

Cardiothoracic surgery

Specialty Overview

Overview

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 of Cardiothoracic Surgeons of 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.

Chris Munsch - SAC Chair
Content Editor to June 2007

Steve Livesey – Content Editor from June 2007

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 CanMEDS framework and Good Medical Practice documents of the Canadian Medical Association and the General Medical Council of the UK, respectively.
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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 competencies 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 Skills and behaviour: 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
- Aortovascular 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 at the time of writing (2007) 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.

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, 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

Initial Stage

Initial Phase of training (ST1 & ST2)

The initial phase of training will consist of an indicative period of two years where trainees will work through four modules. **‘Core Surgical Skills and Knowledge for All Specialties’** is a mandatory module, which is common across all the surgical specialties. Depending on local circumstances the following modules will be available:

- Critical Care and Post Operative Management
- Cardiac Surgery
- Thoracic Surgery
- Cardiology
- Thoracic Medicine
- Vascular Surgery
- Generic Surgical Skills and Knowledge - All specialties

The content for the specialty specific modules is defined in detail in the syllabus. The aims and levels of competence to be attained at this stage are defined for each module

The purposes of the initial stage are for the trainee:

- To acquire experience in the management of a post surgical patient on the critical care, high dependency and post operative wards and to be able to manage, with appropriate supervision, such a patient.
- To gain experience in aspects of the management of a cardiac surgical patient. This includes operative management as appropriate and with supervision.
- To gain experience in the evaluation and management of a patient undergoing thoracic surgery. This includes operative management with supervision where appropriate
- To gain experience in the practical applications of cardiopulmonary bypass, myocardial protection and circulatory support. To understand the science and technology that underpins these disciplines

During this stage the trainee will be gain competence to the defined level in a number of technical skills and procedures for example:

- The use of the defibrillator
- The use of the intra aortic balloon pump
- Echocardiography including TOE
- Arterial and central venous cannulation
- Cannulation and institution of cardiopulmonary bypass
- Weaning from bypass and decannulation
- Femoral cannulation and decannulation
- Pulmonary artery catheterisation
- Intra aortic balloon pump insertion, timing and management
- Tracheostomy
- Fibreoptic, rigid and flexible bronchoscopy
- Chest aspiration, chest drain insertion, chest drain management
- Saphenous vein harvest
- Median sternotomy
- Mammary/radial artery harvest
- Preparation for, and management of, cardiopulmonary bypass

- Proximal aortovenous and distal coronary anastomosis
- Heart valve replacement
- Surgical re-exploration for bleeding or tamponade
- Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions
- Endoscopic and surgical techniques used in lung biopsy
- Surgery for benign and malignant conditions of the lungs, including uncomplicated lobectomy for lung cancer, wedge resection and metastasectomy
- Intraoperative diagnosis and staging
- Open operation for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- VATS procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- Open and VATS procedures for empyema, including techniques for decortication
- Median sternotomy open and close

Those trainees following an academic pathway will be expected to achieve the same level of competence at the end of ST2 as trainees undertaking a ‘Surgery in general – cardiothoracic programme’.

ST1 Placement in Cardiothoracic Surgery

Purposes

The purposes of the cardiothoracic surgery placement are to enable the trainee to:

1. Acquire experience in the management of a post surgical patient on the critical care, high dependency and post operative wards.
2. Gain experience in the evaluation and management of a patient undergoing cardiac surgery.
3. Gain experience in the evaluation and management of a patient undergoing thoracic surgery.

During the placement it is expected that the trainee will cover the following areas (further detail is to be found in the syllabus):

Knowledge

- Knowledge of the basic sciences underpinning the cardiovascular and respiratory systems
- Familiarity with the clinical features and management of the following commonly occurring cardiothoracic conditions:
 - coronary artery disease
 - valvular heart disease
 - lung cancer
 - pneumothorax
- Understanding of the principles and consequences of cardiopulmonary bypass

Clinical Skills

- Clinical assessment and management of the preoperative, postoperative and critically ill patient
- Analysis and interpretation of investigations, including specific diagnostic tests.
- Critical care management including recognition, evaluation and treatment of haemodynamic and ventilatory abnormalities.
- Familiarity with the management of multi-organ failure

- The management of chest trauma (ATLS)

Technical Skills

Practical Skills

- Chest drain insertion and management
- Central venous, arterial and pulmonary artery cannulation
- Tracheal intubation

Operative skills

- Basic surgical skills – dissection, suturing, knots etc
- Saphenous vein harvest (CL3)
- Median Sternotomy (CL2)
- Perform and repair thoracic incisions (CL2)
- rigid and flexible bronchoscopy (CL2)
- Develop the ability to function as a competent assistant at commonly performed cardiothoracic operations including CABG, valve replacement, lung resection and VATS procedures

Cardiothoracic Surgery Trainees Placed in Other Specialties

During ST1 and ST2 trainees wishing to pursue a career in cardiothoracic surgery may be placed in other surgical specialties as part of an overall training programme. The following acts as a guide as to the **areas** in other specialty syllabuses that are most relevant to the cardiothoracic surgery training programme.

General Surgery

- Resuscitation and initial management of patient with multiple injuries
- Management of the acute abdomen and other acute surgical conditions
- Male and female urethral catheterisation
- General tissue handling and basic surgical technique

Click on [Workplace Based Assessments](#) to view the assessment forms including DOPS and PBAs

Topics

Topic	Basic sciences
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None
	<i>Underpinning basic science knowledge appropriate for the practice of surgery.</i>
	<i>Applied anatomy: Knowledge of anatomy appropriate for surgery</i>
Objective	<i>Physiology: Knowledge of physiology relevant to surgical practice</i>
	<i>Pathology: Knowledge of pathological principles underlying system specific pathology</i>
	<i>Microbiology: Knowledge of microbiology relevant to surgical practice</i>

Radiology: Knowledge of diagnostic and interventional radiology

Applied anatomy:

4 Development, organs and structures, surface and imaging anatomy of thorax, abdomen, pelvis, perineum, limbs, neck as appropriate for surgical operations

Physiology:

4 Homeostasis

3 Thermoregulation

3 Metabolic pathways

4 Blood loss

4 Sepsis

4 Fluid balance and fluid replacement therapy

3 Metabolic abnormalities

Pathology:

4 Inflammation

4 Wound healing

4 Cellular injury

4 Vascular disorders

4 Disorders of growth, differentiation and morphogenesis

4 Tumours

3 Surgical immunology

3 Surgical haematology

Knowledge

Microbiology:

4 Surgically important microorganisms

4 Sources of infection

4 Asepsis and antisepsis

4 Sterilisation

4 Antibiotics

4 High risk patient management

Radiology:

3 Principles of diagnostic and interventional radiology

Clinical Skills No content

Technical Skills and Procedures No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic Basic surgical skills

Category Core Surgical Skills and Knowledge for All Specialties

Sub-category: None

Objective *Acquisition of basic surgical skills in instrument and tissue handling.*

Incision of skin and subcutaneous tissue: Ability to incise superficial tissues accurately with suitable instruments.

Closure of skin and subcutaneous tissue: Ability to close superficial tissues accurately.

Knot tying: Ability to tie secure knots.

Haemostasis: Ability to achieve haemostasis of superficial vessels.

Tissue retraction: Use of suitable methods of retraction.

Use of drains: Knowledge of when to use a drain and which to choose.

Tissue handling: Ability to handle tissues gently with appropriate instruments.

Skill as assistant: Ability to assist helpfully, even when the operation is not familiar.

Incision of skin and subcutaneous tissue:

- 4 Langer's lines
- 4 Healing mechanism
- 4 Choice of instrument
- 4 Safe practice
- 4 Basic Surgical Skills course

Closure of skin and subcutaneous tissue:

- 4 Options for closure
- 4 Suture and needle choice
- 4 Safe practice

Knot tying:

- 4 Choice of material

Haemostasis:

- 4 Techniques

Tissue retraction:

- 4 Choice of instruments

Use of drains:

- 4 Indications
- 4 Types
- 4 Management/removal

Tissue handling:

- 4 Choice of instruments

Knowledge

Incision of skin and subcutaneous tissue:

4 Ability to use scalpel, diathermy and scissors

Closure of skin and subcutaneous tissue:

4 Accurate and tension free apposition of wound edges

Knot tying:

4 Single handed

4 Double handed

4 Instrument

4 Superficial

4 Deep

Haemostasis:

4 Control of bleeding vessel (superficial)

4 Diathermy

4 Suture ligation

4 Tie ligation

4 Clip application

Clinical Skills

Tissue retraction:

4 Tissue forceps

4 Placement of wound retractors

Use of drains:

4 Insertion

4 Fixation

4 Removal

Tissue handling:

4 Appropriate application of instruments and respect for tissues

Skill as assistant:

4 Anticipation of needs of surgeon when assisting

Technical Skills and Procedures

No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic The assessment and management of the surgical patient

Category Core Surgical Skills and Knowledge for All Specialties

Sub-category: None

Objective Ability to assess the patient and manage the patient, and propose surgical or non-surgical management.

Knowledge	No content
	3 Surgical history and examination (elective and emergency)
	3 Construct a differential diagnosis
	3 Plan investigations
	3 Clinical decision making
Clinical Skills	3 Case work up and evaluation; risk management
	3 Active participation in MDTs
	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
Technical Skills and Procedures	No content
Professional Skills	Please see the Professional Skills and Behaviour » Initial section for these skills

Topic	Peri-operative care
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None
	<i>Ability to manage patient care in the peri-operative period.</i>
	<i>Pre-operative assessment and management: Ability to assess the patient adequately prior to operation and manage any pre-operative problems appropriately.</i>
Objective	<i>Intraoperative care: Ability to conduct safe surgery in the operating theatre environment.</i>
	<i>Post-operative care: Ability to care for the patient in the post-operative period.</i>
	<i>Blood Products: Appropriate use of blood products.</i>
	<i>Antibiotics: Appropriate use of antibiotics.</i>
	Pre-operative assessment and management:
	4 Cardiorespiratory physiology
	3 Diabetes mellitus
	3 Renal failure
	4 Pathophysiology of blood loss
	4 Pathophysiology of sepsis
	4 Risk factors for surgery and scoring systems
Knowledge	3 Principles of day surgery
	Intraoperative care:
	4 Safety in theatre
	4 Sharps safety
	4 Diathermy, laser use
	4 Infection risks
	3 Radiation use and risks
	4 Tourniquets

3 Principles of local, regional and general anaesthesia

Post-operative care:

- 4 Cardiorespiratory physiology
- 3 Diabetes mellitus
- 3 Renal failure
- 4 Pathophysiology of blood loss
- 4 Pathophysiology of sepsis
- 4 Complications specific to particular operation
- 2 Critical care

Blood Products:

- 4 Components of blood
- 4 Alternatives to use of blood products

Antibiotics:

- 4 Common pathogens in surgical patients
- 4 Antibiotic sensitivities
- 4 Antibiotic side-effects
- 4 Principles of prophylaxis and treatment

Pre-operative assessment and management:

- 4 History and examination
- 4 Interpretation of pre-operative investigations
- 3 Management of comorbidity
- 4 Resuscitation

Intraoperative care:

- 4 Safe conduct of intraoperative care

Post-operative care:

Clinical Skills

- 4 Assessment of patient's condition
- 4 Post-operative analgesia
- 4 Fluid and electrolyte management
- 4 Monitoring of post-operative patient
- 4 Detection of impending organ failure
- 4 Initial management of organ failure
- 4 Use of MDT meetings

Blood Products:

- 4 Appropriate use of blood products
- 4 Management of the complications of blood product transfusion

Antibiotics:

- 4 Appropriate prescription of antibiotics

Technical Skills No content

and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Assessment of multiply injured patients including children
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None
Objective	<i>Safely assess the multiply injured patient.</i>
Knowledge	3 Anatomy 3 Pathogenesis of shock 1 Differences In Children 4 History and examination 3 Investigation
Clinical Skills	4 Resuscitation and early management according to ATLS and APLS guidelines 3 Referral to appropriate surgical subspecialties
Technical Skills and Procedures	3 Central venous line insertion 3 Chest drain insertion 2 Diagnostic peritoneal lavage

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Bleeding diathesis
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None
Objective	<i>Understand, Recognise and Manage bleeding diathesis in the surgical patient.</i> <i>Diagnosis: Diagnose possible bleeding diathesis in the surgical patient.</i> <i>Treatment: Manage bleeding diathesis in the surgical patient.</i>
Knowledge	Diagnosis: 3 Mechanism of haemostasis 3 Pathology of impaired haemostasis e.g. haemophilia, liver disease, massive haemorrhage Treatment: 3 Understands use of blood products Diagnosis: 4 Recognition of conditions likely to lead to the diathesis 3 Recognition of abnormal bleeding during surgery
Clinical Skills	Treatment: 3 Avoidance by correct surgical techniques 3 Corrective measures, e.g. warming, packing
Technical Skills	No content

and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Venous thrombosis + embolism
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None <i>Understanding of practice in the prevention and management of Venous thrombosis and Embolism.</i> <i>Coagulation: Understanding of the physiology and pathophysiology of coagulation.</i>
Objective	<i>Diagnosis: Able to arrange basic investigation of patients with suspected venous thrombosis and embolism.</i> <i>Treatment: Ability to initiate treatment of venous thrombosis and embolism.</i> <i>Prophylaxis: Use of common methods of prophylaxis against venous thrombosis and embolism.</i> Coagulation: 2 Clotting mechanism (Virchow Triad) 2 Effect of surgery and trauma on coagulation 2 Tests for thrombophilia and other disorders of coagulation Diagnosis: 2 Methods of investigation for suspected thromboembolic disease
Knowledge	Treatment: 4 Anticoagulation, heparin and warfarin 2 Role of V/Q scanning, CT angiography and thrombolysis 2 Place of pulmonary embolectomy Prophylaxis: 3 Knowledge of methods of prevention, mechanical and pharmacological Coagulation: 4 Recognition of patients at risk Diagnosis:
Clinical Skills	3 Awareness of symptoms and signs associated with pulmonary embolism and DVT 2 Role of duplex scanning, venography and d-dimer measurement Treatment: 3 Initiate and monitor treatment

Prophylaxis:

4 Awareness at all times of the importance of prophylaxis

**Technical Skills
and Procedures**

No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic Nutrition

Category Core Surgical Skills and Knowledge for All Specialties

Sub-category: None

Objective *Recognise the need for artificial nutritional support and arrange enteral nutrition.*

Knowledge 3 Effects of malnutrition, both excess and depletion
3 Methods of screening and assessment

Clinical Skills 3 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Dietary supplements
2 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Enteral nutrition
1 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Parenteral nutrition

**Technical Skills
and Procedures**

No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic Academic activity

Category Core Surgical Skills and Knowledge for All Specialties

Sub-category: None

An introduction to research methodology and to teaching others.

Objective *Research: Ability to perform a simple research study and present the results.*

Teaching: Ability to teach small groups such as medical students.

Research:

Knowledge 2 Research methodology

Teaching:

2 Teaching methods

Research:

Clinical Skills 2 Ability to analyse published evidence

Teaching:

3 Ability to teach small groups

Technical Skills and Procedures No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Management of the dying patient
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None <i>Ability to manage the dying patient appropriately.</i>
Objective	<i>Palliative Care: Good management of the dying patient in consultation with the palliative care team.</i> <i>Principles of organ donation: Knowledge of the principles of organ donation.</i> Palliative Care: 3 Care of the terminally ill 4 Analgesia 3 Antiemetics 3 Laxatives
Knowledge	Principles of organ donation: 3 Circumstances in which consideration of organ donation is appropriate 3 Principles of brain death 3 Understanding the role of the coroner and the certification of death Palliative Care: 3 Symptom control in the terminally ill patient
Clinical Skills	
Technical Skills and Procedures	No content
Professional Skills	Please see the Professional Skills and Behaviour » Initial section for these skills

Topic	Endocrine and metabolic disorders
Category	Core Surgical Skills and Knowledge for All Specialties
Sub-category:	None <i>To identify, investigate and manage surgical patients with common metabolic disorders</i>
Objective	<i>- To identify, investigate and manage surgical patients with Thyrotoxicosis</i> <i>- To identify, investigate and manage surgical patients with Hypothyroidism</i> <i>- To identify, investigate and manage surgical patients with Hypercalcaemia</i> <i>- Knowledge of the significance of corticosteroid therapy in patient care</i> <i>- To identify, investigate and manage surgical patients with diabetes mellitus</i> <i>- To identify, investigate and manage surgical patients with Hyponatraemia</i>
Knowledge	Thyrotoxicosis 4 Pathophysiology of thyroid hormone excess and associated risks from surgery Hypothyroidism

4 Pathophysiology of thyroid hormone deficiency and associated risks from surgery

Hypercalcaemia

3 Causes and effects of hypercalcaemia

Cortico-steroid therapy

4 Complications

4 Steroid insufficiency

Diabetes Mellitus

4 Complications

Hyponatraemia

4 Pathophysiology of fluid and electrolyte balance

4 Causes of hyponatraemia

Thyrotoxicosis

4 History and examination

3 Investigation of thyrotoxicosis

Hypothyroidism

4 History and examination

4 Investigation

Clinical Skills

Hypercalcaemia

3 Investigation of hypercalcaemia

3 Treatment of hypercalcaemia

Cortico-steroid therapy

4 Peri-operative management of patients on steroid therapy

Diabetes Mellitus

4 Peri-operative management of diabetic patients

Hyponatraemia

4 Treatment

Technical Skills and Procedures

No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic

Child Protection

Category

Core Surgical Skills and Knowledge for All Specialties

Sub-category:

None

Objective

No content

Knowledge

4 Working knowledge of trust and Local Safeguarding Children Boards (LSCBs) Child Protection Procedures

4 Basic understanding of child protection law

4 Understanding of children's rights

4 Working knowledge of types and categories of child maltreatment, presentations, signs and other features (primarily physical, emotional, sexual,

neglect, professional)

4 Understanding of one personal role, responsibilities and appropriate referral patterns in child protection

4 Understanding of the challenges of working in partnership with children and families

Ability to:

4 Recognise the possibility of abuse or maltreatment

4 Recognise limitations of own knowledge and experience and seek appropriate expert advice

Clinical Skills 4 Urgently consult immediate senior in surgery to enable referral to paediatricians

4 Keep appropriate written documentation relating to child protection matters

4 Communicate effectively with those involved with child protection, including children and their families

Technical Skills and Procedures

No content

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic Critical Care and Post-operative Management

Category Module 1

Sub-category: None

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.*

BASIC KNOWLEDGE

Physiology

2 Haemodynamics: physiology and measurement

2 Cardiac arrhythmia

2 Haemostasis, thrombosis and bleeding

2 Acid base balance

2 Pulmonary physiology, ventilation and gas exchange

2 Metabolic response to trauma and surgery

2 GIT, renal and hepatic physiology

2 Nutrition

2 Temperature regulation

Knowledge

Anatomy

2 Heart, pericardium and great vessels

2 Mediastinum, thoracic inlet and neck

2 Tracheobronchial tree and lungs

2 Chest wall and diaphragm

Pathology

2 Inflammation and wound healing

2 Myocardial infarction and complications

2 Endocarditis

- 2 Pericarditis
- 2 Systemic Inflammatory Response Syndrome
- 2 Bronchopulmonary infection
- 2 ARDS

Pharmacology

- 2 Drugs used in the treatment of hypertension, heart failure and angina
- 2 Inotropes, vasodilators and vasoconstrictors
- 2 Anti-arrhythmic drugs
- 2 Haemostatic drugs
- 2 Antiplatelet, anticoagulant and thrombolytic drugs
- 2 Analgesics
- 2 Antibiotics
- 2 Anaesthetic agents, local and general

Microbiology

- 2 Organisms involved in cardiorespiratory infection
- 2 Antimicrobial treatment and policies

CLINICAL KNOWLEDGE

- 2 Cardiopulmonary resuscitation
- 2 Management of cardiac surgical patient
- 2 Management of thoracic surgical patient
- 2 Treatment of cardiac arrhythmia
- 2 Management of complications of surgery
- 2 Blood transfusion and blood products
- 2 Wound infection and sternal disruption
- 2 Neuropsychological consequences of surgery and critical care
- 3 History and examination of the post-operative and critically ill patient

- 3 Analysis and interpretation of post operative and critical care charts and documentation

General management of surgical patient:

- 3 Routine haematology and biochemical investigations
- 2 Chest radiograph and ECG
- 2 Management of fluid balance and circulating volume
- 2 Pain control
- 2 Wound management
- 2 Management of surgical drains
- 2 Antimicrobial policy and prescribing
- 2 Management of post-operative haemorrhage
- 3 Cardiopulmonary resuscitation (ALS)
- 2 Management of complications of surgery
- 3 Blood transfusion and blood products including safe usage of blood
- 2 Wound infection and sternal disruption

Clinical Skills

Recognition, evaluation and treatment of haemodynamic abnormalities:

- 2 Evaluation and interpretation of haemodynamic data
- 2 Interpretation of ECG
- 2 Use of anti-arrhythmic drugs
- 2 Recognition, evaluation and treatment of cardiac arrhythmias
- 2 Understanding and use of cardiac pacing

Recognition, evaluation and treatment of ventilatory abnormalities:

- 2 Interpretation of blood gas results
- 2 Airway management
- 2 Understanding of ventilatory techniques and methods
- 2 Understanding of anaesthetic drugs and methods

Recognition, evaluation and treatment of multiorgan dysfunction:

- 2 Renal dysfunction and support
- 2 GIT dysfunction, feeding and nutrition
- 2 Recognition and evaluation of cerebral and neuropsychological problems

Recognition, evaluation and treatment of haemodynamic abnormalities:

- 2 Use of defibrillator
- 2 Practical use of inotropes and vasoactive drugs
- 2 Use of intra aortic balloon pump
- 1 Echocardiography including TOE

Practical Skills:

Technical Skills and Procedures

- 3 Arterial cannulation
- 3 Central venous cannulation
- 2 Pulmonary artery catheterisation
- 1 Intra aortic balloon pump insertion
- 1 Intra aortic balloon pump timing and management
- 1 Tracheostomy
- 1 Fibreoptic bronchoscopy
- 3 Chest aspiration
- 3 Chest drain insertion
- 2 Chest drain management

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Cardiac surgery
Category	Module 2
Sub-category:	None
Objective	<i>To gain experience in aspects of the management of a cardiac surgical patient. This includes operative management as appropriate and with supervision.</i>
	BASIC KNOWLEDGE
Knowledge	Physiology
	2 Myocardial cellular physiology
	2 Haemodynamics; physiology and measurement

- 2 Electrophysiology, including conduction disorders
- 2 Haemostasis, thrombosis and bleeding
- 2 Acid base balance
- 2 Pulmonary physiology, ventilation and gas exchange
- 2 Metabolic response to trauma
- 2 Vascular biology and reactivity

Anatomy

- 2 Heart, pericardium and great vessels
- 2 Coronary anatomy and variants
- 2 Coronary angiography
- 2 Anatomy of the peripheral vascular system and vascular conduits

Pathology

- 2 Inflammation and wound healing
- 2 Atheroma, medial necrosis and arteritis
- 2 Myocardial infarction and complications
- 2 Systemic Inflammatory Response Syndrome

Pharmacology

- 2 Drugs used in the treatment of hypertension, heart failure and angina
- 2 Anti-arrhythmic drugs
- 2 Haemostatic drugs
- 2 Antiplatelet, anticoagulant and thrombolytic drugs
- 2 Analgesics
- 2 Antibiotics
- 2 Anaesthetic agents, local and general

Microbiology

- 2 Organisms involved in cardiorespiratory infection
- 2 Organisms involved in wound infection
- 2 Antibiotic usage and prophylaxis
- 2 Antisepsis

CLINICAL KNOWLEDGE

General

- 2 Diagnosis, investigation and treatment of heart disease
- 2 Risk assessment and stratification
- 2 Cardiopulmonary resuscitation
- 2 Cardiac arrhythmias
- 2 Complications of surgery
- 2 Renal dysfunction
- 2 Multiorgan failure
- 2 Cardiac rehabilitation
- 2 Blood transfusion and blood products
- 2 Wound infection and sternal disruption

Specific

- 2 Diagnosis investigation and assessment of IHD
 - 2 Operative treatment - Off pump and on pump surgery
 - 2 Results of surgery – survival, graft patency, recurrence
 - 2 Role of PCI and non operative treatment
 - 2 Management of cardiovascular risk factors
 - 2 Diagnosis investigation and assessment of valvular heart disease
 - 2 Timing of surgical intervention in valve disease
 - 2 Options for operative management of hear valve disease including:
 - 2 Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts)
 - 2 Valve design: materials, configuration and biomechanics.
 - 2 Results of surgery – survival, valve thrombosis, endocarditis, bleeding.
 - 2 Interpretation of survival and follow up data
 - 2 Cardiac performance and long term functional status
 - 2 Surgery for conduction problems
 - 2 Surgical treatment of arrhythmias
- 3 History and examination of the cardiovascular system including conduit, drug history, identification of co morbidity and risk assessment

Data interpretation:

- 3 Routine haematology and biochemical investigations
 - 3 Interpretation of haemodynamic data
 - 2 Chest radiograph
 - 2 ECG including exercise ECG
 - 2 Coronary angiography
 - 2 Cardiac catheterisation data
 - 1 Echocardiography including 2D, Doppler and TOE and stress echo
- Clinical Skills** 1 Nuclear cardiology

Patient Management:

- 4 Cardiopulmonary resuscitation
- 3 Diagnosis and treatment of cardiac arrhythmias
- 2 Management of post cardiac surgical patient
- 2 Management of complications of surgery
- 2 Cardiac rehabilitation
- 3 Blood transfusion and blood products, including safe use of blood
- 2 Wound infection and sternal disruption
- 1 Valve selection
- 2 Anticoagulation management including complications.

Operative Management:

- 3 Saphenous vein harvest
 - 2 Median Sternotomy
 - 1 Mammary/radial artery harvest
 - 1 Preparation for and management of cardiopulmonary bypass
 - 1 Proximal aortovenous anastamosis
 - 1 Distal coronary anastamosis
 - 1 Heart Valve replacement
- Technical Skills and Procedures**

1 Surgical re-exploration for bleeding or tamponade

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Thoracic surgery
Category	Module 3
Sub-category:	None
Objective	<i>To gain experience in the evaluation and management of a patient undergoing thoracic surgery. Includes operative management with supervision where appropriate .</i>
Knowledge	<p>BASIC KNOWLEDGE</p> <p>Physiology</p> <ul style="list-style-type: none">2 Pulmonary physiology, ventilation and gas exchange2 Haemostasis, thrombosis and bleeding2 Acid base balance2 Metabolic response to trauma2 Digestive, renal and hepatic physiology2 Nutrition <p>Anatomy</p> <ul style="list-style-type: none">2 Tracheobronchial tree and lungs2 Thoracic inlet, neck and mediastinum2 Oesophagus and upper GI tract2 Chest wall and diaphragm <p>Pathology</p> <ul style="list-style-type: none">2 Inflammation and wound healing2 Bronchopulmonary infections2 ARDS2 Emphysema2 Pulmonary fibrosis2 Pulmonary manifestations of systemic disease2 Systemic manifestations of pulmonary disease2 Benign and malignant tumours of trachea, bronchus and lung parenchyma2 Oesophagitis, columnar-lined oesophagus stricture2 Oesophageal motility disorders2 Malignant and benign tumours of the oesophagus and stomach2 Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid <p>Pharmacology</p> <ul style="list-style-type: none">2 Bronchodilators2 H2 antagonists and proton pump inhibitors2 Haemostatic drugs2 Analgesics2 Antibiotics

2 Anaesthetic agents, local and general

Microbiology

2 Organisms involved in respiratory infection including TB

2 Organisms involved in wound infection

2 Antibiotic usage and prophylaxis

2 Antisepsis

2 Management of intra pleural sepsis

CLINICAL KNOWLEDGE

Thoracic Incisions

2 Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches.

Sternotomy

2 Analgesia including pharmacology, effectiveness, side effects and use in combination regimens

2 Post-operative analgesia, including epidural, PCAS and paravertebral catheter techniques.

Bronchoscopy

2 The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy

Mediastinal exploration

2 Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology.

2 Equipment for mediastinal exploration

2 Benign and malignant tumours of trachea, bronchus and lung parenchyma

2 Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases.

2 Adjuvant and multimodality treatment

2 Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management.

2 Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse.

2 Knowledge of palliative care techniques.

2 Inflammatory, infective and malignant disease of the visceral and parietal pleura.

2 Pneumothorax pleural effusion empyema and haemothorax

2 Conditions of adjacent organs that affect the pleura

2 Medical and surgical management of pleural disease, including radiological, open and VATS techniques.

3 System specific and general history and examination, including drug history, identification of comorbidity and functional status.

Data interpretation:

- 3 Routine haematology and biochemical investigations
- 2 Chest radiograph and ECG
- 2 CT, including contrast enhanced CT
- 2 MRI
- 2 Respiratory function tests
- 2 Ventilation/perfusion scan
- 2 Blood gases
- 1 Oesophageal function tests and contrast studies

Clinical Skills

Patient Management:

- 3 Cardiopulmonary resuscitation
- 2 Diagnosis, investigation and treatment of pulmonary oesophageal and other thoracic conditions
- 2 Risk assessment, stratification and management
- 2 Management of post thoracic surgical patient
- 2 Management of complications of surgery
- 2 Treatment of cardiac arrhythmias
- 2 Pain control
- 2 Wound infection and disruption
- 2 Blood transfusion and blood products
- 2 Physiotherapy and rehabilitation
- 2 Palliative care

Practical Skills:

- 1 Fibreoptic bronchoscopy
- 3 Chest aspiration
- 3 Chest drain insertion
- 2 Chest drain management

Operative Management:

Technical Skills and Procedures

- 2 Correct positioning of patient for thoracic surgery
- 2 Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions
- 2 Perform rigid and flexible bronchoscopy
- 2 Take appropriate specimens for bacteriology, cytology and histology
- 1 Endoscopic and surgical techniques used in lung biopsy
- 1 Surgery for benign and malignant conditions of the lungs, including uncomplicated lobectomy for lung cancer, wedge resection and metastasectomy
- 1 Intraoperative diagnosis and staging
- 2 Open operation for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 1 VATS procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 1 Open and VATS procedures for empyema, including techniques for

decortication.

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

Topic	Cardiopulmonary bypass, myocardial protection and circulatory support
Category	Module 4
Sub-category:	None
Objective	<i>To gain experience in the practical applications of cardiopulmonary bypass, myocardial protection and circulatory support. To understand the science and technology that underpins these disciplines</i>
	BASIC KNOWLEDGE
	Physiology
	2 Haemodynamics: physiology and measurement
	2 Cardiac arrhythmias
	2 Haemostasis, thrombosis and bleeding
	2 Acid base balance
	2 Pulmonary physiology, ventilation and gas exchange
	2 Metabolic response to trauma and surgery
	2 GIT, renal and hepatic physiology
	2 Temperature regulation
	2 Myocardial cellular physiology
	2 Myocardial function and dysfunction
	2 Haemodynamics and arrhythmias
	2 Scientific foundations of myocardial preservation
	2 Physiology of the balloon pump
	Anatomy
Knowledge	2 Heart, pericardium and great vessels
	2 Mediastinum, thoracic inlet and neck
	2 Chest wall and diaphragm
	2 Femoral triangle and peripheral vascular system
	Pathology
	2 Inflammation and wound healing
	2 Systemic Inflammatory Response Syndrome
	2 ARDS
	Pharmacology
	2 Drugs used in the treatment of hypertension, heart failure and angina
	2 Inotropes, vasodilators and vasoconstrictors
	2 Anti-arrhythmic drugs
	2 Haemostatic drugs
	2 Antiplatelet, anticoagulant and thrombolytic drugs
	2 Analgesics
	2 Antibiotics
	2 Anaesthetic agents, local and general

Microbiology

- 2 Organisms involved in cardiorespiratory infection
- 2 Antimicrobial treatment and policies

SPECIFIC KNOWLEDGE

- 2 Principles and practice of CPB
- 2 Relevant equipment and technology and its application
- 2 Monitoring during CPB
- 2 Inflammatory and pathophysiological response to bypass
- 2 Pulsatile and non pulsatile flow
- 2 Effect of CPB on pharmacokinetics
- 2 Priming fluids and haemodilution
- 2 Acid base balance – pH and alpha stat
- 2 Neuropsychological consequences of CPB
- 2 Cell salvage and blood conservation
- 2 Principles and practice of myocardial preservation
- 2 Cardioplegia solutions and delivery modes.
- 2 Non-cardioplegic techniques of preservation
- 2 Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods
- 2 Intra aortic balloon pump – indications for use, patient selection and complications
- 2 Understanding of relevant equipment and technology
- 2 Ventricular assist devices – indications for use, patient selection and complications

Patient Management:

- 2 Practical Knowledge of the Principles and practice of CPB
- 2 Relevant equipment and technology and its application
- 2 Monitoring during CPB
- Clinical Skills** 1 Myocardial management throughout the peri-operative period
- 2 Patient selection for mechanical circulatory support
- 1 Insertion and positioning of the intra aortic balloon pump
- 1 Management of the balloon pump including timing and trouble shooting
- 1 Care of the patient with intra aortic balloon pump, including recognition and management of complications

Operative Management:

- Technical Skills and Procedures** 2 Median sternotomy open and close
- 1 Cannulation and institution of cardiopulmonary bypass
- 1 Safe conduct of CPB – problem solving and troubleshooting
- 1 Weaning from bypass and decannulation
- 2 Femoral cannulation and decannulation

Professional Skills Please see the [Professional Skills and Behaviour » Initial](#) section for these skills

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
- Management of Benign Oesophageal Disorders
- Management of Oesophageal Neoplasia

Click on [Workplace Based Assessments](#) to view the assessment forms including DOPS and PBAs

Topics

Topic	Critical Care and Post-operative Management
Category	Critical Care and Post-operative Management
Sub-category:	None
Objective	<i>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,</i>

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.

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

Knowledge

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

- 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

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

Clinical Skills

- 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

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

PRACTICAL SKILLS

(level as indicated)

4 Arterial cannulation

4 Central venous cannulation

4 Pulmonary artery catheterisation

3 Intra aortic balloon pump insertion

3 Intra aortic balloon pump timing and management

**Technical Skills
and Procedures**

2 Tracheostomy

2 Fibreoptic bronchoscopy

4 Chest aspiration

4 Chest drain insertion

3 Chest drain management

OPERATIVE MANAGEMENT

2 Surgical re-exploration for bleeding or tamponade

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Cardiopulmonary Bypass**

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.*

BASIC KNOWLEDGE

Physiology

Knowledge 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 No content

OPERATIVE MANAGEMENT

- Technical Skills and Procedures** 3 Median sternotomy open and close
- 3 Cannulation and institution of cardiopulmonary bypass
- 3 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

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Myocardial Protection**

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.*

BASIC KNOWLEDGE

3 Myocardial cellular physiology
3 Myocardial function and dysfunction
3 Haemodynamics and arrhythmias
3 Coronary arterial and venous anatomy

Knowledge

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

PATIENT MANAGEMENT

2 Myocardial management throughout the peri-operative period

Clinical Skills

2 Ability to adapt preservation technique to clinical situation

OPERATIVE MANAGEMENT

Technical Skills and Procedures

2 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**

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.*

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

Knowledge

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

PATIENT MANAGEMENT

- 2 Patient selection for mechanical circulatory support

Clinical Skills

- 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

Technical Skills and Procedures

No content

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Ischaemic Heart Disease

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.*

BASIC KNOWLEDGE

Physiology

Knowledge

- 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.

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

Clinical Skills

- 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 cardiopulmonary bypass
- 3 Proximal coronary anastomosis
- 2 Distal coronary anastomosis

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Heart Valve Disease

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.*

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

- Knowledge**
- 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 aagnosis 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

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

Clinical Skills

- 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.

OPERATIVE MANAGEMENT

- 2 Isolated, uncomplicated aortic valve replacement (stented biological or mechanical)
- 2 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 including stentless valves, and root replacement
- 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

Technical Skills and Procedures

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Aortovascular Disease**
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.

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

- Knowledge**
- 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

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

Clinical Skills

- 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

OPERATIVE MANAGEMENT

- 2 Intraoperative monitoring
- 1 Spinal cord protection
- 1 Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery
- 1 Hypothermic strategies including HCA, RCP and SACP
- 3 Femoral 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

Technical Skills and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Cardiothoracic Trauma**
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.*

BASIC KNOWLEDGE

- 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

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

Clinical Skills

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

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.
- 3 Pericardiocentesis and subxiphoid pericardial window for tamponade

OPERATIVE MANAGEMENT OF THORACIC TRAUMA

- 2 Subxiphoid pericardial window for tamponade
- 3 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
- 2 Management of the complications of chest trauma including retained haemothorax and empyema
- 1 Repair of oesophageal injuries
- 1 Repair of aortic transection

Technical Skills and Procedures

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	General Management of a Patient Undergoing Thoracic Surgery
Category	General Management of a Patient Undergoing Thoracic Surgery
Sub-category:	None
Objective	<i>To be competent in the evaluation and management of a patient undergoing thoracic surgery including operative management, with appropriate</i>

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.

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

Knowledge

- 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.

HISTORY AND EXAMINATION

4 System specific and general history and examination, including drug history, identification of comorbidity and functional status.

DATA INTERPRETATION

- Clinical Skills**
- 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

PRACTICAL SKILLS

- 4 Arterial cannulation
- 4 Central venous cannulation
- 4 Pulmonary artery catheterisation
- 3 Tracheostomy
- 3 Fibreoptic bronchoscopy
- 4 Chest aspiration
- 4 Chest drain insertion

Technical Skills and Procedures

3 Chest drain management

OPERATIVE MANAGEMENT

Thoracic Incisions

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

Bronchoscopy

3 Diagnostic bronchoscopy including biopsy - rigid and flexible.

3 Equipment, instrumentation and preparation

3 Perform rigid and flexible bronchoscopy

3 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 and procedure

2 Tracheostomy and minitracheostomy

1 Bronchoscopy in situations where there is unfavourable anatomy or complex pathology and to deal with complications.

Mediastinal Exploration

3 Assembly of relevant equipment for mediastinal exploration

2 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.

2 Mediastinal biopsy

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Neoplasms of the Lung**

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.*
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.

Knowledge 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.

PATIENT MANAGEMENT

As for thoracic surgery - general

Clinical Skills 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.

OPERATIVE MANAGEMENT

2 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, including uncomplicated lobectomy for lung cancer, wedge resection and metastasectomy.

2 Segmentectomy and lobectomy for benign and malignant disease.

1 Redo operations for repeat resections of lung metastases.

1 Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm.

1 Repeat resections for benign and malignant conditions of the lung, including completion pneumonectomy

1 Management of post-operative complications such as empyema and broncho-pleural fistula.

Technical Skills and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Disorders of the Pleura

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*

GENERAL KNOWLEDGE

As for thoracic surgery – general

SPECIFIC KNOWLEDGE

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
- PATIENT MANAGEMENT

As for thoracic surgery – general

Clinical Skills

- 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.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

- 3 Open procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 2 VATS procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 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.

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Disorders of the Chest Wall
Category	Disorders of the Chest Wall

Sub-category:	None
Objective	<p><i>To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate and with appropriate supervision.</i></p> <p>GENERAL KNOWLEDGE</p> <p>As for thoracic surgery - general</p> <p>SPECIFIC KNOWLEDGE</p> <p>3 Anatomy of the chest wall</p> <p>3 Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall.</p> <p>3 Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology.</p> <p>3 Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy.</p>
Knowledge	<p>3 Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction.</p> <p>3 Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae.</p> <p>3 Prosthetic materials used in chest wall surgery</p> <p>3 The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery.</p> <p>3 Techniques of complex chest wall reconstruction involving thoracoplasty or soft-tissue reconstruction</p>
	<p>PATIENT MANAGEMENT</p> <p>As for thoracic surgery - general</p> <p>4 Clinical history and examination</p>
Clinical Skills	<p>3 Interpretation of laboratory, physiological and imaging techniques.</p> <p>3 Patient selection with assessment of function and risk.</p>
Technical Skills and Procedures	<p>OPERATIVE MANAGEMENT</p>

- 3 Chest wall biopsy and choice of appropriate technique.
- 3 Needle biopsy by aspiration or core techniques and the siting of open surgical biopsy.
- 3 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 with thoracoplasty and, with appropriate specialist support, soft tissue reconstruction.

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Disorders of the Diaphragm**

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.*

GENERAL KNOWLEDGE

As for thoracic surgery – general

SPECIFIC KNOWLEDGE

- 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.

PATIENT MANAGEMENT

As for thoracic surgery – general

Specific Skills

Clinical 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.

OPERATIVE MANAGEMENT

1 Resection of the diaphragm, and adjacent structures, including appropriate selection and insertion of prosthetic materials

Technical Skills and Procedures

1 Complications of diaphragmatic resection.

1 Phrenic nerve pacing.

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Emphysema and Bullae**

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.*

GENERAL KNOWLEDGE

As for thoracic surgery – general

SPECIFIC KNOWLEDGE

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

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.

Clinical Skills

OPERATIVE MANAGEMENT

- 2 Procedures to deal with secondary pneumothorax and bullae by open techniques.
- 2 Procedures to deal with secondary pneumothorax and bullae by VATS techniques.
- 1 Lung volume reduction surgery, unilaterally and bilaterally, using open and VATS techniques.

Technical Skills and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Disorders of the Pericardium
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.*

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.

Knowledge

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.

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

3 Interpretation of laboratory, physiological and imaging techniques, including echocardiography.

Clinical Skills

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.

OPERATIVE MANAGEMENT

3 Uncomplicated pericardial fenestration procedures

2 Pericardial fenestration in complex cases.

Technical Skills and Procedures

2 Pericardiectomy for relief of constriction

2 Resection of the pericardium and replacement, in appropriate situations, 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

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.

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.

Knowledge

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

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

3 Interpretation of laboratory, physiological and imaging techniques.

Clinical Skills

3 Patient selection with assessment of function and risk.

3 Post-operative management of patients including recognition and management of post-operative complications .

OPERATIVE MANAGEMENT

3 Selection of appropriate routes for biopsy and excision of mediastinal tumours and cysts.

3 Biopsy of mediastinal masses.

Technical Skills and Procedures

2 Excision of the thymus for myasthenia gravis.

2 Resection of mediastinal cysts and tumours masses.

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

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.*

GENERAL KNOWLEDGE

As for thoracic surgery – general

Knowledge

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.

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.

Clinical Skills

- 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.

OPERATIVE MANAGEMENT

2 Endoscopic assessment of a patient with airways disease

1 Sleeve resection of the trachea for simple benign conditions, including appropriate anastamotic techniques.

1 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease, including appropriate anastamotic techniques.

Technical Skills and Procedures

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

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.

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

Knowledge

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
 - 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 Ebsteins abnormality
- 2 Extra cardiac conduits
- 1 Interrupted aortic arch
- 2 Total anomalous pulmonary venous drainage
- 2 Extra Corporeal Membrane Oxygenation
- 2 Transplantation

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

Clinical Skills

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

OPERATIVE MANAGEMENT

2 Sternotomy - open and close

2 Thoracotomy - open and close

2 Preparation for and management of cardiopulmonary bypass including partial bypass

Technical Skills and Procedures

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)

- Patent ductus arteriosus
- Atrial septal defect
- Ventricular septal defect
- Coarctation
- 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

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.

BASIC KNOWLEDGE

Pathophysiology

3 Haemodynamics of heart failure.

Knowledge

3 Molecular mechanisms underlying heart failure.

3 Haemodynamics of cardiac constriction.

3 Mechanisms and outcomes of respiratory failure.

3 Causes of cardiac failure.

3 Causes of respiratory failure.

Immunology

3 Major and minor histocompatibility 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

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 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient.

4 Management of patients after intrathoracic organ transplantation, including complications

4 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure.

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

Clinical Skills

4 Chest radiograph

4 ECG including exercise ECG

4 Coronary angiography

4 Cardiac catheterisation data

3 Echocardiography including 2D, Doppler and TOE and stress echo

3 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

3 Cardiac rehabilitation

4 Blood transfusion and blood products

3 Wound infection and sternal disruption

OPERATIVE MANAGEMENT

Transplantation

2 Donor Retrieval

1 Implantation of heart

1 Implantation of lung and heart/lung

Technical Skills and Procedures

Surgery for heart failure

2 Surgical revascularisation for ischaemic cardiomyopathy

1 Ventricular reverse remodelling surgery

1 Mitral valve repair for cardiac failure

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.*

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.

Knowledge

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

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

Clinical Skills

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

OPERATIVE MANAGEMENT

Technical Skills and Procedures

- 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

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.*

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

- Knowledge**
- 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.

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.

Clinical Skills

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.

OPERATIVE MANAGEMENT

2 Oesophago-gastro-duodenoscopy

2 Assessment by thoracoscopy laparoscopy and mediastinoscopy

Technical Skills 2 Rigid oesophagoscopy and bronchoscopy

and Procedures 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 (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 (II) 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
- Management of Benign Oesophageal Disorders
- Management of Oesophageal Neoplasia

Click on [Workplace Based Assessments](#) to view the assessment forms including DOPS and PBAs

Topics

Topic	Critical Care and Post-operative Management
Category	Critical Care and Post-operative Management
Sub-category:	None
Objective	<i>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,</i>

multidisciplinary team in the management of a patient requiring complex critical care

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

Knowledge 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

HISTORY AND EXAMINATION

4 History and examination of the post-operative and critically ill patient

DATA INTERPRETATION

Clinical Skills

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 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

PRACTICAL SKILLS

- 4 Arterial cannulation
- 4 Central venous cannulation
- 4 Pulmonary artery catheterisation
- 4 Intra aortic balloon pump insertion
- 4 Intra aortic balloon pump timing and management

Technical Skills and Procedures

- 4 Tracheostomy
- 4 Fibreoptic bronchoscopy
- 4 Chest aspiration
- 4 Chest drain insertion
- 4 Chest drain management

OPERATIVE MANAGEMENT

- 4 Surgical re-exploration for bleeding or tamponade

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Cardiopulmonary Bypass
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support
Sub-category:	Cardiopulmonary Bypass
Objective	<i>To manage the clinical and technical aspects of cardiopulmonary bypass. During this module competence in the management of uncomplicated situations</i>

is obtained. Management of complex or difficult situations may require further training and supervision.

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

- Knowledge** 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 No content

OPERATIVE MANAGEMENT

4 Median sternotomy open and close

4 Cannulation and institution of cardiopulmonary bypass

Technical Skills and Procedures 4 Safe conduct of CPB – problem solving and troubleshooting

4 Weaning from bypass and decannulation

4 Femoral cannulation and decannulation

3 Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Myocardial Protection

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.*

BASIC KNOWLEDGE

- 4 Myocardial cellular physiology
- 4 Myocardial function and dysfunction
- 4 Haemodynamics and arrhythmias
- 4 Coronary arterial and venous anatomy

Knowledge

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

PATIENT MANAGEMENT

- 4 Myocardial management throughout the peri-operative period
- ### Clinical Skills
- 3 Ability to adapt preservation technique to clinical situation

OPERATIVE MANAGEMENT

Technical Skills and Procedures

- 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

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.*

BASIC KNOWLEDGE

- 4 Haemodynamics: physiology and measurement
- ### Knowledge
- 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

PATIENT MANAGEMENT

4 Patient selection for mechanical circulatory support

Clinical Skills

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

No content

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic

Ischaemic Heart Disease

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

BASIC KNOWLEDGE

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

OPERATIVE MANAGEMENT

4 Isolated, first time coronary artery surgery
(May include both off pump and on pump options and arterial revascularisation strategies)

Technical Skills and Procedures

2 Repeat coronary artery surgery

2 Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Heart Valve Disease

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

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

Knowledge

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

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

Clinical Skills 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.

OPERATIVE MANAGEMENT

2 Tricuspid valve surgery

1 Surgical strategies for managing the small aortic root

1 Aortic root surgery including stentless valves, and root replacement

1 Redo Valve surgery

1 Valve surgery for endocarditis

Technical Skills and Procedures 1 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

4 Isolated, uncomplicated aortic valve replacement (stented biological or mechanical)

4 Isolated uncomplicated mitral valve replacement

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Aortovascular Disease

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.*

BASIC KNOWLEDGE

Physiology

4 Vascular biology and reactivity

Knowledge 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

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

Clinical Skills

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

OPERATIVE MANAGEMENT

- 3 Intraoperative monitoring
- 2 Spinal cord protection
- 2 Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery

Technical Skills and Procedures

- 2 Hypothermic strategies including HCA, RCP and SACP
- 3 Femoral 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

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Cardiothoracic Trauma**

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*

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

Knowledge

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

GENERAL TRAUMA MANAGEMENT (ATLS)

4 Assessment and management of airway, breathing and circulation

Clinical Skills 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

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.

4 Pericardiocentesis and subxiphoid pericardial window for tamponade

OPERATIVE MANAGEMENT OF THORACIC TRAUMA

Technical Skills and Procedures

3 Subxiphoid pericardial window for tamponade

4 Postero-lateral, thoracotomy, antero lateral thoracotomy and thoracotomy

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

2 Repair of oesophageal injuries

1 Repair 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**

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.*

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

Knowledge 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.

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

Clinical Skills

- 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

PRACTICAL SKILLS

4 Arterial cannulation

4 Central venous cannulation

4 Pulmonary artery catheterisation

Technical Skills and Procedures

4 Tracheostomy

4 Fiberoptic bronchoscopy

4 Chest aspiration

4 Chest drain insertion

4 Chest drain management

OPERATIVE MANAGEMENT

Thoracic Incisions

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

Bronchoscopy

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

4 Tracheostomy and minitracheostomy

3 Bronchoscopy in situations where there is unfavourable anatomy or complex pathology and to deal with complications.

Mediastinal Exploration

4 Assembly of relevant equipment for mediastinal exploration

4 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.

4 Mediastinal biopsy

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Neoplasms of the Lung
Category	Neoplasms of the Lung
Sub-category:	None
Objective	<i>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.</i>
	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.
Knowledge	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.
	PATIENT MANAGEMENT
	As for thoracic surgery - general
	4 Clinical history and examination
Clinical Skills	4 Interpretation of laboratory, physiological and imaging techniques.
	4 Interpretation of endoscopic findings.
	4 Patient selection with assessment of function and risk.
Technical Skills	OPERATIVE MANAGEMENT

and Procedures

- 4 Bronchoscopic assessment including biopsy
- 4 Endoscopic and surgical techniques of lung biopsy.
- 4 Mediastinal assessment and biopsy
- 2 Endoscopic management of tumours using laser and stenting
- 4 Intraoperative diagnosis and staging
- 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.
- 2 Redo operations for repeat resections of lung metastases.
- 2 Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm.
- 2 Repeat resections for benign and malignant conditions of the lung, including completion pneumonectomy
- 2 Management of post-operative complications such as empyema and broncho-pleural fistula.

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Disorders of the Pleura
Category	Disorders of the Pleura
Sub-category:	None
Objective	<i>To fully evaluate and manage uncomplicated surgical conditions of the pleura and the pleural space</i> GENERAL KNOWLEDGE As for thoracic surgery – general SPECIFIC KNOWLEDGE
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

PATIENT MANAGEMENT

As for thoracic surgery – general

Clinical Skills

- 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.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

- 4 Open procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 4 VATS procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy
- 3 Open and VATS procedures for empyema, including techniques for decortication.
- 2 Open and VATS procedures in complex cases.
- 1 Advanced techniques of pleural space obliteration, with appropriate specialist assistance.

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic Disorders of the Chest Wall
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.*

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.

Knowledge

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

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

Clinical Skills

4 Interpretation of laboratory, physiological and imaging techniques.

4 Patient selection with assessment of function and risk.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

4 Chest wall biopsy and choice of appropriate technique.

4 Needle biopsy by aspiration or core techniques and the siting of open surgical biopsy.

- 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.
- 3 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
- 2 Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions.
- 1 Complex chest wall reconstruction with thoracoplasty and, with appropriate specialist support, soft tissue reconstruction.

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Disorders of the Diaphragm
Category	Disorders of the Diaphragm
Sub-category:	None
Objective	<i>To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate.</i>
	GENERAL KNOWLEDGE
	As for thoracic surgery – general
	SPECIFIC KNOWLEDGE
	4 Anatomy and physiology of the diaphragm.
	4 Pathology of the diaphragm.
Knowledge	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.

PATIENT MANAGEMENT

As for thoracic surgery – general

Specific Skills

Clinical 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.

OPERATIVE MANAGEMENT

2 Resection of the diaphragm, and adjacent structures, including appropriate selection and insertion of prosthetic materials

Technical Skills and Procedures

2 Complications of diaphragmatic resection.

2 Phrenic nerve pacing.

Professional Skills

Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic **Emphysema and Bullae**

Category Emphysema and Bullae

Sub-category: None

Objective *To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate.*

GENERAL KNOWLEDGE

As for thoracic surgery – general

Knowledge

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

PATIENT MANAGEMENT

As for thoracic surgery – general

- 4 Clinical history and examination
- Clinical Skills** 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.

OPERATIVE MANAGEMENT

- 4 Procedures to deal with secondary pneumothorax and bullae by open techniques.
- Technical Skills and Procedures** 4 Procedures to deal with secondary pneumothorax and bullae by VATS techniques.
- 2 Lung volume reduction surgery, unilaterally and bilaterally, using open and VATS techniques.

Professional Skills Please see the [Professional Skills and Behaviour » Intermediate](#) section for these skills

Topic	Disorders of the Pericardium
Category	Disorders of the Pericardium
Sub-category:	None
Objective	<i>To fully assess and manage a patient with disease of the pericardium or</i>

pericardial space, including surgical management where appropriate.

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.

Knowledge

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.

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

3 Interpretation of laboratory, physiological and imaging techniques, including echocardiography.

Clinical Skills

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 Uncomplicated pericardial fenestration procedures
 - 3 Pericardial fenestration in complex cases.
 - 3 Pericardiectomy for relief of constriction
 - 3 Resection of the pericardium and replacement, in appropriate situations, with prosthetic materials.
 - 3 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
Category	Disorders of the Mediastinum
Sub-category:	None
Objective	<i>To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate.</i>
	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
Knowledge	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 .

OPERATIVE MANAGEMENT

4 Selection of appropriate routes for biopsy and excision of mediastinal tumours and cysts.

4 Biopsy of mediastinal masses.

Technical Skills and Procedures

4 Excision of the thymus for myasthenia gravis.

4 Resection of mediastinal cysts and tumours masses.

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

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.

GENERAL KNOWLEDGE

As for thoracic surgery – general

SPECIFIC KNOWLEDGE

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.

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.

Clinical Skills

- 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.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

- 3 Endoscopic assessment of a patient with airways disease
- 2 Sleeve resection of the trachea for simple benign conditions, including

appropriate anastamotic techniques.

2 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease, including appropriate anastamotic techniques.

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, 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

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.

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

Knowledge 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

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

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

- Clinical Skills** 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

OPERATIVE MANAGEMENT

2 Sternotomy – open and close

2 Thoracotomy – open and close

2 Preparation for and management of cardiopulmonary bypass including partial bypass

Technical Skills and Procedures 2 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)

- Patent ductus arteriosus
- Atrial septal defect
- Ventricular septal defect
- Coarctation
- 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**

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.*

BASIC KNOWLEDGE

Pathophysiology

3 Haemodynamics of heart failure.

3 Molecular mechanisms underlying heart failure.

Knowledge 3 Haemodynamics of cardiac constriction.

3 Mechanisms and outcomes of respiratory failure.

3 Causes of cardiac failure.

3 Causes of respiratory failure.

Immunology

3 Major and minor histocompatibility 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

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 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient.

4 Management of patients after intrathoracic organ transplantation, including complications

4 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure.

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

3 Echocardiography including 2D, Doppler and TOE and stress echo

3 Nuclear cardiology

PATIENT MANAGEMENT

Clinical Skills

- 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
- 3 Cardiac rehabilitation
- 4 Blood transfusion and blood products
- 3 Wound infection and sternal disruption

OPERATIVE MANAGEMENT

Transplantation

- 2 Donor Retrieval

- 1 Implantation of heart

- 1 Implantation of lung and heart/lung

Technical Skills and Procedures

- Surgery for heart failure

- 2 Surgical revascularisation for ischaemic cardiomyopathy

- 1 Ventricular reverse remodelling surgery

- 1 Mitral valve repair for cardiac failure

- 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.

BASIC KNOWLEDGE

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

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

Clinical Skills 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

OPERATIVE MANAGEMENT

2 Oesophago-gastro-duodenoscopy.

**Technical Skills
and Procedures** 2 Rigid oesophagoscopy

2 Oesophageal dilatation

2 Open and laparoscopic fundoplication and cardiomyotomy

2 Mobilisation of oesophagus, stomach and colon

1 Oesophageal anastomosis

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.

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.

Knowledge

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.

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

Clinical Skills 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.

OPERATIVE MANAGEMENT

2 Oesophago-gastro-duodenoscopy

2 Assessment by thoracoscopy laparoscopy and mediastinoscopy

Technical Skills and Procedures

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

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.

Click on [Workplace Based Assessments](#) to view the assessment forms including DOPS and PBAs

Topics

Topic	Critical Care and Post-operative Management
Category	Critical Care and Post-operative Management
Sub-category:	None
Objective	<i>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</i>
	BASIC KNOWLEDGE
	Physiology
Knowledge	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

HISTORY AND EXAMINATION

Clinical Skills

- 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 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

PRACTICAL SKILLS

Technical Skills and Procedures

- 4 Arterial cannulation
- 4 Central venous cannulation
- 4 Pulmonary artery catheterisation

- 4 Intra aortic balloon pump insertion
- 4 Intra aortic balloon pump timing and management
- 4 Tracheostomy
- 4 Fibreoptic bronchoscopy
- 4 Chest aspiration
- 4 Chest drain insertion
- 4 Chest drain management

OPERATIVE MANAGEMENT

- 4 Surgical re-exploration for bleeding or tamponade

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Cardiopulmonary Bypass
Category	Cardio-pulmonary Bypass, Myocardial Protection and Circulatory Support
Sub-category:	None
Objective	<i>To manage the clinical and technical aspects of cardiopulmonary bypass, myocardial protection and circulatory support.</i>

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

- | | |
|------------------|---|
| Knowledge | <ul style="list-style-type: none"> 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

No content

OPERATIVE MANAGEMENT

4 Median sternotomy open and close

**Technical Skills
and Procedures**

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

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic **Myocardial Protection**

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.*

BASIC KNOWLEDGE

4 Myocardial cellular physiology

4 Myocardial function and dysfunction

4 Haemodynamics and arrhythmias

4 Coronary arterial and venous anatomy

Knowledge

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

PATIENT MANAGEMENT

4 Myocardial management throughout the peri-operative period

Clinical Skills

4 Ability to adapt preservation technique to clinical situation

OPERATIVE MANAGEMENT

Technical Skills

and Procedures

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**

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.

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

Knowledge

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

PATIENT MANAGEMENT

4 Patient selection for mechanical circulatory support

Clinical Skills

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

No content

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic Ischaemic Heart Disease
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.

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

Knowledge

- 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.

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

Clinical Skills 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

OPERATIVE MANAGEMENT

Technical Skills and Procedures 4 Isolated, first time coronary artery surgery (May include both off pump and on pump options and arterial revascularisation strategies)

4 Repeat coronary artery surgery

3 Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Heart Valve Disease
Category	Heart Valve Disease
Sub-category:	None
Objective	<i>To evaluate and manage a patient with both uncomplicated and complicated heart valve disease, including operative management.</i> 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
Knowledge	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

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

Clinical Skills

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.

OPERATIVE MANAGEMENT

4 Isolated, uncomplicated aortic valve replacement (stented biological or mechanical)

4 Isolated uncomplicated mitral valve replacement

4 Tricuspid valve surgery

4 Combined valve and graft surgery

Technical Skills and Procedures

4 Surgical strategies for managing the small aortic root

4 Aortic root surgery including stentless valves, and root replacement

4 Redo Valve surgery

4 Valve surgery for endocarditis

4 Techniques for surgical ablation of arrhythmias

3 Mitral valve repair

3 Alternative surgical approaches to valve surgery including thoracotomy, transeptal approaches, and minimal access surgery

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic Aortovascular Disease

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

BASIC KNOWLEDGE

Physiology

4 Vascular biology and reactivity

Knowledge

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

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

Clinical Skills

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

OPERATIVE MANAGEMENT

- 4 Intraoperative monitoring
- 4 Spinal cord protection
- 4 Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery

Technical Skills and Procedures

- 4 Hypothermic strategies including HCA, RCP and SACP
- 4 Femoral cannulation
- 3 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

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Cardiothoracic Trauma
Category	Cardiothoracic Trauma
Sub-category:	None
Objective	<i>To evaluate and manage, including surgical management where appropriate, and as part of a multidisciplinary team, a patient with thoracic trauma.</i> <i>Competence in operative management of thoracic trauma is required of all CCT holders in cardiothoracic surgery. All trainees should maintain their ATLS certification and senior trainees are encouraged to become ATLS instructors.</i>
	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
Knowledge	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
	GENERAL TRAUMA MANAGEMENT (ATLS)
Clinical Skills	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

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.
- 4 Pericardiocentesis and subxiphoid pericardial window for tamponade

Technical Skills and Procedures

OPERATIVE MANAGEMENT OF THORACIC TRAUMA

- 4 Subxiphoid pericardial window for tamponade
- 4 Postero-lateral, thoracotomy, antero lateral thoracotomy and thoracotomy
- 4 Bilateral Anterior Thoracotomy
- 4 Median sternotomy and closure
- 4 Repair of cardiac injuries

4 Repair of pulmonary and bronchial injuries

4 Management of the complications of chest trauma including retained haemothorax and empyema

3 Repair of oesophageal injuries

3 Repair of aortic transection

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	General Management of a Patient Undergoing Thoracic Surgery
Category	General Management of a Patient Undergoing Thoracic Surgery
Sub-category:	None
Objective	<i>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.</i>
	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
Knowledge	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.

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

Clinical Skills

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

PRACTICAL SKILLS

4 Arterial cannulation

4 Central venous cannulation

4 Pulmonary artery catheterisation

4 Tracheostomy

Technical Skills and Procedures

4 Fibreoptic bronchoscopy

4 Chest aspiration

4 Chest drain insertion

4 Chest drain management

OPERATIVE MANAGEMENT

Thoracic Incisions

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

4 Perform and close sternotomy incision

Bronchoscopy

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

4 Tracheostomy and minitracheostomy

3 Bronchoscopy in situations where there is unfavourable anatomy or complex pathology and to deal with complications.

Mediastinal Exploration

4 Assembly of relevant equipment for mediastinal exploration

4 Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.

4 Mediastinal biopsy

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic Neoplasms of the Lung
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.

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

Knowledge

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.

PATIENT MANAGEMENT

As for thoracic surgery - general

4 Clinical history and examination

Clinical Skills

4 Interpretation of laboratory, physiological and imaging techniques.

4 Interpretation of endoscopic findings.

4 Patient selection with assessment of function and risk.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

4 Bronchoscopic assessment including biopsy

4 Endoscopic and surgical techniques of lung biopsy.

- 4 Mediastinal assessment and biopsy
- 3 Endoscopic management of tumours using laser and stenting
- 4 Intraoperative diagnosis and staging
- 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.
- 4 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 Repeat resections for benign and malignant conditions of the lung, including completion pneumonectomy
- 3 Management of post-operative complications such as empyema and broncho-pleural fistula.

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Disorders of the Pleura
Category	Disorders of the Pleura
Sub-category:	None
Objective	<i>To fully evaluate and manage surgical conditions of the pleura and the pleural space, including complicated situations.</i>
	GENERAL KNOWLEDGE
	As for thoracic surgery – general
	SPECIFIC KNOWLEDGE
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

PATIENT MANAGEMENT

As for thoracic surgery – general

Clinical Skills

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.

OPERATIVE MANAGEMENT

Technical Skills and Procedures

4 Open procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy

4 VATS procedures for uncomplicated pleural problems e.g. pneumothorax, effusion, haemothorax including drainage, biopsy, pleurodesis and pleurectomy

4 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.

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Disorders of the Chest Wall
Category	Disorders of the Chest Wall
Sub-category:	None
Objective	<i>To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate, and including complex cases.</i>
	GENERAL KNOWLEDGE
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

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

Clinical Skills

4 Interpretation of laboratory, physiological and imaging techniques.

4 Patient selection with assessment of function and risk.

OPERATIVE MANAGEMENT

4 Chest wall biopsy and choice of appropriate technique.

4 Needle biopsy by aspiration or core techniques and the siting of open surgical biopsy.

Technical Skills and Procedures

4 Open and excision biopsy and resection of the chest wall for benign and malignant conditions.

4 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

4 Pectus correction, by both open and minimally-invasive techniques, including post-operative care and complications

4 Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions.

3 Complex chest wall reconstruction with thoracoplasty and, with appropriate specialist support, soft tissue reconstruction.

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Disorders of the Diaphragm
Category	Disorders of the Diaphragm
Sub-category:	None
Objective	<i>To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate, and including complicated cases.</i> 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. PATIENT MANAGEMENT As for thoracic surgery – general Specific Skills
Knowledge	
Clinical 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

- 4 Resection of the diaphragm, and adjacent structures, including appropriate selection and insertion of prosthetic materials
- 4 Complications of diaphragmatic resection.
- 4 Phrenic nerve pacing.

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Emphysema and Bullae
Category	Emphysema and Bullae
Sub-category:	None
Objective	<i>To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate, and including complicated cases.</i>
	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.
Knowledge	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
	PATIENT MANAGEMENT
	As for thoracic surgery – general
	4 Clinical history and examination
Clinical Skills	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.

OPERATIVE MANAGEMENT

4 Procedures to deal with secondary pneumothorax and bullae by open techniques.

Technical Skills and Procedures

4 Procedures to deal with secondary pneumothorax and bullae by VATS techniques.

3 Lung volume reduction surgery, unilaterally and bilaterally, using open and VATS techniques.

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Disorders of the Pericardium
Category	Disorders of the Pericardium
Sub-category:	None
Objective	<i>To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate, and including complicated cases.</i>
	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.
Knowledge	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.

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

4 Interpretation of laboratory, physiological and imaging techniques, including echocardiography.

Clinical Skills 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.

OPERATIVE MANAGEMENT

4 Uncomplicated pericardial fenestration procedures

4 Pericardial fenestration in complex cases.

Technical Skills and Procedures 4 Pericardiectomy for relief of constriction

4 Resection of the pericardium and replacement, in appropriate situations, with prosthetic materials.

4 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

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.*

GENERAL KNOWLEDGE

As for thoracic surgery – general

Knowledge 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

PATIENT MANAGEMENT

As for thoracic surgery – general

4 Clinical history and examination

4 Interpretation of laboratory, physiological and imaging techniques.

Clinical Skills

4 Patient selection with assessment of function and risk.

4 Post-operative management of patients including recognition and management of post-operative complications .

OPERATIVE MANAGEMENT

4 Selection of appropriate routes for biopsy and excision of mediastinal tumours and cysts.

4 Biopsy of mediastinal masses.

Technical Skills and Procedures

4 Excision of the thymus for myasthenia gravis.

4 Resection of mediastinal cysts and tumours masses.

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
Category	Disorders of the Airway
Sub-category:	None
Objective	<i>To assess and manage a patient with disease of the major airways, including surgical management where appropriate, and including complicated cases.</i> 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.
Knowledge	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 anastomotic 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. PATIENT MANAGEMENT
Clinical Skills	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.

OPERATIVE MANAGEMENT

- 4 Endoscopic assessment of a patient with airways disease
- 4 Sleeve resection of the trachea for simple benign conditions, including appropriate anastamotic techniques.
- 4 Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease, including appropriate anastamotic techniques.
- 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.

Technical Skills and Procedures

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic Congenital Heart Disease
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.*

BASIC KNOWLEDGE

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

The anatomy, pathophysiology natural history and management of the following conditions or procedures

- 4 Patent ductus arteriosus
- 4 Aortopulmonary window
- 4 Atrial septal defect
- 4 Ventricular septal defect
- 4 Coarctation
- 4 PA banding
- 4 Aortopulmonary and venous shunts
- 4 Transposition of the great arteries - switch procedure
- 3 Congenitally corrected TGA
- 4 Single ventricle/univentricular heart
- 4 Tetralogy of Fallot/Pulmonary atresia plus VSD
- 4 Pulmonary atresia and intact septum
- 4 Hypoplastic left heart and Norwood procedure
- 4 Truncus arteriosus
- 4 Double outlet right ventricle
- 4 Pulmonary atresia plus VSD and MAPCAs
- 4 Partial and complete atrioventricular septal defects
- 4 Anomalies of the pulmonary venous drainage (partial and total)
- 4 Anomalies of systemic venous drainage
- 4 Congenital aortic valve disease (including supra-valve stenosis)
- 4 LV outflow tract obstruction
- 4 Sinus of valsalva aneurysm
- 4 Congenital mitral valve disease
- 4 Congenital tricuspid valve disease (including Ebsteins abnormality)
- 4 Anomalies of the coronary arteries (including ALCAPA)
- 4 Vascular rings
- 3 Cardiac tumours
- 4 Pericardial disease
- 4 Extra cardiac conduits
- 4 Interrupted aortic arch
- 4 Extra Corporeal Membrane Oxygenation and VAD
- 4 Transplantation for congenital heart disease

HISTORY AND EXAMINATION

- 4 Cardiovascular system and general history and examination of child or adult with congenital heart disease

Clinical Skills

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

OPERATIVE MANAGEMENT

4 Sternotomy - open and close, including resternotomy

4 Thoracotomy - open and close

4 Preparation for and management of cardiopulmonary bypass including partial bypass

Technical Skills and Procedures 4 Approaches for ECMO, cannulation and management.

Surgical management of the following common uncomplicated conditions:

4 Patent ductus arteriosus

4 Atrial septal defect

4 Ventricular septal defect

4 Coarctation

3 Aortopulmonary window

4 Vascular ring

4 Aortopulmonary and venous shunts

4 PA banding

Surgical management of the following conditions requiring advanced procedures:

- 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

Surgical management of the following conditions requiring complex procedures:

- 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
Category	Intrathoracic transplantation and surgery for heart failure
Sub-category:	None
Objective	<i>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.</i>
	BASIC KNOWLEDGE
	Pathophysiology
	4 Haemodynamics of heart failure.
	4 Molecular mechanisms underlying heart failure.
Knowledge	4 Haemodynamics of cardiac constriction.
	4 Mechanisms and outcomes of respiratory failure.
	4 Causes of cardiac failure.
	4 Causes of respiratory failure.
	Immunology

4 Major and minor histocompatibility 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 Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient.

4 Management of patients after intrathoracic organ transplantation, including complications

4 Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure.

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

Clinical Skills

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 Management of brain-dead donor
 - 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
- OPERATIVE MANAGEMENT

Transplantation

- 4 Donor Retrieval
- 4 Implantation of heart
- 4 Implantation of lung and heart/lung

Technical Skills and Procedures

- Surgery for heart failure
- 4 Surgical revascularisation for ischaemic cardiomyopathy
- 4 Ventricular reverse remodelling surgery
- 4 Mitral valve repair for cardiac failure
- 4 Implantation of extracorporeal VAD
- 4 Implantation of intracorporeal VAD

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Management of Benign Oesophageal Disorders
Category	Disorders of the Oesophagus
Sub-category:	None
Objective	<i>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</i>
	BASIC KNOWLEDGE
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

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

Clinical Skills

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

OPERATIVE MANAGEMENT

- Technical Skills and Procedures** 4 Oesophago-gastro-duodenoscopy.
- 4 Rigid oesophagoscopy
- 4 Oesophageal dilatation

4 Open and laparoscopic fundoplication and cardiomyotomy

4 Mobilisation of oesophagus, stomach and colon

4 Oesophageal anastomosis

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills

Topic	Management of Oesophageal Neoplasia
Category	Disorders of the Oesophagus
Sub-category:	None
Objective	<i>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</i>
	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
Knowledge	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.

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

Clinical Skills

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.

OPERATIVE MANAGEMENT

4 Oesophago-gastro-duodenoscopy

4 Assessment by thoracoscopy laparoscopy and mediastinoscopy

Technical Skills and Procedures

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

Professional Skills Please see the [Professional Skills and Behaviour » Final](#) section for these skills