning.

Assessment and feedback

Types of assessment

The assessment blueprint and framework

The Overarching Blueprint demonstrates that the curriculum is consistent with the four domains of Good Medical Practice: Knowledge, skills and performance; *Safety and quality; Communication, partnership and teamwork; Maintaining trust*. The specialty-specific syllabuses specify the knowledge, skills and performance required for different stages of training and have patient safety as their principal consideration. The professional behaviour and leadership skills syllabus specifies the standards for patient safety; communication, partnership and team-working and maintaining trust. The standards have been informed by the Academy Common Competency Framework and the Academy and NHS Leadership Competency Framework.

Curriculum assessment runs throughout training as illustrated in the Assessment Framework (PDF: 16kb) and is common to all disciplines of surgery.

Types of assessment

Assessments can be categorised as *for* learning or *of* learning, although there is a link between the two.

Assessment *for* Learning - is primarily aimed at aiding learning through constructive feedback that identifies areas for development. Alternative terms are Formative or Low-stakes assessment. Lower reliability is acceptable for individual assessments as they can and should be repeated frequently. This increases their reliability and helps to document progress. Such assessments are ideally undertaken in the workplace.

Assessments for learning are used in the curriculum as part of a developmental or on-going teaching and learning process and mainly comprise workplace-based assessments. They provide the trainee with educational feedback from skilled clinicians that should result in reflection on practice and an improvement in the quality of care. Assessments are collated in the trainee's learning portfolio. These are regularly reviewed during each placement, providing evidence that inform the judgement of the Assigned Educational Supervisors' (AES) reports to the Training Programme Director and the Annual Review of Competence Progression (ARCP). Assessments for learning therefore contribute to summative judgements of the trainee's progress.

Assessment *of* Learning - is primarily aimed at determining a level of competence to permit progression through training or for certification. Such assessments are undertaken infrequently (e.g. examinations) and must have high reliability as they often form the basis of decisions. Alternative terms are summative or high-stakes assessments [GMC].

Assessments of learning in the curriculum are focussed on the waypoints in the specialty syllabuses. For the most part these comprise the examinations and structured AES end of placement reports which, taken in the round, cover the important elements of the syllabus and ensure that no gaps in achievement are allowed to develop. They are collated at the ARCP panel, which determines progress or otherwise.

The balance between the two assessment approaches principally relates to the relationship between competence and performance. Competence (can do) is necessary but not sufficient for performance (does), and as trainees' experience increases so performance-based assessment in the workplace becomes more important.

Assessment and feedback

Workplace Based Assessment (WBA)

The purpose of WBA

The primary purpose of WBA is to provide short loop feedback between trainers and their trainees – a formative assessment to support learning. They are designed to be mainly trainee driven but may be triggered or guided by the trainer. The number of types and intensity of each type of WPBA in any one assessment cycle will be initially determined by the Learning Agreement fashioned at the beginning of a training placement and regularly reviewed. The intensity may be altered to reflect progression and trainee need. For example a trainee in difficulty would undertake more frequent assessments above an agreed baseline for all trainees. In that sense WPBAs meet the criterion of being adaptive.

WBAs are designed to:

- **Provide feedback to trainers and trainees as part of the learning cycle**

The most important use of the workplace-based assessments is in providing trainees with feedback that informs and develops their practice (formative). Each assessment is completed only for the purpose of providing meaningful feedback on one encounter. The assessments should be viewed as part of a process throughout training, enabling trainees to build on assessor feedback and chart their own progress. Trainees should complete more than the minimum number identified.

- **Provide formative guidance on practice**

Surgical trainees can use different methods to assess themselves against important criteria (especially that of clinical reasoning and decision-making) as they learn and perform practical tasks. The methods also encourage dialogue between the trainee and Assigned Educational Supervisor (AES), Clinical Supervisors (CS) and other trainers.

- **Encompass the assessment of skills, knowledge, behaviour and attitudes during day-to-day surgical practice**

WBA is trainee led; the trainee chooses the timing, the case and assessor under the guidance of the AES via the Learning Agreement. It is the trainee's responsibility to ensure completion of the required number of the agreed type of assessments by the end of each placement.

- **Provide a reference point on which current levels of competence can be compared with those at the end of a particular stage of training**

The primary aim is for trainees to use assessments throughout their training programmes to demonstrate their learning and development. At the start of a level it would be normal for trainees to have some assessments which are less than satisfactory because their performance is not yet at the standard for the completion of that level. In cases where assessments are less than satisfactory, trainees should repeat assessments as often as required to show progress.

- **Inform the AES's (summative) assessment at the completion of each placement**

Although the principal role of WBA is formative, the summary evidence will be used to inform the nnual review process and will contribute to the decision made as to how well the trainee is progressing.

- **Contribute towards a body of evidence held in the trainee's learning portfolio and be made available for the Annual Review of Competence Progression (ARCP)**

At the end of a period of training, the trainee's portfolio will be reviewed. The accumulation of formative assessments will be one of a range of indicators that inform the decision as to satisfactory completion of training at the ARCP.

Guidance on good practice use of the Workplace Based assessments (WBAs)

The assessment methods used are:

- CBD (Case Based Discussion)
- CEX (Clinical Evaluation Exercise)
- PBA (Procedure-based Assessment)
- DOPS (Direct Observation of Procedural Skills in Surgery)
- Multi Source Feedback (Peer Assessment Tool)
- Assessment of Audit
- Observation of Teaching

Assessment of Audit (AoA)

The AoA reviews a trainee's competence in completing an audit. Like all workplace-based assessments, it is intended to support reflective learning through structured feedback. It was adapted for surgery from an instrument originally developed and evaluated by the UK Royal Colleges of Physicians.

The assessment can be undertaken whenever an audit is presented or otherwise submitted for review. It is recommended that more than one assessor takes part in the assessment, and this may be any surgeon with experience appropriate to the process. Assessors do not need any prior knowledge of the trainee or their performance to date, nor do the assessors need to be the trainee's current Assigned Educational Supervisor.

Verbal feedback should be given immediately after the assessment and should take no more than 5 minutes to provide. A summary of the feedback with any action points should be recorded on the Assessment of Audit form and uploaded into the trainee's portfolio.

The Assessment of Audit guidance notes provide a breakdown of competences evaluated by this method.

Case Based Discussion (CBD)

The CBD was originally developed for the Foundation training period and was contextualised to the surgical environment. The method is designed to assess clinical judgement, decision-making and the application of medical knowledge in relation to patient care in cases for which the trainee has been directly responsible. The method is particularly designed to test higher order thinking and synthesis as it allows assessors to explore deeper understanding of how trainees compile, prioritise and apply knowledge. The CBD is not focused on the trainees' ability to make a diagnosis nor is it a viva-style assessment. The CBD should be linked to the trainee's reflective practice.

The CBD process is a structured, in-depth discussion between the trainee and the trainee's assessor (normally the Assigned Educational Supervisor) about how a clinical case was managed by the trainee; talking through what occurred, considerations and reasons for actions. By using clinical cases that offer a challenge to the trainee, rather than routine cases, the trainee is able to explain the complexities involved and the reasoning behind choices they made. It also enables the discussion of the ethical and legal framework of practice. It uses patient records as the basis for dialogue, for systematic assessment and structured feedback. As the actual record is the focus for the discussion, the assessor can also evaluate the quality of record keeping and the presentation of cases.

Most assessments take no longer than 15-20 minutes. After completing the discussion and filling in the assessment form, the assessor should provide immediate feedback to the trainee. Feedback would normally take about 5 minutes.

Clinical Evaluation Exercise (CEX) and Clinical Evaluation Exercise for Consent (CEXC)

The CEX/C is a method of assessing skills essential to the provision of good clinical care and to facilitate feedback. It assesses the trainee's clinical and professional skills on the ward, on ward rounds, in Accident and Emergency or in outpatient clinics. It was designed originally by the American Board of Internal Medicine and was contextualised to the surgical environment.

Trainees will be assessed on different clinical problems that they encounter from within the curriculum in a range of clinical settings. Trainees are encouraged to choose a different assessor for each assessment but one of the assessors must be the trainee's current Assigned Educational Supervisor. Each assessor must have expertise in the clinical problem.

The assessment involves observing the trainee interact with a patient in a clinical encounter. The areas of competence covered include: consent (CEXC), history taking, physical examination, professionalism, clinical judgement, communication skills, organisation/efficiency and overall clinical care. Most encounters should take between 15-20 minutes.

Assessors do not need to have prior knowledge of the trainee. The assessor's evaluation is recorded on a structured form that enables the assessor to provide developmental verbal feedback to the trainee immediately after the encounter. Feedback would normally take about 5 minutes.

Direct Observation of Procedural Skills (DOPS)

The DOPS is used to assess the trainee's technical, operative and professional skills in a range of basic diagnostic and interventional procedures, or parts of procedures, during routine surgical practice in order to facilitate developmental feedback. The method is a surgical version of an assessment tool originally developed and evaluated by the UK Royal Colleges of Physicians.

The DOPS is used in simpler environments and can take place in wards or outpatient clinics as well as in the operating theatre. DOPS is set at the standard for Core Surgical Training (CT1/ST1 and CT2/ST2) although some specialties may also use specialty level DOPS in higher specialty training.

The DOPS form can be used routinely every time the trainer supervises a trainee carrying out one of the specified procedures, with the aim of making the assessment part of routine surgical training practice. The procedures reflect the index procedures in each specialty syllabus which are routinely carried out in the trainees' workplace.

The assessment involves an assessor observing the trainee perform a practical procedure within the workplace. Assessors do not need to have prior knowledge of the trainee. The assessor's evaluation is recorded on a structured form that enables the assessor to provide verbal developmental feedback to the trainee immediately afterwards. Trainees are encouraged to choose a different assessor for each assessment but one of the assessors must be the current Assigned Educational Supervisor. Most procedures take no longer than 15-20 minutes. The assessor will provide immediate feedback to the trainee after completing the observation and evaluation. Feedback would normally take about 5 minutes.

The DOPS form is completed for the purpose of providing feedback to the trainee. The overall rating on any one assessment can only be completed if the entire procedure is observed. A judgement will be made on completion of the placement about the overall level of performance achieved in each of the assessed surgical procedures

Multi-Source Feedback (MSF)

Surgical trainees work as part of a multi-professional team with other people who have complementary skills. Trainees are expected to understand the range of roles and expertise of team members in order to communicate effectively to achieve high quality service for patients. The MSF, also known as peer and 360° assessment, is a method of assessing professional competence within a team-working environment and providing developmental feedback to the trainee.

Trainees should complete the MSF once a year. The trainee's Assigned Educational Supervisor (AES) may request further assessments if there are areas of concern at any time during training.

The MSF comprises a self-assessment and assessments of a trainee's performance from a range of co-workers. It uses up to 12 raters with a minimum of 8. Raters are chosen by the trainee and will always include the AES and a range of colleagues covering different grades and environments (e.g. ward, theatre, outpatients) but not patients.

The MSF process should be started in time for raters to submit their online assessments and the generation of the trainee's personalised feedback for discussion with the AES before the end of the placement, and for a further MSF to be performed before the end of the training year, if required. The MSF should, therefore, be undertaken:

- in the 3rd month of the first four-month placement in a training year
- in the 5th month of the first six-month placement in a training year
- in the 5th month of a one-year placement

The competences map across to the standards of Good Medical Practice and to the core objectives of the ISCP. The method enables serious concerns, such as those about a trainee's probity and health, to be highlighted in confidence to the AES, enabling appropriate action to be taken.

Feedback is in the form of a peer assessment chart that enables comparison of the self-assessment with the collated views received from co-workers for each of the 16 competences including a global rating, on a 3-point scale. Trainees are not given access to individual assessments, however, raters' written comments are listed verbatim. The AES should meet with the trainee to discuss the feedback on performance in the MSF. The AES makes comments and signs off the trainee's MSF assessment and can also recommend a repeat MSF.

Observation of Teaching (OoT)

The OoT provides formative feedback to trainees as part of the on-going culture of reflective learning that workplace-based assessment seeks to develop. It was adapted from the Teaching Observation Tool developed by the Joint Royal Colleges of Physicians' Training Board (JRCPTB) for use in surgery. It assesses instances of formal teaching delivered by the trainee as and when they arise.

The form is intended for used when teaching by a trainee is directly observed by the assessor. This must be in a formal situation where others are gathered specifically to learn from the speaker, and does not include bedside teaching or other occasions of teaching in the presence of a patient. Assessors may be any surgeon with suitable experience to review the teaching event; it is likely that these will be consultants for trainees in higher specialty levels.

Possible areas for consideration to aid assessment and evaluation are included in the guidance notes below. It should be noted that these are suggestions for when considering comments and observations rather than mandatory competences.

Procedure Based Assessment

The PBA assesses the trainee's technical, operative and professional skills in a range of specialty procedures or parts of procedures during routine surgical practice up to the level of certification. PBAs provide a framework to assess practice and facilitate feedback in order to direct learning. The PBA was originally developed by the Orthopaedic Competence Assessment Project (OCAP) for Trauma and Orthopaedic surgery and was further developed by the Specialty Advisory Committees for surgery for use in all the surgical specialties.

The assessment method uses two principal components:

- A series of competences within 5 domains. Most of the competences are common to all procedures, but a relatively small number of competences within certain domains are specific to a particular procedure.
- A global assessment that is divided into 8 levels of global rating. The highest rating is the ability to perform the procedure to the standard expected of a specialist in practice within the NHS (the level required for certification or equivalent).

The assessment form is supported by a worksheet consisting of descriptors outlining desirable and undesirable behaviours that assist the assessor in deciding whether or not the trainee has reached a satisfactory standard for certification, on the occasion observed, or requires development.

The procedures chosen should be representative of those that the trainee would normally carry out at that training level and will be one of an indicative list of index procedures relevant to the specialty. The trainee generally chooses the timing and makes the arrangements with the assessor. The assessor will normally be the trainee's, Clinical Supervisor or another surgical consultant trainer. One of the assessors must be the trainee's current Assigned Educational Supervisor. Some PBAs may be assessed by senior trainees depending upon their level of training and the complexity of the procedure. Trainees are encouraged to request assessments on as many procedures as possible with a range of different assessors.

Assessors do not need to have prior knowledge of the trainee. The assessor will observe the trainee undertaking the agreed sections of the PBA in the normal course of workplace activity (usually scrubbed). Given the priority of patient care, the assessor must choose the appropriate level of supervision depending on the trainee's stage of training. Trainees will carry out the procedure, explaining what they intend to do throughout. The assessor will provide verbal prompts, if required, and intervene if patient safety is at risk.

The practicalities of Workplace Based Assessment

Introduction

'I have no time to do this'

The clips located here are intended to illustrate the utility and versatility of the work based assessment tools (WPBA). They show that no more than ten minutes are required for any of these tools to be used meaningfully. They can be undertaken as a planned or as an opportunistic exercise. Any interaction with a trainee and trainer can be converted into a learning opportunity and then be evidenced for the benefit of the trainee and trainer as a WPBA.

The primary purpose of workplace-based assessments is for learning through constructive short loop feedback between trainers and their trainees that identifies areas for development. Collectively they are used as part of the Annual Review of Competence Progression (ARCP) which is a summative process. However, individually the tools are designed to develop trainees and are formative assessment tools which can:

- Trigger conversations between trainee and trainer;
- Enable observation and discussion of clinical practice;
- Record good practice and outline areas for development of knowledge, skills, judgement and professional behaviour;
- Formulate action plans for development;
- Enable trainees to analyse pattern recognition.

The tools are **not** intended to:

- Score trainees;
- Summate progress globally;
- Predict future performance;
- Be completed without a face to face feedback conversation.

These assessments can be divided into:

1. Observational tools

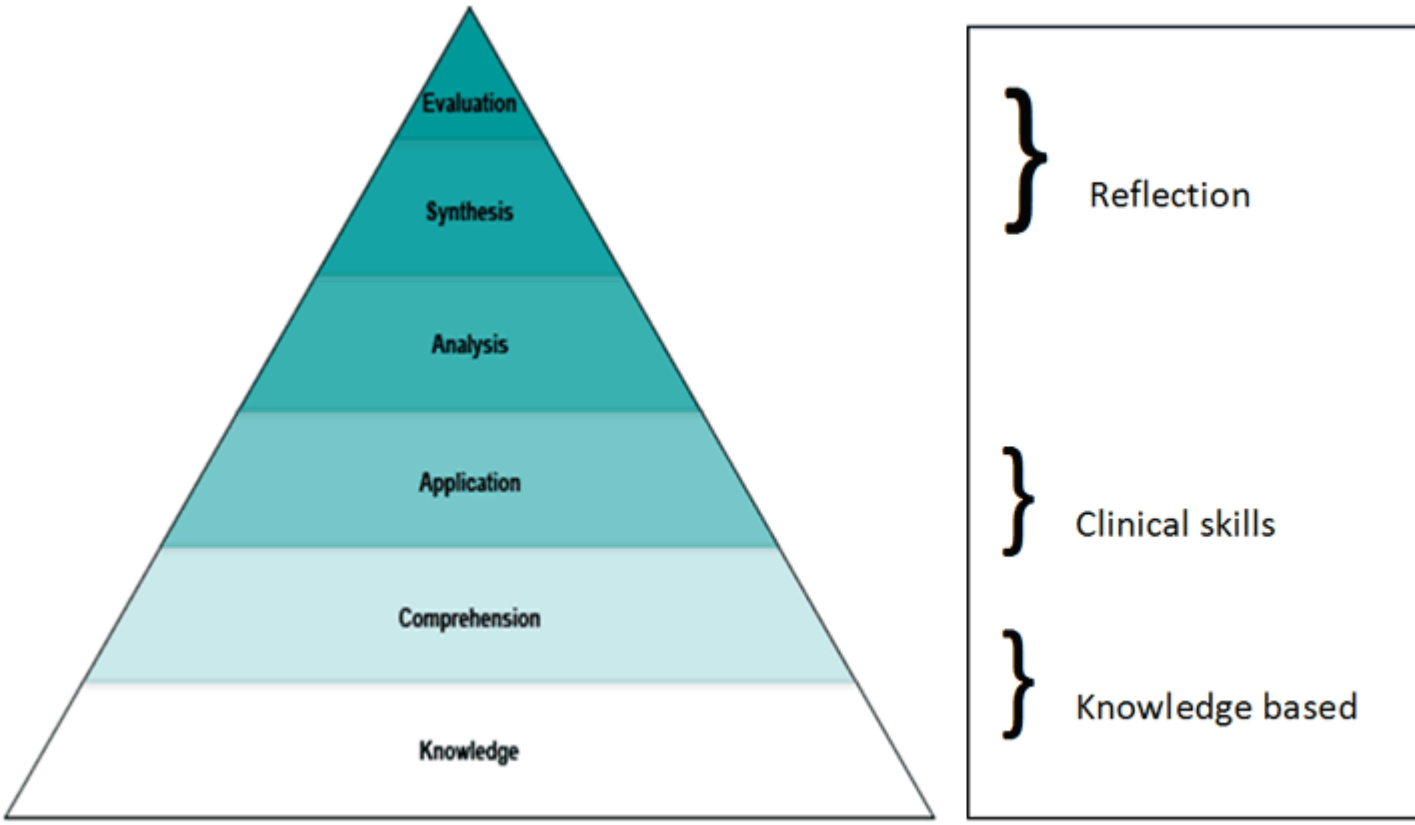
The purpose of the CEX, DOPS and PBA tools is to encourage trainee practice within a supported environment, followed by a developmental conversation (feedback) to identify elements of good practice and areas for development. Such development should be discussed in terms of follow up actions that will extend the trainee's technical proficiency and clinical skills.

2. Discussion tools

The CBD can record any conversation that reviews a trainee's practice or their thoughts about practice. From an office based, time protected tutorial to the short conversation that happens in the theatre coffee room, or even the corridor, a CBD allows trainers to explore the thinking of their trainees, and to share understanding and professional thinking.

CBDs focus on knowledge and understanding and occur at different levels of Bloom's taxonomy (see figure below). A CBD that looks at knowledge addresses the knowledge base of the trainee e.g. a trainee might be asked for the classification of shock. The trainer could take the discussion beyond the classification to look at how that knowledge relates to the understanding of the patient's condition and the symptoms manifested by the patient. Application relates to the use of knowledge and understanding in practice and so the trainee may be asked to consider the possible treatment options for that patient. Analysis and synthesis are higher order levels of the thinking or cognitive function and CBDs that look at a situation reflectively, to break it down and consider what elements helped or hindered patient care, can be invaluable to trainees in reviewing and making sense of their experiences and in extending their critical thinking. At the evaluation level trainees may well be engaging in discussions that relate to service improvement and changes in practice at a group level rather than an individual one.

Blooms Taxonomy



3. Insight tools

The Multi Source Feedback collects the trainee's self-assessment together with the subjective views of the trainee from a specified range of colleagues (consultants, specialty doctors, senior nurses and other healthcare providers.) The benefit of the MSF lies in the conversation between trainer and trainee to review and discuss the overview of the collated comments.

Practicalities

Trainers are under the pressure of training multiple trainees all at differing levels of competence and therefore with different training needs. EWTR and the constraints of managing a service as well as training require that we use our time smarter rather than working longer hours for both trainees and trainers. One educational opportunity whether in an operating theatre, on call or in a clinic can be developed into a targeted learning opportunity for individual but also multiple trainees.

The following videos will demonstrate how one case can:

1. allow targeted learning for multiple trainees
2. be alongside our normal surgical practice
3. make use of wastage time during our surgical practice
4. produce multiple items of evidence of trainee development for their portfolio

Each scenario demonstrated ensures that:

1. **Although the trainer facilitates the discussion, the recording of the case is undertaken by the trainee**
2. **Each discussion concludes with an action plan that tasks the trainee with further development**

Observational Tools

The purpose of the CEX, DOPS and PBA tools is to encourage trainee practice within a supported environment, followed by a developmental conversation (feedback) to identify elements of good practice and

areas for development. Such development should be discussed in terms of follow up actions that will extend the trainee's technical proficiency and clinical skills.

The following clips demonstrate the versatility of surgical practice. An operation can be divided into several stages all of which can be used to develop trainees at differing levels of competence as well as developing teaching and training skills in the more senior trainees. The clips also demonstrate the use of DOPS and PBAs within a surgical team.

PBA/DOPS

Here a consultant is asked to provide feedback to two trainees on their DOPS (insertion of a catheter) and a PBA (laparoscopic port insertion) before the procedure begins and so this is trainee triggered. It is also possible that a list is designated as a training list and therefore all cases can be used in this way. It is important that trainees or trainers request that such tools be used prior to the procedure. DOPS, PBAs and CEXs are all observational tools and so if the observer is not aware that they are required to observe and provide feedback until after the event the quality of the observation and feedback will be compromised. Note that the consultant requested that the forms be available for her to use whilst observing and providing feedback to the trainees. This is to guide her in her evaluation and also to record comments for the trainees to document subsequently on the ISCP web-based forms.

The following clips are the discussions that occur in the coffee room after completing a laparoscopic cholecystectomy for a FY2, CTI and ST3.

Discussion Tools

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CBDs that look at information are addressing the knowledge base of the trainee. This may be asking trainees for the classification of shock. A trainer could take the discussion beyond the classification to look at how that knowledge relates to the understanding of the patient's condition and the symptoms manifested by the patient. Application relates to the use of knowledge and understanding in practice and so the trainee may be asked to consider the possible treatment options for that patient. Analysis and synthesis are higher order levels of the thinking or cognitive function and CBDs that look at a situation reflectively, to break it down and consider what elements helped or hindered patient care, can be invaluable to trainees in reviewing and making sense of their experiences and in extending their critical thinking. At the evaluation level trainees may well be engaging in discussions that relate to service improvement and changes in practice at a group level rather than an individual one.

In the clips we see three CBDs focusing on the same case. The first looks at the knowledge base underpinning the case. The second looks at the clinical skills used by a CT2 - that is the application of knowledge and understanding. The third one looks at Reflection by the registrar involved in the case.

Overall Summary of case

A 23 year old man had arrived in Accident and Emergency (A&E) after being involved in a road traffic accident (RTA). He had been riding a bike and had been hit from the left hand side by a car, had got up and was shaken but sore. He was brought to A&E by ambulance and triaged by A&E. He was seen three hours later by the A&E SHO and fast tracked to SAU by a surgical CT1 at handover time. The incoming CT2 flagged him up as a case that should be reviewed by the Registrar on call. The CT2 had seen the patient in SAU as he had been transferred. Suspicious of a splenic injury with the clinical findings, he had requested a CT scan. The CT scan was carried out and was not reported for several hours. The patient was stable and so there was no real urgency but was discussed in the corridor with the consultant on call who had been angered by the clinical scenario and requested that the report be made readily available. The ST3 was busy on call and asked the CT2 to chase the report. Finally the scan result was available at 6pm just as the patient deteriorated and the ST3/ST5 was called urgently as blood pressure was falling. The patient needed urgent review and theatre that evening for a splenectomy. The procedure was carried out by an ST5 with consultant supervision.

Insight Tools

The Multi Source Feedback collects the trainee's self-assessment together with subjective views of the trainee from a specified range of colleagues (consultants, specialty doctors, senior nurses and other Health care providers.) The benefit of the MSF lies in the conversation between trainer and trainee to review and discuss the overview of the collated comments.

The Multi Source Feedback (previously known as Mini PAT) tool is used to provide a 360 degree range of feedback across a spectrum of professional domains which are closely related to the GMC duties of a good doctor. Trainees fill in their self-rating form and they ask a range of people for their ratings too, anonymously. When the data are collated electronically the Assigned Educational Supervisor will meet with the trainee to discuss the overview of the data.

The following two clips show two trainees, (played by the same actor) discussing their feedback with their Assigned Educational Supervisor.

In both clips the AES approaches the conversation in a similar way, explaining what she would like to discuss and then looking first at the strengths of the trainee and where these correlate to the strengths perceived by the other raters, before moving on to any developmental areas and finally compiling an action plan for further development.

Examinations

Examinations are held at two key stages: during initial training and towards the end of specialty training.

MRCS

The Membership Examination of the Surgical Royal Colleges of Great Britain and in Ireland (MRCS) is designed for candidates in the generality part of their specialty training. The purpose of the MRCS is to determine that trainees have acquired the knowledge, skills and attributes required for the completion of core training in surgery and, for trainees following the Intercollegiate Surgical Curriculum Programme, to determine their ability to progress to higher specialist training in surgery.
The MRCS examination has two parts: Part A (written paper) and Part B Objective Structured Clinical Examination (OSCE).

Part A (written paper)

Part A of the MRCS is a machine-marked, written examination using multiple-choice Single Best Answer and Extended Matching items. It is a four hour examination consisting of two papers, each of two hours' duration, taken on the same day. The papers cover generic surgical sciences and applied knowledge, including the core knowledge required in all surgical specialties as follows:

Paper 1 - Applied Basic Science
Paper 2 - Principles of Surgery-in-General

The marks for both papers are combined to give a total mark for Part A. To achieve a pass the candidate is required to demonstrate a minimum level of knowledge in each of the two papers in addition to achieving or exceeding the pass mark set for the combined total mark for Part A.

Part B (OSCE)

The Part B (OSCE) integrates basic surgical scientific knowledge and its application to clinical surgery. The purpose of the OSCE is to build on the test of knowledge encompassed in the Part A examination and test how candidates integrate their knowledge and apply it in clinically appropriate contexts using a series of stations reflecting elements of day-to-day clinical practice.

Further information can be obtained from www.intercollegiatemrcsexams.org.uk

DO-HNS and MRCS(ENT)

Otolaryngology trainees at CT1/2 level in ENT themed core surgical training posts should undertake Part A of the MRCS and the Part 2 (OSCE) of the Diploma in Otolaryngology – Head and Neck Surgery (DO-HNS) in order to acquire the Intercollegiate MRCS(ENT) Diploma. From August 2013, the MRCS(ENT) examination will be a formal exit requirement from Core Surgical Training for Otolaryngology trainees. It is also a mandatory requirement for entry into higher specialty training in ENT. The DO-HNS examination exists as a separate entity but is not a requirement for ST3 unless paired with the MRCS as explained above.

The purpose of the Diploma in Otolaryngology – Head and Neck Surgery (DO-HNS) is to test the breadth of knowledge, the clinical and communication skills and the professional attributes considered appropriate by the Colleges for a doctor intending to undertake practice within an otolaryngology department in a trainee position. It is also intended to provide a test for those who wish to practise within another medical specialty, but have an interest in the areas where that specialty interacts with the field of otolaryngology. It is also relevant for General Practitioners wishing to offer a service in minor ENT surgery.

FRCS

The Intercollegiate Specialty Examination (FRCS) is a summative assessment in each of the ten surgical specialties. It is a mandatory requirement for certification and entry to the Specialist Register. It forms part of the overall assessment system for UK and Irish surgical trainees who have participated in a formal surgical training programme leading to UK certification or a Certificate of Eligibility for Specialist Registration via the

Combined Programme (CESR CP) or, in the Republic of Ireland, a Certificate of Completion of Specialist Training (CCST).

Section 1 is a written test composed of two Multiple Choice Questions papers; Paper 1: Single Best Answer [SBA] and Paper 2: Extended Matching Items [EMI]. Candidates must meet the required standard in Section 1 in order to gain eligibility to proceed to Section 2.

Section 2 is the clinical component of the examination. It consists of a series of carefully designed and structured interviews on clinical topics, some being scenario-based and some being patient-based. Further information can be obtained from www.intercollegiate.org.uk

Feedback

All the assessments in the curriculum, both those *for* learning and *of* learning, include a feedback element. Workplace based assessments are designed to include immediate feedback for learning as part of two-way dialogue towards improving practice. Formal examinations provide limited feedback as part of the summative process. Assigned Educational Supervisors are able to provide further feedback to each of their trainees through the regular planned educational review and appraisal that features at the beginning, middle and end of each placement. Feedback is based on the evidence contained in the portfolio.

Educational feedback:

- Enhances the validity of the assessment and ensures trainees receive constructive criticism on their performance.
- Is given by skilled clinicians, thereby enhancing the learning process.

Constructive formative feedback should include three elements:

- An outline of the strengths the trainee displayed,
- Suggestions for development,
- Action plan for improvement.

Feedback is complemented by the trainee's reflection on his/her practice with the aim of improving the quality of care.

The Annual Review of Competence Progression (ARCP)

Purpose of the ARCP (adapted from the Gold Guide):

The ARCP is a formal Deanery/LETB process which scrutinises each surgical trainee's suitability to progress to the next stage of, or complete, the training programme. It follows on from the appraisal process and bases its recommendations on the evidence that has been gathered in the trainee's learning portfolio during the period between ARCP reviews. The ARCP records that the required curriculum competences and experience are being acquired, and that this is at an appropriate rate. It also provides a coherent record of a trainee's progress. The ARCP is not in itself an assessment exercise of clinical or professional competence.

The ARCP should normally be undertaken on at least an annual basis for all trainees in surgical training. Some Deaneries/Local Education and Training Boards (LETBs) plan to arrange two ARCPs each year in the early years of training. An ARCP panel may be convened more frequently if there is a need to deal with progression issues outside the normal schedule.

The surgical Specialty Advisory Committees (SACs) use the opportunity afforded, through their regional Liaison Member on the panel, to monitor the quality of training being delivered by the programme and/or its components.

Further information on this process can be found in the Reference Guide to Postgraduate Specialty Training in the UK.

Preparation for the ARCP

The trainee's learning portfolio provides the evidence of progress. It is the trainee's responsibility to ensure that the documentary evidence is complete in good time for the ARCP.

The SAC representatives on ARCP Panels will monitor trainees' progress throughout their training to assess whether they are on course to obtain certification or a Certificate of Eligibility for Specialist Registration via a Combine Programme; CESR(CP). Particular attention will be paid in the final two years of training to ensure that any remedial action can be taken, if necessary, to enable individual trainees to successfully complete their training.

The ARCP Panel

Please note that during the time of the panel meeting, members of an ARCP panel will have access to the portfolios of the trainees they review. Panel members are appointed by the Deanery/LETB and are likely to include the following:

- Postgraduate Dean / Associate Director / Associate Dean
- Training Programme Director
- Chair of the Specialty Training Committee
- College/Faculty representatives (e.g. liaison member from the surgical specialty SAC)
- Assigned Educational Supervisors (who have not been directly responsible for the trainee's placements)
- Associate Directors/Deans
- Academic representatives (for academic programmes, who have not been directly responsible for the trainee's placements)
- A representative from an employing authority
- Lay/patient representative
- External trainer
- Representative from an employing organisation

ARCP Outcomes

The ARCP panel will make one of the following recommendations about each trainee based on the evidence put before them:

Satisfactory progress

1. Achieving progress and competences at the expected rate

Unsatisfactory progress

2. Development of specific competences required – additional training time not required
3. Inadequate progress by the trainee – additional training time required
4. Released from training programme with or without specified competences

Insufficient evidence

5. Incomplete evidence presented – additional training time may be required

Recommendation for completion of the training programme (core or higher)

6. Gained all required competences for the programme

(Similar outcomes are made for those in Locum Appointment for Training (LAT) / Fixed-term Specialty Training Appointment (FTSTA) / Out of programme (OOP) and Top-up training).

The training system

Roles and responsibilities

Schools of Surgery/LETBs/Deaneries

Schools of Surgery or their equivalent have been created nationally within each Postgraduate Medical Deanery and/or Local Education and Training Board (LETB) and the Scottish Surgical Specialties Training Board (SSSTB) within NHS Education for Scotland (NES). They provide the structure for educational, corporate and financial governance and co-ordinate the educational, organisational and quality management activities of surgical training programmes. The Schools draw together the representatives and resources of Deaneries/LETBs/SSTB, JCST, trusts, NHS service providers and other relevant stakeholders in postgraduate medical education and training. They ensure the implementation of curricula and assessment methodologies with associated training requirements for educational supervision. In the Republic of Ireland, these roles are undertaken by the Medical Council, HSE National Doctors Training and Planning (NDTP) and the Royal College of Surgeons in Ireland (RCSI).

Who is Involved in training?

The key roles involved in teaching and learning are Training Programme director (TPD), Assigned Educational Supervisor (AES), Clinical Supervisor (CS), Assessor and Trainee.

Training Programme Director

The majority of Training Programme Directors (TPDs) manage specialty programmes; there are, however, a number TPDs who manage Core Surgical Training programmes TPD (CST).

TPDs are responsible for:

- Organising, managing and directing the training programmes, ensuring that the programmes meet curriculum requirements;
- Identifying and supporting local faculty (i.e. AES, CS) including organising their induction and training where necessary;
- Overseeing progress of individual trainees through the levels of the curriculum; ensuring that appropriate levels of supervision, training and support are in place;
- Helping the Postgraduate Dean and AES manage trainees who are running into difficulties by identifying remedial placements and resources where required;
- Working with delegated Specialty Advisory Committee (SAC) representatives (SAC Liaison Members) and College representatives (e.g. college tutors) to ensure that programmes deliver the specialty curriculum;
- Ensuring that Deanery/LETB administrative support are knowledgeable about curriculum delivery and are able to work with SACs, trainees and trainers;
- Administering and chairing the Annual Review of Competence Progression meetings (ARCP).

Assigned Educational Supervisor

Educational supervision is a fundamental conduit for delivering teaching and training in the NHS. It takes advantage of the experience, knowledge and skills of expert clinicians / consultant trainers and their familiarity with clinical situations. It ensures interaction between an experienced clinician and a trainee. This is the desired link between the past and the future of surgical practice, to guide and steer the learning process of the trainee. Clinical supervision is also vital to ensure patient safety and the high quality service of trainees. The curriculum requires trainees reaching the end of their training to demonstrate competence in clinical supervision before Certification. The Joint Committee on Surgical Training (JCST) also acknowledges that the process of gaining competence in supervision must start at an early stage in training with trainees supervising more junior trainees. The example set by the educational supervisor is the most powerful influence upon the standards of conduct and practice of a trainee.

In the UK, the GMC's plan for recognition and approval of trainers will take full effect from 31 July 2016. In addition to the GMC's statutory requirements for approval of GP trainers, postgraduate deans and medical

schools will formally recognise medical trainers who are named Assigned Educational Supervisors and named Clinical Supervisors.

The Assigned Educational Supervisor (AES) is responsible for between 1 and 4 trainees at any time. The number will depend on factors such as the size of the unit and the availability of support such as a Clinical Supervisors (CSs) or Clinical Tutors (CTs). The role of the Assigned Educational Supervisor is to:

- Have overall educational and supervisory responsibility for the trainee in a given placement;
- Ensure that an induction to the unit (where appropriate) has been carried out;
- Ensure that the trainee is familiar with the curriculum and assessment system relevant to the level/stage of training and undertakes it according to requirements;
- Ensure that the trainee has appropriate day-to-day supervision appropriate to their stage of training;
- Act as a mentor to the trainee and help with both professional and personal development;
- Agree a Learning Agreement, setting, agreeing, recording and monitoring the content and educational objectives of the placement;
- Discuss the trainee's progress with each trainer with whom a trainee spends a period of training and involve them in the formal report to the annual review process;
- Undertake regular formative/supportive appraisals with the trainee (typically one at the beginning, middle and end of a placement) and ensure that both parties agree to the outcome of these sessions and keep a written record;
- Ensure a record is kept in the portfolio of any serious incidents for concerns and how they have been resolved;
- Regularly inspect the trainee's learning portfolio and ensure that the trainee is making the necessary clinical and educational progress;
- Inform trainees of their progress and encourage trainees to discuss any deficiencies in the training programme, ensuring that records of such discussions are kept;
- Ensure patient safety in relation to trainee performance by the early recognition and management of those doctors in distress or difficulty;
- Keep the Training Programme Director informed of any significant problems that may affect the trainee's training;
- Provide an end of placement AES report for the Annual Review of Competence Progression (ARCP).

In order to become an AES, a trainer must be familiar with the curriculum and have a demonstrated an interest and ability in teaching, training, assessing and appraising. They must have appropriate access to teaching resources and time for training allocated to their job plan (approx. 0.25 PA per trainee). AESs must have undertaken training in a relevant Training the Trainers course/programme offered by an appropriate educational institution and must keep up-to-date with developments in training. They must have access to the support and advice of their senior colleagues regarding any issues related to teaching and training and to keep up-to-date with their own professional development.

Clinical Supervisor

Clinical supervisors (CS) are responsible for delivering teaching and training under the delegated authority of the AES. They:

- Carry out assessments as requested by the AES or the trainee. This will include delivering feedback to the trainee and validating assessments;
- Ensure patient safety in relation to trainee performance;
- Liaise closely with other colleagues, including the AES, regarding the progress and performance of the trainee with whom they are working during the placement;
- Keep the AES informed of any significant problems that may affect the trainee's training;
- Provide regular CS Reports which contribute to the AES's end of placement report for the ARCP.

The training of CSs should be similar to that of the AES.

Assessor

Assessors will carry out a range of assessments and provide feedback to the trainee and the AES, which will support judgements made about a trainee's overall performance. Assessments during training will usually be

carried out by clinical supervisors (consultants) and other members of the surgical team, including (for the MSF). Those who are not medically qualified may also be tasked with this role.

Those carrying out assessments must be appropriately qualified in the relevant professional discipline and trained in the methodology of workplace based assessment (WBA). This does not apply to MSF raters.

Trainee

The trainee is required to take responsibility for his/her learning and to be proactive in initiating appointments to plan, undertake and receive feedback on learning opportunities. The trainee is responsible for ensuring that

- a Learning Agreement is carried out in each placement;
- opportunities to discuss progress are identified;
- assessments are undertaken and validated by assessors in good time;
- evidence is systematically recorded in the learning portfolio.

Teaching

The detail of clinical placements will be determined locally by Training Programme Directors (TPD). In order to provide sufficient teaching and learning opportunities, the placements need to be in units that:

- Are able to provide sufficient clinical resource;
- Have sufficient trainer capacity.

The JCST has developed a series of Quality Indicators (QIs) to help identify good and poor quality training placements. The QIs are measured through the JCST trainee survey.

The PDs and AESs define the parameters of practice and monitor the delivery of training to ensure that the trainee has exposure to:

- A sufficient range and number of cases in which to develop the necessary technical skills (according to the stage of training) and professional judgement (to know when to carry out the procedure and when to seek assistance);
- Managing the care of patients in the case of common conditions that are straightforward, patients who display well known variations to common conditions, and patients with ill-defined problems;
- Detailed feedback.

Development of professional practice can be supported by a wide variety of teaching and learning processes, including role modelling, coaching, mentoring, reflection, and the maximising of both formal and informal opportunities for the development of expertise on the job. Learning opportunities need to be related to changing patterns of healthcare delivery.

The training system

Training roles

Training roles will exist, with minor, locally agreed variation, in all Deaneries/LETBs/Schools and are a requirement of the ISCP.

In accordance with GMC and curriculum standards:

- There must be an adequate number of appropriately qualified and experienced staff in place to deliver an effective training programme.
- Trainers must have the time within their job plan to support the role.
- Subject areas of the curriculum must be taught by staff with relevant specialist expertise and knowledge.
- Individuals undertaking educational roles must undergo a formal programme of training and be subject to regular review.
- Training programmes should include practise exercises covering an understanding of the curriculum, workplace-based assessment methodology and how to give constructive feedback. They should also include equality and diversity training.

The main surgical training roles fall into one of two broad categories:

- Those to do with managing individual trainees (i.e. Clinical Supervisor, Assigned Educational Supervisor, Training Programme Director)
- Those to do with managing the system. Included within these roles would be important aspects such as the provision of common learning resources and quality control of the training being provided. Training Programme Directors would fall into this category.

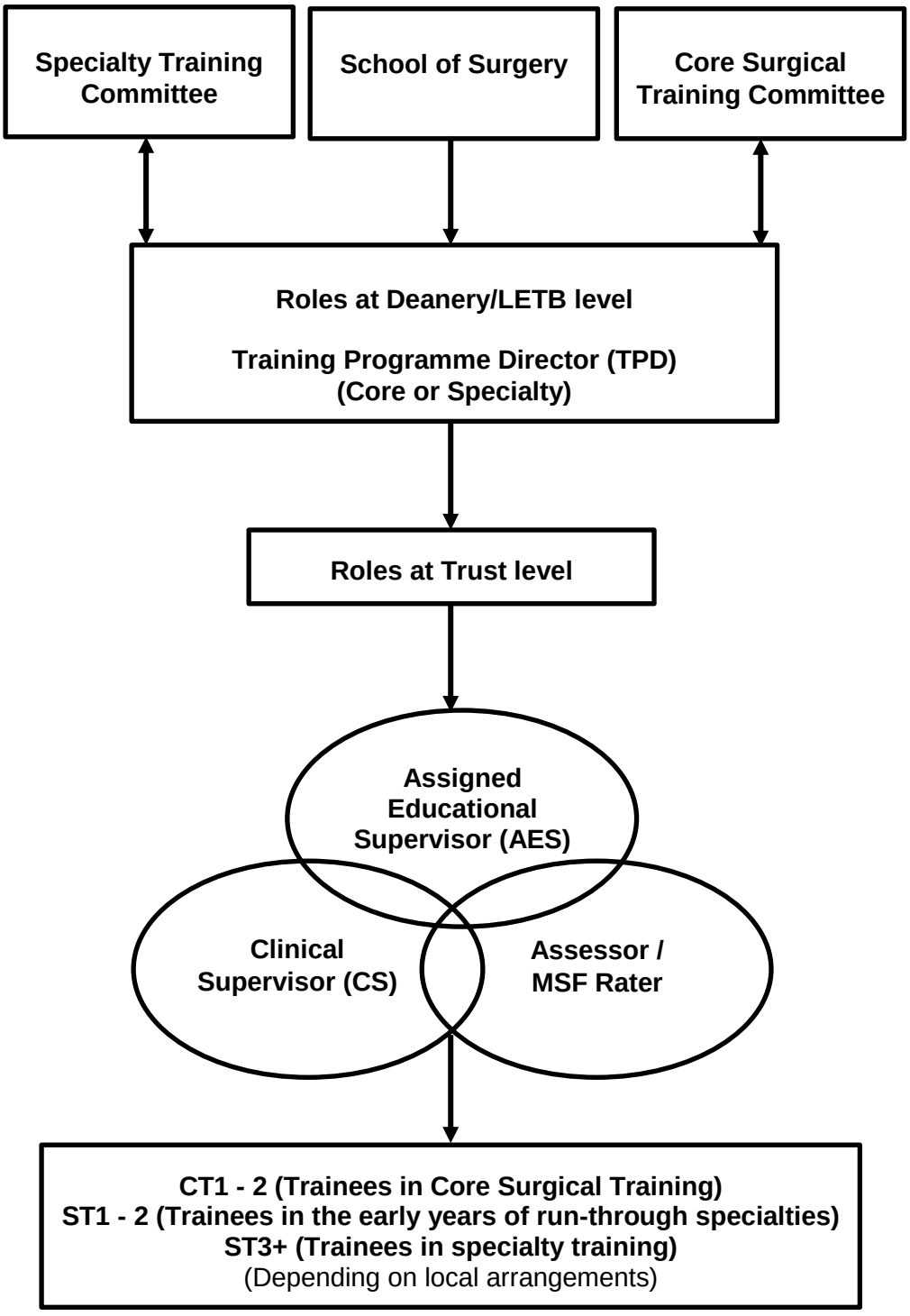
It may be entirely appropriate for a surgeon involved in training to hold more than one role (e.g. Assigned Educational Supervisor, Clinical Supervisor and Assessor) where the workload is manageable and the trainee continues to receive training input from several sources. The role of assessor is not intended to be used as a formal title, but describes a function that will be intrinsic to many of the roles described in the ISCP.

The ISCP requires adherence to a common nomenclature for the trainers who are working directly with the trainee and these are highlighted on the website. These roles are Training Programme Director (core surgical training or specialty training), Assigned Educational Supervisor, Clinical Supervisor, Trainee and Assessor. This is to support the interactive parts of the website, access levels etc. and it is strongly recommended that Deaneries/LETBs use the titles outlined here in the interests of uniformity.

There is great variation in the number of trainees being managed at the various levels within Deaneries/LETBs/Schools of Surgery. This is particularly the case during the early years of training. For this reason, many Deaneries/LETBs will find that the Training Programme Director roles may have to be subdivided. It is recommended that the suffix or prefix ‘deputy’ is used in conjunction with the main title rather than devising a completely new title. This will make clear the general area in which the surgeon is working and should help to avoid confusion.

Wherever possible these roles are harmonised with the Gold Guide but there may be minor variations in nomenclature and tasks that reflect the intercollegiate approach to surgical specialty training.

Training Governance Structure



Multi-professional team

The Training System

Quality assurance of the training system

The General Medical Council (GMC) has overall responsibility for the quality assurance of medical education and training in the UK, as outlined in its Quality Improvement Framework (QIF) but it delegates some responsibility in this respect to the Postgraduate Medical Deaneries and/or Local Education and Training Boards (LETBs) and their Schools of Surgery, the Joint Committee on Surgical Training (JCST) and Local Education Providers (LEPs). In the Republic of Ireland, these roles are undertaken by the Medical Council (MC) and by the Royal College of Surgeons in Ireland (RCSI).

Deaneries and LETBs are responsible for the quality management of training programmes and posts and must implement processes to ensure training within their region meets national standards and is implemented in accordance with the GMC-approved curricula. LEPs deliver training and are responsible for its quality control. In the Republic of Ireland, this is overseen by the MC and the RSCI.

As part of its role in the quality management of surgical training, the JCST has developed its own quality assurance strategy based upon its quality indicators, trainee surveys, Certification Guidelines and the annual specialty report. For more information on the quality assurance of surgical training, please visit the Quality assurance page on the JCST website.

Quality Indicators

- The JCST, in conjunction with the Schools of Surgery, has developed a series of quality indicators (QIs) in order to assess the quality of surgical training placements in each of the surgical specialties and at core level.
- The QIs, which are measured through the JCST trainee survey, enable good and poor quality training placements to be identified so appropriate action may be taken.

The QIs for each surgical specialty and core surgical training are available to download from the JCST Quality Indicators page of the JCST website.

JCST trainee survey

- The JCST launched the trainee survey in November 2011, which was developed in conjunction with the Schools of Surgery.
- The survey is run through the ISCP website and trainees are notified through their ISCP account of when they should complete it. This should be towards the end of each placement and prior to their ARCP.
- Confirmation of completion of all relevant surveys will be part of the evidence assessed at the trainees' ARCP.

For more information on the trainee survey, please visit the JCST Trainee Survey page of the JCST website.

Certification Guidelines

- Each SAC has produced a series of guidelines to identify what trainees applying for Certification will normally be expected to have achieved during their training programme. The guidelines cover such aspects of training as: clinical and operative experience; operative competency; research; quality improvement; and management and leadership.
- Trainees and trainers should use the guidelines to inform decisions about the experiences that trainees need to gain during their 5/6 year programme.
- Trainees will be monitored against the guidelines throughout their training programmes to ensure they are receiving appropriate exposure to all aspects of training.

For more information and to download a copy of the guidelines for each specialty, please visit the Certification Guidelines page of the JCST website.

Annual Specialty Report

The JCST submits an Annual Specialty Report (ASR) to the GMC to provide both a national overview of the status of surgical training and an update on any major developments.

For more information on the ASR, please visit the GMC Quality Improvement Framework (QIF) page.

Teaching and Learning

Principles of surgical education

The balance between didactic teaching and learning in clinical practice will change as the trainee progresses through the training programme, with the former decreasing and the latter increasing.

A number of people from a range of professional groups will be involved in teaching. In accordance with GMC standards, subject areas of the curriculum must be taught by staff with relevant specialist expertise and knowledge. Specialist skills and knowledge are usually taught by consultants and more advanced trainees; whereas the more generic aspects of practice can also be taught by the wider multi-disciplinary team. The Assigned Educational Supervisor (AES) is key as he/she agrees with each trainee how he/she can best achieve his or her learning objectives within a placement.

Establishing a learning partnership creates the professional relationship between the teacher (AES, CS or assessor) and the learner (trainee) that is essential to the success of the teaching and learning programme.

The learning partnership is enhanced when:

- The teacher understands:
    - Educational principles, values and practices and has been appropriately trained;
    - The role of professional behaviour, judgement, leadership and team-working in the trainee's learning process;
    - The specialty component of the curriculum;
    - Assessment theory and methods.
- The learner:
    - Understands how to learn in the clinical practice setting, recognising that everything they see and do is educational;
    - Recognises that although observation has a key role to play in learning, action (doing) is essential;
    - Is able to translate theoretical knowledge into surgical practice and link surgical practice with the relevant theoretical context.
    - Uses reflection to improve and develop practice (see self-directed learning);
- There is on-going dialogue in the clinical setting between teacher and the learner;
- There are adequate resources to provide essential equipment and facilities;
- There is adequate time for teaching and learning.

Trainee-led learning

The ISCP encourages a learning partnership between the trainee and AES in which learning is trainee-led and trainer-guided. Trainees are expected to take a proactive approach to learning and development and towards working as a member of a multi-professional team. Trainees are responsible for:

- Utilising opportunities for learning throughout their training;
- Triggering assessments and appraisal meetings with their trainers, identifying areas for observation and feedback throughout placements;
- Maintaining an up to date learning portfolio;
- Undertaking self and peer assessment;
- Undertaking regular reflective practice.

Learning opportunities

There are many learning opportunities available to trainees to enable them to develop their knowledge, clinical and professional judgement, technical and operative ability and conduct as a member of the profession of surgery. The opportunities broadly divide into three areas:

- Learning from practice otherwise known as learning on-the-job or in the workplace. This can be informal and opportunistic or planned and structured

Learning from practice

The workplace provides learning opportunities on a daily basis for surgical trainees, based on what they see and what they do. Whilst in the workplace, trainees will be involved in supervised clinical practice, primarily in a hospital environment in wards, clinics or theatre. The trainees' role in these contexts will determine the nature of the learning experience.

Learning will start with observation of a trainer (not necessarily a doctor) and will progress to assisting a trainer; the trainer assisting/supervising the trainee and then the trainee managing a case independently but with access to expert help. The level of supervision will decrease and the level of complexity of cases will increase as trainees become proficient in the appropriate technical skills and are able to demonstrate satisfactory professional judgement. Continuous systematic feedback, both formal and informal, and reflection on practice are integral to learning from practice, and will be assisted by assessments for learning (formative assessment methods) such as surgical Direct Observation of Procedural Skills in Surgery (DOPS), Procedure Based Assessment (PBA), Clinical Evaluation Exercise (CEX) and Case Based Discussion (CBD), each of which has been developed for the purpose.

Trainees are required to keep a surgical logbook to support the assessment of operative skills, using corresponding supervision levels:

Assisting (A):

The trainer completes the procedure from start to finish
The trainee performs the approach and closure of the wound
The trainer performs the key components of the procedure

Supervised - trainer scrubbed (S-TS):

The trainee performs key components of the procedure (as defined in the relevant PBA) with the trainer scrubbed

Supervised - trainer unscrubbed (S-TU):

The trainee completes the procedure from start to finish
The trainer is unscrubbed and is:
- in the operating theatre throughout
- in the operating theatre suite and regularly enters the operating theatre during the procedure (70% of the duration of the procedure)

Performed (P):

The trainee completes the procedure from start to finish
The trainer is present for <70% of the duration of the procedure
The trainer is not in the operating theatre and is:
- scrubbed in the adjacent operating theatre
- not in the operating suite but is in the hospital

Training more junior trainee (T):

A non-consultant grade surgeon training a junior trainee

Observed (O):

Procedure observed by an unscrubbed trainee

In the Workplace – Informal

Surgical learning is largely experiential in its nature with any interaction in the workplace having the potential to become a learning episode. The curriculum encourages trainees to manage their learning and to reflect on practice. Trainees are encouraged to take advantage of clinical cases, audit and the opportunities to shadow peers and consultants.

Theatre (training) lists

Training lists on selected patients enable trainees to develop their surgical skills and experience under supervision. The lists can be carried out in a range of settings, including day case theatres, main theatres endoscopy suites and minor injuries units.

Each surgical procedure can be considered an integrated learning experience and the formative workplace assessments provide feedback to the trainee on all aspects of their performance, from pre-operative planning and preparation, to the procedure itself and subsequent post-operative management.

The syllabus is designed to ensure that teaching is systematic and based on progression. The level of supervision will decrease and the level of complexity of cases will increase as trainees become proficient in the appropriate technical skills and are able to demonstrate satisfactory professional judgement. By Certification time trainees will have acquired the skills and judgement necessary to provide holistic care for patients normally presenting to their specialty and referral to other specialists as appropriate. Feedback on progress is facilitated by the DOPS and PBA.

Clinics (Out Patients)

Trainees build on clinical examination skills developed during the Foundation Programme. There is a progression from observing expert clinical practice in clinics to assessing patients themselves, under direct observation initially and then independently, and presenting their findings to the trainer. Trainees will assess new patients and will review/follow up existing patients.

Feedback on performance will be obtained primarily from the CEX and CBD workplace assessments together with informal feedback from trainers and reflective practice.

Ward Rounds (In Patient)

As in the other areas, trainees will have the opportunity to take responsibility for the care of in-patients appropriate to their level of training and need for supervision. The objective is to develop surgeons as effective communicators both with patients and with other members of the team. This will involve taking consent, adhering to protocols, pre-operative planning and preparation and post-operative management.

Progress will be assessed by MSF, CBD, CEX, DOPS and PBA.

Learning from formal situations

Work based practice is supplemented by an educational programme of courses, local postgraduate teaching sessions arranged by the Specialty Training Committees (STCs) or Schools of Surgery and regional, national and international meetings. Courses have a role at all levels, for example basic surgical skills courses using skills centres and specialty skills programmes. These focus on developing specific skills using models, tissue in skills labs and deceased donors as appropriate and are delivered by the colleges, specialty associations and locally by Deaneries/LETBs.

It is recognised that there is a clear and increasingly prominent role for off the job learning through specific intensive courses to meet specific learning goals. Trainees must show evidence that they have gained competence in the management of trauma through a valid certificate of the Advanced Trauma Life Support (ATLS®), Advanced Paediatric Life Support (APLS) or equivalent, at the completion of core training. In the following specialties, trainees need to show that this certificate of competence is being maintained up to Certification.

- Neurosurgery
- Oral and Maxillofacial Surgery
- Paediatric Surgery (APLS)
- Plastic Surgery
- Trauma and Orthopaedic Surgery

Learning from simulation

Simulation in this context means any reproduction or approximation of a real event, process, or set of conditions or problems e.g. taking a history in clinic, performing a procedure or managing post-operative care. Trainees have the opportunity of learning in the same way as they would in the real situation but in a patient-safe environment. Simulation can be used for the development of both individuals and teams.

Simulation training is often classified as either high or low fidelity. The fidelity of simulation refers to how accurately or closely the simulation resembles the situation being reproduced. The realism of the simulation may reflect the environment in which simulation takes place, the instruments used or the emotional and behavioural features of the real situation. Simulation training does not necessarily depend on the use of expensive equipment or complex environments e.g. it may only require a suturing aid or a role play.

Simulation training has several purposes:
- supporting learning and keeping up to date;
- addressing specific learning needs;
- situational awareness of human factors which can influence people and their behaviour;
- enabling the refining or exploration of practice in a patient-safe environment;
- promoting the development of excellence;
- improving patient care.

The use of simulation in surgical training should be regarded as part of a blended approach to managing teaching and learning concurrent with supervised clinical practice. The use of simulation on its own cannot replace supervised clinical practice and experience or authorise a doctor to practice unsupervised.

Provision of feedback and performance debriefing are integral and essential parts of simulation-based training. Feedback can be assisted by workplace-based assessments and recorded in the learning portfolio. Simulation training should broadly follow the same pattern of learning opportunities offering insight into the development of technical skills, team-working, leadership, judgement and professionalism.

Self-directed learning

Self-directed learning is encouraged. Trainees are encouraged to establish study groups, journal clubs and conduct peer review; there will be opportunities for trainees to learn with peers at a local level through postgraduate teaching and discussion sessions; and nationally with examination preparation courses. Trainees are expected to undertake personal study in addition to formal and informal teaching. This will include using study materials and publications and reflective practice. Trainees are expected to use the developmental feedback they get from their trainers in appraisal meetings and from assessments to focus further research and practice.

Reflective practice is a very important part of self-directed learning and is a vital component of continuing professional development. It is an educational exercise that enables trainees to explore with rigour, the complexities and underpinning elements of their actions in surgical practice in order to refine and improve them.

Reflection in the oral form is very much an activity that surgeons engage in already and find it useful and developmental. Writing reflectively adds more to the oral process by deepening the understanding of surgeons about their practice. Written reflection offers different benefits to oral reflection which include: a record for later review, a reference point to demonstrate development and a starting point for shared discussion.

Some of this time will be taken as study leave. In addition there are the web based learning resources which are on the ISCP website and specialty association websites.

Supervision

In accordance with the requirements of Good Medical Practice, the ultimate responsibility for the quality of patient care and the quality of training lies with the supervisor. Supervision is designed to ensure the safety of the patient by encouraging safe and effective practice and professional conduct. The level of supervision will change in line with the trainee's progression through the stages of the curriculum, enabling trainees to develop independent learning. Those involved in the supervision of trainees must undertake appropriate training.

Trainees must be placed in approved posts that meet the required training and educational standards. Individual trusts must take responsibility for ensuring that clinical governance and health and safety standards are met.

Clinical Supervisors and other trainers must have the relevant qualifications, experience and training to undertake the role. There is an expectation that supervision and feedback are part of the on-going relationship between trainees and their trainers and assessors, and that it will take place informally on a daily basis.

The syllabus content details the level of knowledge, clinical, technical/operative and professional skills expected of a trainee at any given stage of training. The surgical logbook provides a record of the trainee's operative experience and supervision levels corresponding to the operative levels of: *Observed (O); Assisting (A); Supervised - trainer scrubbed (S-TS); Supervised - trainer unscrubbed (S-TU); Performed (P) and Training a more junior trainee (T).*

Trainees must work at a level commensurate with their experience and competence, and this should be explicitly set down by the Assigned Educational Supervisor in the Learning Agreement. There is a gradual reduction in the level of supervision required until the level of competence for independent practice is acquired.

In keeping with Good Medical Practice and Good Clinical Care, trainees have a responsibility to recognise and work within the limits of their professional competence and to consult with colleagues as appropriate. The development of good judgement in clinical practice is a key requirement of the curriculum. The content of the curriculum dealing with professional behaviour emphasises the responsibilities of the trainee to place the well-being and safety of patients above all other considerations. Throughout the curriculum, great emphasis is laid on the development of good judgement and this includes the ability to judge when to seek assistance and advice. Appropriate consultation with trainers and colleagues for advice and direct help is carefully monitored and assessed.

The Learning Agreement

The Learning Agreement is a written statement of the mutually agreed learning goals and strategies negotiated between a trainee (learner) and the trainee's Assigned Educational Supervisor (AES). It is agreed at the initial objective setting meeting and covers the period of the placement. The agreement is based on the learning needs of the individual trainee undertaking the learning as well as the formal requirements of the curriculum. The web-based Learning Agreement form is accessed through the secure area of the website and is completed on-line. The AES and trainee complete the Learning Agreement together and are guided by the Training Programme Director's (TPD's) Global Objective. A blank Learning Agreement Form (for illustrative purposes only) is available in the Help area of the website.

Training Programme Director's (TPD's) Global Objective

The TPD's global objective is a statement which the TPD can set for the trainee's training year, informing placement objectives. The broad global objectives, derived from the syllabuses, are included in the Learning Agreement and highlight what the trainee should achieve during a period that may encompass several placements. They normally cover the period between the annual reviews.

The global objective for early years training would normally cover the following components:

- Run-through programmes: the common surgical syllabus, specialty-specific competences in the chosen specialty and professional behaviour and leadership skills for the stage.
- Themed programmes: the common surgical syllabus, specialty-specific competences in a number of complementary specialties and professional behaviour and leadership skills for the stage.
- Un-themed, broad-based programmes: the common surgical syllabus, sampling of specialty-specific competences in a number of specialties (topping up in specific specialties later in the stage) and professional behaviour and leadership skills for the stage.

For those wishing to pursue an academic surgical career, a proportion of competences might emphasise additional academic pursuits including research and teaching.

Together, the global and placement objectives are the means used by the TPD, AES and trainee to ensure curriculum coverage.

The content of the Learning Agreement will be influenced by the:

- Requirements set by the surgical specialty in its syllabus for the stage of training;
- Learner's previous experience;
- Learner's knowledge and skills;
- Learner's personal aspirations set down in a Personal Development Plan;
- Local circumstances of the placement.

Although the Learning Agreement is a statement of expected outcomes there is equal emphasis on learning opportunities and how the outcomes can be met. Trainees use it to keep track of which objectives have been completed and which have not; AESs use it to set down the educational strategies that are suited to the experiential learning appropriate to the placement, to monitor progress and make a summative report to the annual review. TPDs use it to oversee the process and to ensure that the correct training is delivered appropriate to the achievement of learning outcomes.

Each stage in the process allows the trainee and the AES to make individual comments on the training and appraisal process and to sign it off. The trainee also has the right of appeal to the TPD through the process. The trainee will meet the AES at the start of each placement to agree the learning and development plan and at mid-point and end of placement to review and report on progress. The frequency of meetings can be increased if required. The Learning Agreement provides a mechanism for the trainee and AES to meet and discuss feedback and guidance.

Stages in the Learning Agreement

There are three stages to the Learning Agreement that should be completed in sequence: Objective Setting; Interim Review; and Final Review.

In the Objective Setting stage, the trainee and the AES:

- Agree the learning objectives for the placement according to the trainee's needs and the learning that can be delivered in the placement and with reference to the TPD's global objective;
- Identify learning opportunities in the workplace such as in theatre, ward, clinic and simulated settings;
- Agree on the workplace-based assessments that can be undertaken to obtain formative feedback and demonstrate progress matched to areas of the syllabus e.g. DOPS for central venous line insertion;
- Identify the resources required so that the trainee can achieve his/her learning objectives, for example, time in clinic and theatre, equipment, reflective practice, trainers;
- Identify formal learning opportunities, activities or events in the educational programme, that the trainee should attend e.g. seminars, presentations, peer reviews.
- Consider the examinations the trainee is required to take whilst in the placement and courses the trainee plans to attend.
- Consider opportunities for audit and quality improvement activities, research and other projects.

Once these aspects have been agreed, the trainee and the AES sign off the Learning Agreement.

Although the objective setting stage of the Learning Agreement is the agreed plan for the placement, it can be modified during training if circumstances change and this can be recorded during the interim or final review.

Interim Review occurs at the mid-point of the placement. This stage is encouraged even for 4-month placements to check that progress is in line with the placement objectives. In the event that difficulties are being experienced, focussed training and repeat assessments should be initiated. The objectives for progress and further action plans agreed at the meeting are recorded on the Interim Review form and are signed off by the trainee and AES.

Final Review occurs towards the end of the placement. The trainee and AES review what the trainee has learned in the placement against the placement objectives set down in the Learning Agreement. Evidence would typically include the following:

- Workplace-based assessments and feedback (these should occur frequently with a range of assessors)
- Surgical logbook
- Audit and quality improvement
- Courses and seminars
- Examinations
- Meetings and conferences
- Patient feedback
- Presentations and posters
- Projects
- Publications
- Reflective practice (includes self MSF, reflective CBD, reflections in the journal and workplace-based assessment)
- Research
- Teaching

Each tool captures elements of judgment in action and maps to standards of Good Medical Practice. Over the training period they reveal the trainee's particular strengths, areas for development and progress.

Assigned Educational Supervisor's Report: The AES is responsible for synthesising the portfolio evidence at the end of the placement. The process of judging the evidence also involves the Trainee's Clinical Supervisors. The AES's evidence-based report is written in terms of the trainee's progress and specific learning outcomes and is facilitated by the learning portfolio. The report will be a key document for the Annual Review of Competence Progression (ARCP).

The TPD takes a holistic view of progress over the whole training period.

The Learning Portfolio

The trainee's portfolio has been designed to store evidence of the trainee's competence and fitness to practise. It serves as a repository of evidence that a trainee is progressing and meeting all the requirements of the curriculum. The portfolio is the vehicle used by the Annual Review of Competence Progression (ARCP) to recommend the trainee's continuing training or Certification.

The portfolio is organised into discrete sections, each designed to help trainees along the training pathway. The main sections of the portfolio include the Learning Agreement from each placement, reports from the trainee's Assigned Educational Supervisor (AES) and Clinical Supervisors (CSs); workplace-based assessment (WBA), a summary of the surgical logbook, other evidence of workplace activity and the ARCP.

The trainee is solely responsible for the contents of the portfolio both in terms of quality and veracity. Submission of information known to be false, if discovered, will have very serious consequences. All entries to the portfolio must respect the confidentiality of colleagues and patients and should not contain names or numbers to identify patients or staff. Portfolio evidence must be collected and documented systematically by the trainee as they progress through each placement.

Trainees must record all assessments that are conducted during the training period. WBA is considered to be formative and those that are of a less than satisfactory standard, if reflected upon appropriately, need not necessarily be seen as negative because they provide developmental feedback to drive learning and so improve practice. Where assessments have been unsatisfactory they should be repeated after focussed training until successful. The portfolio should enable the AES at the end of placement to assess the trainee in the round.

As part of the their professional obligations, trainees are also required to sign an educational contract which defines, in terms of education and training, their relationships, duties and obligations. It also makes explicit the basic framework the trainee can expect from each placement and what is expected by the AES in return. Statements of health and probity statement are also obligatory because doctors must have integrity and honesty and must take care of their own health and well-being so as not to put patients at risk.