



ROYAL COLLEGE OF  
PHYSICIANS AND  
SURGEONS OF GLASGOW



**Joint Committee on Intercollegiate Examinations**

# **Intercollegiate Specialty Examination in Cardiothoracic Surgery**

## **Syllabus Blueprint 2016**

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## Principles for Blueprinting Assessment to the Curriculum in Surgical Specialties

1. Standard educational practice requires a curriculum to include an indication of how each aspect of the syllabus is to be assessed. This “blueprinting” process also shows how each aspect relates to Good Medical Practice.
2. Each specialty syllabus has been mapped to a range of assessments:
  - a. CEX
  - b. CBD
  - c. DOPS
  - d. PBA
  - e. MSF
  - f. Section 1 of the specialty FRCS (written section)
  - g. Section 2 of the specialty FRCS (clinical and oral section)
3. This does not imply that the indicated assessments must be used.
4. The indications are not exclusive, and it is possible that other types of assessment which have not been indicated may also be used to assess individual items.
5. In general:
  - a. Knowledge will be assessed by Section 1 and Section 2 FRCS and by CBD.
  - b. Clinical skills will be assessed by CEX and Section 2 FRCS
  - c. The use of scenarios within Section 2 FRCS allows a wide range of clinical skills to be assessed.
  - d. Technical skills will be assessed by DOPS and PBA
  - e. Professional skills will be assessed by MSF
6. The blueprinting indicates which assessments may be used for each item at any stage through training.
7. The Good Medical Practice domains are:
  1. Knowledge, skills and performance
  2. Safety and quality
  3. Communication, partnership and teamwork
  4. Maintaining trust

	CEX	CBD	DOPS	PBA	MSF	FRCS Section 1	FRCS Section 2	GMP
<b>Critical Care and Post-operative Management</b>								
<b>OBJECTIVE</b>								
To be able to manage a post surgical patient on the critical care, high dependency and post operative wards								
To work as part of a multi-professional, multidisciplinary team in the management of a patient requiring complex critical care. Competence in the management of uncomplicated situations should be achieved during this period. Management of complicated or difficult situations will require appropriate supervision and guidance.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
<b>Physiology</b>								
Haemodynamics: physiology and measurement		X				X	X	1
Cardiac arrhythmia		X				X	X	1
Haemostasis, thrombosis and bleeding		X				X	X	1
Acid base balance		X				X	X	1
Pulmonary physiology, ventilation and gas exchange		X				X	X	1
Metabolic response to trauma and surgery		X				X	X	1
GIT, renal and hepatic physiology		X				X	X	1
Nutrition		X				X	X	1
Temperature regulation		X				X	X	1
<b>Anatomy</b>								
Heart, pericardium and great vessels		X				X	X	1
Mediastinum, thoracic inlet and neck		X				X	X	1
Tracheobronchial tree and lungs		X				X	X	1
Chest wall and diaphragm		X				X	X	1
<b>Pathology</b>								
Inflammation and wound healing		X				X	X	1
Myocardial infarction and complications		X				X	X	1
Endocarditis		X				X	X	1
Pericarditis		X				X	X	1
Systemic Inflammatory Response Syndrome		X				X	X	1
Bronchopulmonary infection		X				X	X	1
ARDS		X				X	X	1
<b>Pharmacology</b>								
Drugs used in the treatment of hypertension, heart failure and angina		X				X	X	1
Inotropes, vasodilators and vasoconstrictors		X				X	X	1
Anti-arrhythmic drugs		X				X	X	1
Haemostatic drugs		X				X	X	1
Antiplatelet, anticoagulant and thrombolytic drugs		X				X	X	1
Analgesics		X				X	X	1
Antibiotics		X				X	X	1
Anaesthetic agents, local and general		X				X	X	1
<b>Microbiology</b>								
Organisms involved in cardiorespiratory infection		X				X	X	1
Antimicrobial treatment and policies		X				X	X	1
<b>CLINICAL KNOWLEDGE</b>								
Cardiopulmonary resuscitation	X	X				X	X	1
Management of cardiac surgical patient	X	X				X	X	1,3
Management of thoracic surgical patient	X	X				X	X	1,3
Treatment of cardiac arrhythmia	X	X				X	X	1
Management of complications of surgery	X	X				X	X	1
Blood transfusion and blood products	X	X				X	X	1
Wound infection and sternal disruption	X	X				X	X	1
Neuropsychological consequences of surgery and critical care	X	X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>HISTORY AND EXAMINATION</b>								
History and examination of the post-operative and critically ill patient	X	X					X	1,3
<b>DATA INTERPRETATION</b>								
Analysis and interpretation of post operative and critical care charts and documentation		X					X	1
Routine haematology and biochemical investigations		X					X	1
Chest radiograph and ECG		X				X	X	1
Echocardiography including TOE		X					X	1
<b>PATIENT MANAGEMENT</b>								
General management of surgical patient	X	X					X	1
Management of fluid balance and circulating volume	X	X					X	1
Pain control	X	X					X	1
Wound management	X	X					X	1
Management of surgical drains	X	X					X	1
Antimicrobial policy and prescribing	X	X					X	1
Management of post-operative haemorrhage	X	X					X	1
Cardiopulmonary resuscitation (ALS)	X	X					X	1
Management of complications of surgery	X	X					X	1
Blood transfusion and blood products	X	X				X	X	1
Wound infection and sternal disruption	X	X					X	1
Recognition, evaluation and treatment of haemodynamic abnormalities	X	X					X	1
Evaluation and interpretation of haemodynamic data	X	X					X	1
Practical use of inotropes and vasoactive drugs	X	X					X	1
Use of intra aortic balloon pump	X	X					X	1
Recognition, evaluation and treatment of cardiac arrhythmias	X	X				X	X	1
Interpretation of ECG	X	X				X	X	1

Use of anti-arrhythmic drugs	X	X				X	X	1
Use of defibrillator	X	X					X	1
Understanding and use of cardiac pacing	X	X					X	1
Recognition, evaluation and treatment of ventilatory abnormalities	X	X					X	1
Interpretation of blood gas results	X	X				X	X	1
Airway management	X	X					X	1
Understanding of ventilatory techniques and methods	X	X				X	X	1
Understanding of anaesthetic drugs and methods	X	X				X	X	1
Recognition, evaluation and treatment of multiorgan dysfunction	X	X					X	1
Renal dysfunction and support	X	X					X	1
GIT dysfunction, feeding and nutrition	X	X					X	1
Recognition and evaluation of cerebral and neuropsychological problems	X	X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>PRACTICAL SKILLS</b>								
Arterial cannulation			X	X				1
Central venous cannulation			X	X				1
IABP insertion			X	X				1
IABP timing and management			X	X				1
Tracheostomy			X	X				1
Fibreoptic bronchoscopy			X					1
Chest aspiration			X					1
Chest drain insertion			X					1
Chest drain management			X					1
Establish an airway			X					1
Internal Cardiac Massage				X				1
<b>OPERATIVE MANAGEMENT</b>								
Re-exploration for bleeding or tamponade				X				1

<b>Cardiopulmonary Bypass</b>								
<b>OBJECTIVE</b>								
To manage with supervision the clinical and technical aspects of cardiopulmonary bypass								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
<b>Physiology</b>								
Haemodynamics: physiology and measurement	X		X		X		X	1
Cardiac arrhythmias	X		X		X		X	1
Haemostasis, thrombosis and bleeding	X		X		X		X	1
Acid base balance	X		X		X		X	1
Pulmonary physiology, ventilation and gas exchange	X		X		X		X	1
Metabolic response to trauma and surgery	X		X		X		X	1
GIT, renal and hepatic physiology	X		X		X		X	1
Temperature regulation	X		X		X		X	1
<b>Anatomy</b>								
Heart, pericardium and great vessels	X		X		X		X	1
Mediastinum, thoracic inlet and neck	X		X		X		X	1
Chest wall and diaphragm	X		X		X		X	1
Femoral triangle and peripheral vascular system	X		X		X		X	1
<b>Pathology</b>								
Inflammation and wound healing	X		X		X		X	1
Systemic Inflammatory Response Syndrome	X		X		X		X	1
ARDS	X		X		X		X	1
<b>Pharmacology</b>								
Drugs used in the treatment of hypertension, heart failure and angina	X		X		X		X	1
Inotropes, vasodilators and vasoconstrictors	X		X		X		X	1
Anti-arrhythmic drugs	X		X		X		X	1
Haemostatic drugs	X		X		X		X	1
Antiplatelet, anticoagulant and thrombolytic drugs	X		X		X		X	1
Analgesics	X		X		X		X	1
Antibiotics	X		X		X		X	1
Anaesthetic agents, local and general	X		X		X		X	1
<b>Microbiology</b>								
Organisms involved in cardiorespiratory infection	X		X		X		X	1
Antimicrobial treatment and policies	X		X		X		X	1
<b>SPECIFIC KNOWLEDGE</b>								
Principles and practice of CPB	X		X				X	1
Relevant equipment and technology and its application	X		X				X	1
Monitoring during CPB	X		X				X	1
Inflammatory and pathophysiological response to bypass	X		X		X		X	1
Pulsatile and non pulsatile flow	X		X		X		X	1
Effect of CPB on pharmacokinetics	X		X		X		X	1
Priming fluids and haemodilution	X		X				X	1
Acid base balance - pH and alpha stat	X		X		X		X	1
Neuropsychological consequences of CPB	X		X				X	1
Cell salvage and blood conservation	X		X				X	1
<b>CLINICAL SKILLS</b>								
N/A								
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Median sternotomy open and close				X				1
Cannulation and institution of cardiopulmonary bypass				X				1

Safe conduct of CPB - problem solving and troubleshooting				X				1
Weaning from bypass and decannulation				X				1
Femoral cannulation and decannulation				X				1
Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation				X				1
Relevant cannulation techniques and appropriate delivery of cardioplegia				X				1

Myocardial Protection								
<b>OBJECTIVE</b>								
To manage with supervision the clinical and technical aspects of intraoperative myocardial protection.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
Myocardial cellular physiology		X				X	X	1
Myocardial function and dysfunction		X				X	X	1
Haemodynamics and arrhythmias		X				X	X	1
Coronary arterial and venous anatomy		X				X	X	1
<b>SPECIFIC KNOWLEDGE</b>								
Scientific foundations of myocardial preservation		X				X	X	1
Principles and practice of myocardial preservation		X				X	X	1
Cardioplegia solutions and delivery modes.		X				X	X	1
Non-cardioplegic techniques of preservation		X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>PATIENT MANAGEMENT</b>								
Myocardial management throughout the peri-operative period		X				X	X	1
Ability to adapt preservation technique to clinical situation		X				X	X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Median sternotomy open and close				X				1
Cannulation and institution of cardiopulmonary bypass				X				1
Safe conduct of CPB - problem solving and troubleshooting				X				1
Weaning from bypass and decannulation				X				1
Femoral cannulation and decannulation				X				1
Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation				X				1
Relevant cannulation techniques and appropriate delivery of cardioplegia				X				1

Circulatory Support								
<b>OBJECTIVE</b>								
To manage with supervision the clinical and technical aspects of circulatory support.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
Haemodynamics: physiology and measurement		X				X	X	1
Cardiac arrhythmias		X				X	X	1
Haemostasis, thrombosis and bleeding		X				X	X	1
Anatomy of the femoral triangle and peripheral vascular system		X				X	X	1
Inotropes, vasodilators and vasoconstrictors		X				X	X	1
Anti-arrhythmic drugs		X				X	X	1
Haemostatic drugs		X				X	X	1
Antiplatelet, anticoagulant and thrombolytic drugs		X				X	X	1
<b>SPECIFIC KNOWLEDGE</b>								
Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods		X				X	X	1
Intra aortic balloon pump - indications for use, patient selection and complications		X				X	X	1
Physiology of the balloon pump		X				X	X	1
Understanding of relevant equipment and technology		X				X	X	1
Ventricular assist devices, indications for use, patient selection and complications		X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>PATIENT MANAGEMENT</b>								
Patient selection for mechanical circulatory support	X	X				X	X	1
Insertion and positioning of the intra aortic balloon pump			X	X				1
Management of the balloon pump including timing and trouble shooting		X	X	X			X	1
Care of the patient with intra aortic balloon pump, including recognition and management of complications		X	X	X			X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Median sternotomy open and close				X				1
Cannulation and institution of cardiopulmonary bypass				X				1
Safe conduct of CPB - problem solving and troubleshooting				X				1
Weaning from bypass and decannulation				X				1
Femoral cannulation and decannulation				X				1
Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation				X				1
Relevant cannulation techniques and appropriate delivery of cardioplegia				X				1

Ischaemic Heart Disease								
<b>OBJECTIVE</b>								
To evaluate and manage with appropriate supervision the surgical aspects of a patient with ischaemic heart disease including the complications of ischaemic heart disease.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
Physiology								
Myocardial cellular physiology		X				X	X	1
Haemodynamics; physiology and measurement		X				X	X	1
Electrophysiology, including conduction disorders		X				X	X	1
Haemostasis, thrombosis and bleeding		X				X	X	1

Acid base balance		X				X	X	1
Pulmonary physiology, ventilation and gas exchange		X				X	X	1
Metabolic response to trauma		X				X	X	1
Vascular biology and reactivity		X				X	X	1
Anatomy								
Heart, pericardium and great vessels		X				X	X	1
Coronary anatomy and variants		X				X	X	1
Coronary angiography		X				X	X	1
Anatomy of the peripheral vascular system and vascular conduits		X				X	X	1
Pathology								
Inflammation and wound healing		X				X	X	1
Atheroma, medial necrosis and arteritis		X				X	X	1
Intimal hyperplasia and graft atherosclerosis		X				X	X	1
Myocardial infarction and complications		X				X	X	1
Systemic Inflammatory Response Syndrome		X				X	X	1
Pharmacology								
Drugs used in the treatment of hypertension, heart failure and angina		X				X	X	1
Anti-arrhythmic drugs		X				X	X	1
Haemostatic drugs		X				X	X	1
Antiplatelet, anticoagulant and thrombolytic drugs		X				X	X	1
Analgesics		X				X	X	1
Antibiotics		X				X	X	1
Anaesthetic agents, local and general		X				X	X	1
Microbiology								
Organisms involved in cardiorespiratory infection		X				X	X	1
Organisms involved in wound infection		X				X	X	1
Antibiotic usage and prophylaxis		X				X	X	1
Antisepsis		X				X	X	1
CLINICAL KNOWLEDGE								
General								
Diagnosis, investigation and treatment of heart disease		X				X	X	1
Risk assessment and stratification		X				X	X	1
Cardiopulmonary resuscitation		X				X	X	1
Cardiac arrhythmias		X				X	X	1
Complications of surgery		X				X	X	1
Renal dysfunction		X				X	X	1
Multiorgan failure		X				X	X	1
Cardiac rehabilitation		X				X	X	1
Blood transfusion and blood products		X				X	X	1
Wound infection and sternal disruption		X				X	X	1
Specific								
Diagnosis investigation and assessment of IHD		X				X	X	1
Operative treatment - Off pump and on pump surgery		X				X	X	1
Results of surgery, survival, graft patency, recurrence		X				X	X	1
Arterial revascularisation		X				X	X	1
Redo coronary artery surgery		X				X	X	1
Role of PCI and non operative treatment		X				X	X	1
Management of cardiovascular risk factors		X				X	X	1
Complications of myocardial infarction and ischaemic heart disease		X				X	X	1
VSD, mitral regurgitation, aneurysm.		X				X	X	1
CLINICAL SKILLS								
HISTORY AND EXAMINATION								
Cardiovascular system and general history and examination including conduit, drug history, identification c comorbidity and risk assessment	X	X					X	1,3
DATA INTERPRETATION								
Routine haematology and biochemical investigations		X				X	X	1
Interpretation of haemodynamic data		X				X	X	1
Chest radiograph		X				X	X	1
ECG including exercise ECG		X				X	X	1
Coronary Angiography		X					X	1
Cardiac Catheterisation data		X					X	1
Echocardiography including 2D, Doppler and TOE and stress echo		X					X	1
Nuclear cardiology		X					X	1
PATIENT MANAGEMENT								
Cardiopulmonary resuscitation		X					X	1
Diagnosis and treatment of cardiac arrhythmias		X				X	X	1
Management of post cardiac surgical patient		X					X	1
Management of complications of surgery		X					X	1
Cardiac rehabilitation		X					X	1
Blood transfusion and blood products		X				X	X	1
Wound infection and sternal disruption		X					X	1
TECHNICAL SKILLS AND PROCEDURES								
OPERATIVE MANAGEMENT								
Saphenous vein harvest					X			1
Mammary artery/radial artery harvest					X			1
Preparation for and management of cardiopulmonary bypass					X			1
Proximal coronary anastomosis					X			1
Distal coronary anastomosis					X			1
Principles for establishment of safe conditions for off pump surgery					X			1

Isolated, first time coronary artery surgery (May include both off pump and on pump options and arterial revascularisation strategies)				X					1
Repeat coronary artery surgery				X					1
Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm				X					1
Isolated, first time coronary artery surgery (May include both off pump and on pump options and arterial revascularisation strategies)				X					1
Repeat coronary artery surgery				X					1
Complications of ischaemic heart disease including post infarction VSD, mitral regurgitation and left ventricular aneurysm				X					1

Heart Valve Disease									
<b>OBJECTIVE</b>									
To evaluate and manage, with appropriate supervision, a patient with both uncomplicated heart valve disease, including operative management.									
<b>KNOWLEDGE</b>									
<b>BASIC KNOWLEDGE</b>									
<b>Physiology</b>									
Cardiovascular physiology including valve physiology and haemodynamics		X				X	X		1
Electrophysiology, including conduction disorders		X				X	X		1
Haemostasis, thrombosis and bleeding		X				X	X		1
Acid base balance		X				X	X		1
Pulmonary physiology, ventilation and gas exchange		X				X	X		1
Metabolic response to trauma		X				X	X		1
<b>Anatomy</b>									
Cardiac chambers and valves, pericardium and great vessels		X				X	X		1
Anatomy of the conduction system		X				X	X		1
<b>Pathology</b>									
Pathophysiology of valve incompetence and stenosis.		X				X	X		1
Consequences of valve disease on cardiac function and morphology		X				X	X		1
Pathophysiology of mixed valve disease and combined valve pathology (eg aortic and mitral)		X				X	X		1
Combined valvular and ischaemic heart disease		X				X	X		1
Atrial fibrillation and other arrhythmias		X				X	X		1
<b>Pharmacology</b>									
Drugs used in the treatment of hypertension, heart failure and angina		X				X	X		1
Anti-arrhythmic drugs		X				X	X		1
Haemostatic drugs		X				X	X		1
Antiplatelet, anticoagulant and thrombolytic drugs		X				X	X		1
Analgesics		X				X	X		1
Antibiotics		X				X	X		1
Anaesthetic agents, local and general		X				X	X		1
<b>Microbiology</b>									
Organisms involved in cardio respiratory infection		X				X	X		1
Organisms involved in wound infection		X				X	X		1
Antibiotic usage and prophylaxis		X				X	X		1
Antisepsis		X				X	X		1
Endocarditis and prosthetic valve endocarditis		X				X	X		1
<b>CLINICAL KNOWLEDGE</b>									
<b>General knowledge</b>									
Cardiopulmonary resuscitation		X					X		1
Care of the cardiac surgical patient		X					X		1
Complications of surgery		X					X		1
Risk assessment and stratification		X					X		1
Management of cardiovascular risk factors		X				X	X		1
<b>Specific Knowledge</b>									
Diagnosis investigation and assessment of valvular heart disease		X					X		1
Timing of surgical intervention in valve disease		X					X		1
Options for operative management, including: Valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts)		X					X		1
Valve design: materials, configuration and biomechanics.		X					X		1
Results of surgery – survival, valve thrombosis, endocarditis, bleeding.		X				X	X		1
Interpretation of survival and follow up data		X				X	X		1
Cardiac performance and long term functional status		X					X		1
Surgery for conduction problems		X					X		1
Surgical treatment of arrhythmias		X					X		1
<b>CLINICAL SKILLS</b>									
<b>HISTORY AND EXAMINATION</b>									
Cardiovascular system and general history and examination including drug history, identification of comorbidity and risk assessment	X	X					X		1,3
<b>DATA INTERPRETATION</b>									
Routine haematology and biochemical investigations		X				X	X		1
Interpretation of haemodynamic data		X				X	X		1
Chest radiograph		X				X	X		1
ECG interpretation including exercise ECG		X				X	X		1
Coronary angiography		X					X		1
Cardiac catheterisation data including left and right heart data		X					X		1
Echocardiography (thoracic and transoesophageal) including 2D, Doppler and stress echo		X					X		1
Nuclear cardiology		X					X		1
<b>PATIENT MANAGEMENT</b>									
Cardiopulmonary resuscitation		X					X		1
Diagnosis and treatment of cardiac arrhythmias		X				X	X		1
Management of post cardiac surgical patient		X					X		1

Management of complications of surgery	X					X	1
Cardiac rehabilitation	X					X	1
Blood transfusion and blood products	X				X	X	1
Wound infection and sternal disruption	X					X	1
Non operative management of endocarditis	X				X	X	1
Valve selection	X					X	1
Anticoagulation management including complications.	X				X	X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>							
<b>OPERATIVE MANAGEMENT</b>							
Isolated, uncomplicated aortic valve replacement (stented biological or mechanical)				X			1
Isolated uncomplicated mitral valve replacement				X			1
Tricuspid valve surgery				X			1
Combined valve and graft surgery				X			1
Surgical strategies for managing the small aortic root				X			1
Aortic root surgery				X			1
Redo Valve surgery				X			1
Valve surgery for endocarditis				X			1
Techniques for surgical ablation of arrhythmias				X			1
Mitral valve repair				X			1
Alternative surgical approaches to valve surgery including thoracotomy, transeptal approaches, and minima access surgery	X		X				1

<b>Aortovascular Disease</b>							
<b>OBJECTIVE</b>							
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.							
<b>KNOWLEDGE</b>							
<b>BASIC KNOWLEDGE</b>							
<b>Physiology</b>							
Vascular biology and reactivity	X				X	X	1
Haemodynamics; physiology and measurement	X				X	X	1
Rheology and arterial pressure regulation	X				X	X	1
Haemostasis, thrombosis and bleeding	X				X	X	1
Physiology of transfusion therapy	X				X	X	1
Principles of surgical infectious disease	X				X	X	1
Acid base balance	X				X	X	1
Metabolic response to trauma	X				X	X	1
Pathophysiology and of hypothermia including the effects upon haemoglobin, metabolic rate and pH with the management	X				X	X	1
<b>Anatomy</b>							
Heart, pericardium and great vessels	X				X	X	1
Anatomy of the peripheral vascular system	X				X	X	1
Blood supply of the spinal cord	X				X	X	1
<b>Pathology</b>							
Inflammation and wound healing	X				X	X	1
Atheroma, medial necrosis and arthritis	X				X	X	1
Inherited disorders of vascular biology	X				X	X	1
Systemic Inflammatory Response Syndrome	X				X	X	1
<b>Pharmacology</b>							
Drugs used in the treatment of hypertension, heart failure and angina	X				X	X	1
Anti-arrhythmic drugs	X				X	X	1
Haemostatic drugs	X				X	X	1
Antiplatelet, anticoagulant and thrombolytic drugs	X				X	X	1
Anti-emetics	X				X	X	1
Analgesics	X				X	X	1
Antibiotics	X				X	X	1
Anaesthetic agents, local and general	X				X	X	1
<b>Microbiology</b>							
Organisms involved in cardiorespiratory infection	X				X	X	1
Organisms involved in wound infection	X				X	X	1
Antibiotic usage and prophylaxis	X				X	X	1
Antisepsis	X				X	X	1
<b>CLINICAL KNOWLEDGE</b>							
<b>General</b>							
Risk assessment	X					X	1
Cardiopulmonary resuscitation	X					X	1
Cardiac arrhythmias	X				X	X	1
Complications of surgery	X					X	1
Renal dysfunction	X				X	X	1
Multiorgan failure	X				X	X	1
Blood transfusion and blood products	X				X	X	1
Wound infection and sternal disruption	X					X	1
<b>Specific</b>							
Natural history of aortic disease	X				X	X	1
Diagnosis, investigation and assessment of aortic disease	X					X	1
Knowledge of operative treatment including spinal cord and cerebral preservation strategies:	X				X	X	1
Type A dissection	X				X	X	1
Type B dissection	X				X	X	1
Traumatic aortic rupture	X				X	X	1
Thoraco-abdominal aneurysm	X				X	X	1



Results of surgery – survival, complication rates		X				X	X	1
Non-surgical management including the role of endovascular stenting		X					X	1
Management of cardiovascular and non-cardiovascular risk factors		X					X	1
<b>CLINICAL SKILLS</b>								
<b>HISTORY AND EXAMINATION</b>								
Cardiovascular system and general history and examination including assessment of pre-operative complications, drug history, identification of co-morbidity and risk assessment	X	X				X	X	1,3
<b>DATA INTERPRETATION</b>								
Routine haematology and biochemical investigations		X				X	X	1
Interpretation of haemodynamic data		X				X	X	1
Chest radiograph		X				X	X	1
ECG including exercise ECG		X				X	X	1
Coronary Angiography		X					X	1
Aortography		X					X	1
Cardiac Catheterisation data		X					X	1
Echocardiography including 2D, doppler and TOE and stress echo		X					X	1
CT scanning		X					X	1
MRI scanning		X					X	1
<b>PATIENT MANAGEMENT</b>								
Cardiopulmonary resuscitation		X					X	1
Diagnosis and treatment of cardiac arrhythmias		X				X	X	1
Management of post cardiac surgical patient		X					X	1
Management of complications of surgery		X					X	1
Cardiac rehabilitation		X					X	1
Blood transfusion and blood products		X				X	X	1
Wound infection and sternal disruption		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Preparation for and management of cardiopulmonary bypass, including alternative, non-bypass strategies for descending aortic surgery					X			1
Organ protection strategies including HCA, RCP and SACP					X			1
Femoral cannulation					X			1
Axillary cannulation					X			1
Surgery for acute dissection of the ascending aorta					X			1
Aortic root replacement for chronic aortic root disease					X			1
Complex aortic surgery including arch surgery, descending aortic and thoraco-abdominal aortic surgery					X			1

<b>Cardiothoracic Trauma</b>								
<b>OBJECTIVE</b>								
To evaluate and manage, including surgical management where appropriate, and as part of a multidisciplinary team, a patient with thoracic trauma.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
Anatomy of the lungs, heart, chest wall, diaphragm and oesophagus		X				X	X	1
Anatomy of the larynx, trachea and bronchial tree		X				X	X	1
Physiology of breathing and its control		X				X	X	1
Physiology of the heart and circulation		X				X	X	1
<b>GENERAL TRAUMA MANAGEMENT</b>								
Principles of trauma management (as defined by ATLS)		X				X	X	1
Principles of emergency resuscitation following cardiac arrest		X				X	X	1
<b>SPECIFIC KNOWLEDGE</b>								
The mechanism and patterns of injury associated with blunt, penetrating, blast and deceleration injuries to the chest		X				X	X	1
The post-ATLS, definitive care of blunt, penetrating and deceleration injuries to the chest.		X					X	1
The indications and use of appropriate investigations in thoracic trauma management		X					X	1
Pain relief in chest trauma, including epidural anaesthesia.		X					X	1
Indications for immediate, urgent and delayed thoracotomy in trauma		X					X	1
<b>CLINICAL SKILLS</b>								
<b>GENERAL TRAUMA MANAGEMENT (ATLS)</b>								
Assessment and management of airway, breathing and circulation	X	X					X	1,3
Maintenance of an adequate airway and respiratory support	X		X				X	1
Protection of the cervical spine	X		X				X	1
Circulatory resuscitation	X		X				X	1
Establishment of appropriate monitoring				X			X	1
Assessment and management of pain and anxiety	X						X	1,3
<b>CARDIOTHORACIC TRAUMA MANAGEMENT</b>								
Examination and assessment of the of the chest, including respiratory cardiovascular and circulatory systems	X	X					X	1
Recognition and management of immediately life threatening situations: obstructed airway, tension pneumothorax, massive haemothorax, open chest wound, flail chest and cardiac tamponade	X	X					X	1
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	X	X					X	1
Recognition of potentially life threatening penetrating injuries to the chest and abdomen	X	X					X	1
Interpretation of chest x-ray, ECG, arterial blood gases and echocardiography		X					X	1
Detection and treatment of cardiac arrhythmias		X					X	1
Management of the widened mediastinum including appropriate investigations and multidisciplinary consultation		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>PRACTICAL SKILLS</b>								
Establish an emergency airway (surgical and non-surgical)				X				1
Insertion and management of thoracic drains				X				1

Establish adequate venous access and monitoring.			X							1
<b>OPERATIVE MANAGEMENT OF THORACIC TRAUMA</b>										
Postero-lateral, thoracotomy, antero lateral thoracotomy and thoraco-laparotomy					X					1
Bilateral Anterior Thoracotomy					X					1
Median sternotomy and closure					X					1
Repair of cardiac injuries					X					1
Repair of pulmonary and bronchial injuries					X					1
Management of the complications of chest trauma including retained haemothorax and empyema					X					1
Repair of oesophageal injuries					X					1
Treatment of aortic transection					X					1

<b>General Management of a Patient Undergoing Thoracic Surgery</b>										
<b>OBJECTIVE</b>										
To be competent in the evaluation and management of a patient undergoing thoracic surgery including operative management, with appropriate supervision. The knowledge and clinical skills are common to all thoracic surgical conditions, and should be read in conjunction with the curriculum for specific surgical conditions.										
<b>KNOWLEDGE</b>										
<b>BASIC KNOWLEDGE</b>										
<b>Physiology</b>										
Pulmonary physiology, ventilation and gas exchange		X					X	X		1
Haemostasis, thrombosis and bleeding		X					X	X		1
Acid base balance		X					X	X		1
Metabolic response to trauma		X					X	X		1
Digestive, renal and hepatic physiology		X					X	X		1
Nutrition		X					X	X		1
<b>Anatomy</b>										
Tracheobronchial tree and lungs		X					X	X		1
Thoracic inlet, neck and mediastinum		X					X	X		1
Oesophagus and upper GI tract		X					X	X		1
Chest wall and diaphragm		X					X	X		1
<b>Pathology</b>										
Inflammation and wound healing		X					X	X		1
Bronchopulmonary infections		X					X	X		1
ARDS		X					X	X		1
Emphysema		X					X	X		1
Pulmonary fibrosis		X					X	X		1
Pulmonary manifestations of systemic disease		X					X	X		1
Systemic manifestations of pulmonary disease		X					X	X		1
Benign and malignant tumours of trachea, bronchus and lung parenchyma		X					X	X		1
Oesophagitis, columnar-lined oesophagus stricture		X					X	X		1
Oesophageal motility disorders		X					X	X		1
Malignant and benign tumours of the oesophagus and stomach		X					X	X		1
Malignant and benign tumours of the pleura and chest wall, mediastinum and thyroid		X					X	X		1
<b>Pharmacology</b>										
Bronchodilators		X					X	X		1
H2 antagonists and proton pump inhibitors		X					X	X		1
Haemostatic drugs		X					X	X		1
Analgesics		X					X	X		1
Antibiotics		X					X	X		1
Anaesthetic agents, local and general		X					X	X		1
<b>Microbiology</b>										
Organisms involved in respiratory infection including TB		X					X	X		1
Organisms involved in wound infection		X					X	X		1
Antibiotic usage and prophylaxis		X					X	X		1
Antisepsis		X					X	X		1
Management of intra pleural sepsis		X					X	X		1
<b>CLINICAL KNOWLEDGE</b>										
<b>Thoracic Incisions</b>										
Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches.		X		X				X		1
Sternotomy		X		X				X		1
Difficult access and improving exposure.		X		X				X		1
Early and late complications of thoracic incisions		X						X		1
Analgesia including pharmacology, effectiveness, side effects and use in combination regimens		X						X		1
Post-operative analgesia, including epidural, PCAS and paravertebral catheter techniques.		X						X		1
<b>Bronchoscopy</b>										
The role of rigid and flexible bronchoscopy in the investigation of airway and pulmonary disease.		X						X		1
The anaesthetic, airway and ventilatory management during rigid and flexible bronchoscopy		X						X		1
<b>Mediastinal exploration</b>										
Endoscopic, radiological and surgical approaches used to evaluate and diagnose mediastinal disease of benign, infective, primary and malignant aetiology.		X						X		1
Equipment for mediastinal exploration		X						X		1
Relevant imaging techniques, and influence on surgical approach.		X						X		1
<b>CLINICAL SKILLS</b>										
<b>HISTORY AND EXAMINATION</b>										
System specific and general history and examination, including drug history, identification of comorbidity and functional status.	X	X							X	1,3
<b>DATA INTERPRETATION</b>										
Routine haematology and biochemical investigations		X					X	X		1
Chest radiograph and ECG		X					X	X		1

CT, including contrast enhanced CT		X				X	X	1
Interpretation of imaging of the mediastinum.		X				X	X	1
MRI and PET		X				X	X	1
Respiratory function tests		X				X	X	1
Ventilation/perfusion scan		X					X	1
Blood gases		X				X	X	1
Oesophageal function tests and contrast studies		X				X	X	1
<b>PATIENT MANAGEMENT</b>								
<b>General</b>								
Cardiopulmonary resuscitation		X					X	1
Risk assessment, stratification and management		X					X	1
Management of patients making an uncomplicated or complicated recovery from thoracic operations.		X					X	1,3
Post-operative management of pain control, respiratory failure, sputum retention, haemodynamic instability and low urine output.		X					X	1,3
Treatment of cardiac arrhythmias		X				X	X	1
Pain control		X					X	1
Wound infection and disruption		X					X	1
Blood transfusion and blood products		X				X	X	1
Physiotherapy and rehabilitation		X					X	1
Palliative care		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>PRACTICAL SKILLS</b>								
Tracheostomy				X				1
Fibreoptic bronchoscopy			X					1
Chest aspiration			X					1
Chest drain insertion			X					1
Chest drain management		X	X				X	1
<b>OPERATIVE MANAGEMENT</b>								
<b>Incisions</b>								
Correct positioning of patient for thoracic surgery				X				1
Perform and repair thoracic incisions, including lateral, anterior, muscle sparing and VATS incisions.				X				1
Difficult access and improving exposure				X				1
Perform and close sternotomy incision				X				1
<b>OPERATIVE MANAGEMENT</b>								
<b>Bronchoscopy</b>								
Diagnostic bronchoscopy including biopsy - rigid and flexible.			X					1
Equipment, instrumentation and preparation			X					1
Perform rigid and flexible bronchoscopy			X					1
Airway and ventilatory management			X					1
Recognise normal and abnormal anatomy.			X					1
Identify common pathologies and the surgical relevance of the findings.			X					1
Take appropriate specimens for bacteriology, cytology and histology.			X					1
Management of moderate bleeding and other common complications.			X					1
To appropriately supervise the care of patients recovering from bronchoscopy.		X	X				X	1
Post-operative bronchoscopy: indications and procedure		X	X				X	1
Tracheostomy and minitracheostomy				X				1
<b>Mediastinal Exploration</b>								
Surgical evaluation of the mediastinum using cervical, anterior and VATS approaches.				X				1

<b>Neoplasms of the Lung</b>								
<b>OBJECTIVE</b>								
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.								
<b>KNOWLEDGE</b>								
<b>GENERAL KNOWLEDGE</b>								
As for thoracic surgery - general								
<b>SPECIFIC KNOWLEDGE</b>								
Benign and malignant tumours of trachea, bronchus and lung parenchyma		X				X	X	1
Epidemiology, presentation, diagnosis, staging (pre-operative, intraoperative and pathological) and treatment of lung cancer and lung metastases.		X				X	X	1
Neoadjuvant and adjuvant treatment of lung cancer		X				X	X	1
Results of treating thoracic malignancy by surgery, medical or oncological techniques, including multimodality management.		X				X	X	1
Survival, recurrence rates and relapse patterns after surgical treatment and the investigation and management of relapse.		X				X	X	1
Knowledge of palliative care techniques.		X				X	X	1
Treatment of post-operative complications of pulmonary resection such as empyema and broncho-pleura fistula.		X				X	X	1
Role of repeat surgery in recurrent and second primary malignancies of the lung.		X				X	X	1
Medical and surgical options to deal with recurrent or problematic complications of pulmonary resection.		X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>PATIENT MANAGEMENT</b>								
As for thoracic surgery - general								
Clinical history and examination	X	X					X	1,3
Interpretation of laboratory, physiological and imaging techniques.		X				X	X	1
Interpretation of endoscopic findings.		X					X	1
Patient selection with assessment of function and risk.		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Bronchoscopic assessment including biopsy			X					1

Endoscopic and surgical techniques of lung biopsy			X						1
Mediastinal assessment and biopsy			X						1
Intraoperative diagnosis and staging				X					1
Endoscopic management of tumours using laser and stenting			X						1
Surgery for benign and malignant conditions of the lungs				X					1
Segmentectomy and lobectomy for benign and malignant disease				X					1
Redo operations for lung metastases				X					1
Advanced resections for lung cancer, including sleeve lobectomy, pneumonectomy and extended resections involving chest wall and diaphragm.				X					1
Management of post-operative complications such as empyema and broncho-pleural fistula.				X					1

Disorders of the Pleura									
<b>OBJECTIVE</b>									
To evaluate and manage surgical conditions of the pleura and the pleural space, including operative management and with appropriate supervision									
<b>KNOWLEDGE</b>									
<b>GENERAL KNOWLEDGE</b>									
As for thoracic surgery – general									
<b>SPECIFIC KNOWLEDGE</b>									
Anatomy and physiology of the pleura			X				X	X	1
Inflammatory, infective and malignant disease of the visceral and parietal pleura.			X				X	X	1
Pneumothorax			X				X	X	1
Pleural effusion			X				X	X	1
Empyema			X				X	X	1
Mesothelioma			X				X	X	1
Haemothorax			X				X	X	1
Chylothorax			X				X	X	1
Conditions of adjacent organs that affect the pleura			X				X	X	1
Medical and surgical management of pleural disease, including radiological, open and VATS techniques.			X				X	X	1
Techniques to deal with failures of primary treatment.			X				X	X	1
Advanced techniques for pleural space obliteration such as thoracoplasty and soft-tissue transfer			X				X	X	1
<b>CLINICAL SKILLS</b>									
<b>PATIENT MANAGEMENT</b>									
As for thoracic surgery – general									
Interpretation of imaging of the pleura			X				X	X	1
Chest drains: insertion, management, removal and treatment of complications.			X	X				X	1
Management of patients making uncomplicated and complicated recovery from pleural interventions.			X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>									
<b>OPERATIVE MANAGEMENT</b>									
Open procedures for non-complex pleural problems						X			1
VATS procedures for non- complex pleural problems						X			1
Open and VATS procedures for empyema, including techniques for decortication.						X			1
Open and VATS procedures in complex cases.						X			1
Advanced techniques of pleural space obliteration.						X			1

Disorders of the Chest Wall									
<b>OBJECTIVE</b>									
To assess and manage a patient with abnormality or disease affecting the chest wall, including surgical management where appropriate and with appropriate supervision									
<b>KNOWLEDGE</b>									
<b>GENERAL KNOWLEDGE</b>									
As for thoracic surgery - general									
<b>SPECIFIC KNOWLEDGE</b>									
Anatomy of the chest wall			X				X	X	1
Congenital, inflammatory, infective and neoplastic conditions that can affect the components of the chest wall.			X				X	X	1
Clinical, laboratory and imaging techniques used in the evaluation of chest wall pathology.			X				X	X	1
Techniques used in the diagnosis of chest wall disease, including aspiration and core biopsy, and incision and excision biopsy.			X				X	X	1
Pectus deformities: aetiology, physiological and psychological consequences. Surgical options for correction.			X				X	X	1
Techniques used to resect the sternum and chest wall, physiological and cosmetic sequelae.			X				X	X	1
Prosthetic materials used in chest wall surgery			X				X	X	1
The role of repeat surgery to deal with recurrent conditions and the complications of previous surgery.			X				X	X	1
Techniques of complex chest wall reconstruction involving thoracoplasty or soft-tissue reconstruction			X				X	X	1
<b>CLINICAL SKILLS</b>									
<b>PATIENT MANAGEMENT</b>									
As for thoracic surgery - general									
Clinical history and examination		X						X	1,3
Interpretation of laboratory, physiological and imaging techniques.			X				X	X	1
Patient selection with assessment of function and risk.			X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>									
<b>OPERATIVE MANAGEMENT</b>									
Chest wall biopsy and choice of appropriate technique.					X				1
Open and excision biopsy and resection of the chest wall for benign and malignant conditions.					X				1
Chest wall resection in combination with resection of the underlying lung.					X				1
Selection and insertion of prosthetic materials, and selection of cases in which such materials are required					X				1
Pectus correction, by both open and minimally-invasive techniques, including post-operative care and complications					X				1
Surgery for the complications of chest wall resection, and repeat surgery to resect recurrent chest wall conditions.					X				1

Complex chest wall reconstruction				X						1
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Disorders of the Diaphragm										
<b>OBJECTIVE</b>										
To assess and manage a patient with disease or abnormality of the diaphragm, including surgical management where appropriate, and with appropriate supervision.										
<b>KNOWLEDGE</b>										
<b>GENERAL KNOWLEDGE</b>										
As for thoracic surgery – general										
<b>SPECIFIC KNOWLEDGE</b>										
Anatomy and physiology of the diaphragm.		X				X	X			1
Pathology of the diaphragm.		X				X	X			1
Clinical, physiological and imaging techniques in the assessment of diaphragmatic abnormalities.		X				X	X			1
Physiological consequences of diaphragmatic herniation or paresis.		X				X	X			1
Surgical techniques used to biopsy and resect diaphragmatic tumours.		X				X	X			1
Situations in which replacement of the diaphragm is required, the materials used and their value and limitations.		X				X	X			1
Complications of diaphragmatic resection and their management.		X				X	X			1
Techniques used to electrically pace the diaphragm, and the conditions in which such treatment is appropriate.		X				X	X			1
<b>CLINICAL SKILLS</b>										
<b>PATIENT MANAGEMENT</b>										
As for thoracic surgery – general										
Specific Skills										
Clinical history and examination	X						X			1,3
Interpretation of laboratory, physiological and imaging techniques.		X				X	X			1
Patient selection with assessment of function and risk.		X					X			1
Management of patients making an uncomplicated or complicated recovery from diaphragmatic resection.		X					X			1
<b>TECHNICAL SKILLS AND PROCEDURES</b>										
<b>OPERATIVE MANAGEMENT</b>										
Resection and repair of the diaphragm and adjacent structures					X					1
Complications of diaphragmatic resection		X			X		X			1
Management of diaphragmatic trauma		X			X		X			1

Emphysema and Bullae										
<b>OBJECTIVE</b>										
To fully assess and manage a patient with emphysema and bullae, including surgical management where appropriate, and with appropriate supervision.										
<b>KNOWLEDGE</b>										
<b>GENERAL KNOWLEDGE</b>										
As for thoracic surgery – general										
<b>SPECIFIC KNOWLEDGE</b>										
Aetiology, pathology and physiology of chronic obstructive airways disease (COPD)		X				X	X			1
Epidemiology and public health issues		X				X	X			1
Smoking cessation measures.		X				X	X			1
Clinical, laboratory, physiological and imaging techniques.		X				X	X			1
Medical and surgical management of COPD and its complications		X				X	X			1
Selection criteria and pre-operative preparation		X				X	X			1
Surgical techniques used in the treatment of emphysema and bullae and the results of surgical treatment including relevant clinical trials.		X				X	X			1
Lung volume reduction surgery: techniques, complications and management of complications.		X				X	X			1
Experimental and developmental techniques in lung volume reduction surgery		X				X	X			1
<b>CLINICAL SKILLS</b>										
<b>PATIENT MANAGEMENT</b>										
As for thoracic surgery – general										
Clinical history and examination	X						X			1,3
Interpretation of laboratory, physiological and imaging techniques.		X				X	X			1
Patient selection with assessment of function and risk.		X					X			1
Post-operative management of patients making an uncomplicated recovery from surgery for emphysema or the complications of such diseases.		X					X			1
Management of patients following lung volume reduction surgery.		X					X			1
<b>TECHNICAL SKILLS AND PROCEDURES</b>										
<b>OPERATIVE MANAGEMENT</b>										
Procedures to deal with secondary pneumothorax and bullae by open techniques.					X					1
Procedures to deal with secondary pneumothorax and bullae by VATS techniques.					X					1
Lung volume reduction surgery using open and VATS techniques.					X					1

Disorders of the Pericardium										
<b>OBJECTIVE</b>										
To fully assess and manage a patient with disease of the pericardium or pericardial space, including surgical management where appropriate, and with appropriate supervision.										
<b>KNOWLEDGE</b>										
<b>GENERAL KNOWLEDGE</b>										
As for thoracic surgery – general										
<b>SPECIFIC KNOWLEDGE</b>										
Anatomy of the pericardium.		X				X	X			1
Pathology of the pericardium.		X				X	X			1
Pathophysiological consequences of pericardial constriction and tamponade.		X				X	X			1
Clinical, echocardiographic and imaging techniques used to detect pericardial disease and assess its consequences.		X				X	X			1
Techniques for pericardial drainage using guided needle aspiration		X				X	X			1

Surgical drainage by sub-xiphoid, thoracotomy or VATS approaches.		X				X	X	1
Surgical techniques for pericardiectomy.		X				X	X	1
Materials used for pericardial replacement, their value and limitations and the situations in which used.		X				X	X	1
Post-operative complications following resection of the pericardium and its prosthetic replacement.		X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>PATIENT MANAGEMENT</b>								
As for thoracic surgery – general								
Clinical history and examination		X					X	1,3
Interpretation of laboratory, physiological and imaging techniques, including echocardiography.		X				X	X	1
Recognition and assessment of pericardial tamponade and constriction.		X					X	1
Techniques for pericardial drainage using guided needle aspiration			X				X	1
Recognition of pericardial herniation and cardiac strangulation.		X					X	1
Patient selection with assessment of function and risk.		X					X	1
Management of patients making an uncomplicated or complicated recovery from pericardial surgery.		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Non-complex pericardial fenestration procedures				X				1
Pericardial fenestration in complex cases				X				1
Pericardiectomy for relief of constriction				X				1
Resection of the pericardium and replacement with prosthetic materials				X				1
Competence in dealing with the complications of pericardial resection and replacement				X				1

<b>Disorders of the Mediastinum</b>								
<b>OBJECTIVE</b>								
To fully assess and manage a patient with benign and malignant disease of the mediastinum, including surgical management where appropriate, and with appropriate supervision.								
<b>KNOWLEDGE</b>								
<b>GENERAL KNOWLEDGE</b>								
As for thoracic surgery – general								
<b>SPECIFIC KNOWLEDGE</b>								
Anatomy of the mediastinum		X				X	X	1
Congenital, benign, infective and malignant (primary and secondary) conditions of the mediastinum.		X				X	X	1
Systemic conditions associated with the mediastinum.		X				X	X	1
Clinical, laboratory, electromyographic and imaging techniques used in the diagnosis and assessment of patients with mediastinal disease		X				X	X	1
Myasthenia gravis: medical, surgical and peri-operative management		X				X	X	1
Staging of thymoma and grading of myasthenia		X				X	X	1
Benign and malignant conditions, which do not require surgical biopsy or resection.		X				X	X	1
Oncological treatment of malignant diseases of the mediastinum, including multidisciplinary care.		X				X	X	1
Surgical techniques for the treatment of myasthenia gravis, mediastinal cysts and tumours, complications and results.		X				X	X	1
Retrosternal goitre and its management		X				X	X	1
<b>CLINICAL SKILLS</b>								
<b>PATIENT MANAGEMENT</b>								
As for thoracic surgery – general								
Clinical history and examination		X					X	1,3
Interpretation of laboratory, physiological and imaging techniques.		X				X	X	1
Patient selection with assessment of function and risk.		X					X	1
Post-operative management of patients including recognition and management of post-operative complications .		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT</b>								
Biopsy of mediastinal masses using appropriate techniques			X	X				1
Excision of the thymus				X				1
Isolated resection of mediastinal cysts and tumours				X				1
Resection of mediastinal cysts and tumours, including extended resections involving adjacent structures				X				1

<b>Disorders of the Airway</b>								
<b>OBJECTIVE</b>								
To assess and manage a patient with disease of the major airways, including surgical management where appropriate, and with appropriate supervision.								
<b>KNOWLEDGE</b>								
<b>GENERAL KNOWLEDGE</b>								
As for thoracic surgery – general								
<b>SPECIFIC KNOWLEDGE</b>								
Anatomy of the larynx, trachea and bronchus.		X				X	X	1
Physiology of the normal airway.		X				X	X	1
Pathophysiology of disease and its effects on lung function.		X				X	X	1
Endoscopic appearances in health and disease.		X				X	X	1
Congenital, inflammatory, infective, benign and neoplastic diseases of the airways.		X				X	X	1
Symptoms, signs of airway disease.		X				X	X	1
Clinical, physiological and imaging tests undertaken to diagnose and assess airway disease.		X				X	X	1
Techniques for surgical resection of the trachea.		X					X	1
Bronchoplastic procedures and the limitations of these techniques.		X					X	1
Medical and oncological treatments available to deal with airway diseases.		X				X	X	1
Endoscopic techniques used to deal with benign and malignant conditions, including disobliteration and stenting.		X				X	X	1
Presentation, investigation and management of anastomotic complications following airway surgery.		X				X	X	1
Presentation, evaluation and treatment of fistulae in the aerodigestive tract, due to benign, malignant and iatrogenic causes.		X				X	X	1
Role of open and endoscopic procedures in dealing with problems		X				X	X	1

CLINICAL SKILLS							
<b>PATIENT MANAGEMENT</b>							
As for thoracic surgery – general							
Clinical history and examination	X					X	1
Interpretation of laboratory, physiological and imaging techniques.		X			X	X	1
Recognition, diagnosis and assessment of airway obstruction.		X				X	1
Patient selection with assessment of function and risk.		X				X	1
Post-operative care of patients making an uncomplicated recovery from major airway surgery.		X				X	1
Post-operative care of patients making a complicated recovery from airway surgery.		X				X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>							
<b>OPERATIVE MANAGEMENT</b>							
Endoscopic assessment of a patient with airways disease			X				1
Sleeve resection of the trachea for simple benign conditions			X				1
Sleeve resection of the main bronchi, including lobectomy where appropriate, for malignant disease			X				1
Techniques for the relief of major airways obstruction including stenting			X				1
Airway resection for tumours and complex benign conditions and techniques for airway reconstruction anastomosis and laryngeal release			X				1
Repeat resections for recurrence and the complications of prior resection.			X				1
Management of fistulae in the aerodigestive tract by surgical and endoscopic techniques			X				1

Congenital Heart Disease							
<b>OBJECTIVE</b>							
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.							
<b>KNOWLEDGE</b>							
<b>BASIC KNOWLEDGE</b>							
Physiology							
Relevant general physiology of childhood		X			X	X	1
Fetal circulation and circulatory changes at birth		X			X	X	1
Haemodynamics; physiology and measurement including shunt calculations		X			X	X	1
Physiology of pulmonary vasculature		X			X	X	1
Myocardial cellular physiology in immature myocardium		X			X	X	1
Electrophysiology, including conduction disorders		X			X	X	1
Haemostasis, thrombosis and bleeding		X			X	X	1
Acid base balance		X			X	X	1
Pulmonary physiology, ventilation and gas exchange		X			X	X	1
Metabolic response to trauma		X			X	X	1
Vascular biology and reactivity		X			X	X	1
Physiology of Cardiopulmonary Bypass including low flow and circulatory arrest.		X			X	X	1
Ph and alpha stat CPB management		X			X	X	1
Anatomy							
Embryology of the heart		X			X	X	1
Anatomy of the heart, pericardium and great vessels		X			X	X	1
Pulmonary anatomy		X			X	X	1
Coronary anatomy and variants		X			X	X	1
Anatomy of the peripheral vascular system and vascular conduits including aortopulmonary shunts		X			X	X	1
Sequential cardiac analysis and terminology of cardiac malformations		X			X	X	1
Pathology							
Inflammation and wound healing		X			X	X	1
Systemic Inflammatory Response Syndrome		X			X	X	1
Effect of growth and pregnancy		X			X	X	1
Pharmacology							
Drugs used in the treatment of congenital heart disease		X			X	X	1
Inotropes		X			X	X	1
Anti-arrhythmic drugs		X			X	X	1
Haemostatic drugs		X			X	X	1
Antiplatelet, anticoagulant and thrombolytic drugs		X			X	X	1
Analgesics		X			X	X	1
Antibiotics		X			X	X	1
Anaesthetic agents, local and general		X			X	X	1
Hypotensive agents (systemic and pulmonary).		X			X	X	1
Microbiology							
Organisms involved in cardiorespiratory infection		X			X	X	1
Organisms involved in wound infection		X			X	X	1
Antibiotic usage and prophylaxis		X			X	X	1
Antisepsis		X			X	X	1
<b>CLINICAL KNOWLEDGE</b>							
General							
Diagnosis, investigation and treatment of congenital heart disease		X			X	X	1
Results of surgery - survival, common complications and management.		X				X	1
Late complications of surgery for congenital heart disease		X				X	1
Role of interventional cardiology.		X				X	1
Role of mechanical assist (IABP, VAD and ECMO)		X				X	1
Indications for referral for transplantation		X				X	1
Risk assessment and stratification		X				X	1
Cardiopulmonary resuscitation		X				X	1
Cardiac arrhythmias		X			X	X	1
Renal dysfunction		X			X	X	1
Multiorgan failure		X			X	X	1

Cardiac rehabilitation	X				X	1
Blood transfusion and blood products	X			X	X	1
Wound infection and sternal disruption	X				X	1
Types of cardiac prosthesis and indications for use	X				X	1
Specific Knowledge						
The anatomy, pathophysiology natural history and management of the following conditions or procedures						
Patent ductus arteriosus	X			X	X	1
Aortopulmonary window	X			X	X	1
Atrial septal defect	X			X	X	1
Ventricular septal defect	X			X	X	1
Coarctation	X			X	X	1
PA banding and shunts	X			X	X	1
Aortopulmonary and venous shunts	X			X	X	1
Transposition of the great arteries / switch procedure	X			X	X	1
Congenitally corrected TGA	X				X	1
Single ventricle/univentricular heart	X			X	X	1
Tetralogy of Fallot/Pulmonary atresia plus VSD	X			X	X	1
Fontan procedure	X			X	X	1
Rastelli procedure	X			X	X	1
Hypoplastic left heart and Norwood procedure	X			X	X	1
Norwood procedure	X			X	X	1
Truncus arteriosus	X			X	X	1
Double outlet right ventricle	X			X	X	1
Pulmonary atresia plus VSD and MAPCAs	X			X	X	1
Pulmonary atresia and intact septum	X			X	X	1
Single ventricle	X			X	X	1
Partial and complete atrioventricular septal defects	X			X	X	1
Anomalies of the pulmonary venous drainage (partial and total)	X			X	X	1
Anomalies of systemic venous drainage	X			X	X	1
Congenital aortic valve disease (including supra-valve stenosis)	X			X	X	1
LV outflow tract obstruction	X			X	X	1
Sinus of valsalva aneurysm	X			X	X	1
Congenital mitral valve disease	X			X	X	1
3 Congenital tricuspid valve disease (including Ebsteins abnormality)	X			X	X	1
Anomalies of the coronary arteries (including ALCAPA)	X			X	X	1
3 Vascular rings	X			X	X	1
Cardiac tumours	X			X	X	1
4 Pericardial disease	X			X	X	1
Aortic valve disease including Ross procedure	X			X	X	1
Mitral valve disease	X			X	X	1
Tricuspid valve disease including Ebsteins abnormality	X			X	X	1
Extra cardiac conduits	X			X	X	1
Interrupted aortic arch	X			X	X	1
Total anomalous pulmonary venous drainage	X			X	X	1
Extra Corporeal Membrane Oxygenation	X			X	X	1
Extra Corporeal Membrane Oxygenation and VAD	X			X	X	1
Transplantation	X			X	X	1
Transplantation for congenital heart disease	X			X	X	1
CLINICAL SKILLS						
HISTORY AND EXAMINATION						
Cardiovascular system and general history and examination of child or adult with congenital heart disease	X				X	1,3
DATA INTERPRETATION						
Routine haematology and biochemical investigations	X			X	X	1
Chest radiograph and ECG	X			X	X	1
Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations	X			X	X	1
Echocardiography in congenital heart disease, including 2D, doppler and TOE	X				X	1
PATIENT MANAGEMENT						
Principles of paediatric intensive care	X				X	1
Management of adults and children following congenital heart surgery	X				X	1
Management of complications of surgery	X				X	1
Cardiopulmonary resuscitation	X				X	1
Diagnosis and treatment of cardiac arrhythmias	X			X	X	1
Blood transfusion and blood products	X				X	1
Wound infection and sternal disruption	X				X	1
TECHNICAL SKILLS AND PROCEDURES						
OPERATIVE MANAGEMENT						
Sternotomy - open and close			X			1
Thoracotomy - open and close			X			1
Preparation for and management of cardiopulmonary bypass including partial bypass			X			1
Approaches for ECMO, cannulation and management			X			1
Surgical management of the following common uncomplicated conditions (level 1 - a higher level of operative competence is not required during this module):			X			1
Patent ductus arteriosus			X			1
Atrial septal defect			X			1
Ventricular septal defect			X			1
Coarctation			X			1
PA banding and shunts			X			1
Aortopulmonary window			X			1
Vascular ring			X			1



Aortopulmonary and venous shunts				X					1
<b>Surgical management of the following conditions requiring advanced procedures:</b>									
Partial atrioventricular septal defect				X					1
Aortic and mitral valve surgery including Ross procedure				X					1
Open aortic valvotomy				X					1
Open pulmonary valvotomy				X					1
Tricuspid valve surgery including Ebsteins				X					1
Tetralogy of Fallot/Pulmonary atresia plus VSD				X					1
Fontan procedures				X					1
Extra cardiac conduits and their replacement				X					1
Complete atrioventricular septal defect				X					1
<b>Surgical management of the following conditions requiring complex procedures:</b>									
Interrupted aortic arch				X					1
Total anomalous pulmonary venous drainage				X					1
Transposition of the great arteries (switch procedure)				X					1
Rastelli procedure				X					1
Norwood procedure				X					1
Truncus arteriosus repair				X					1
Double outlet right ventricle				X					1
Pulmonary atresia plus VSD and MAPCAs				X					1

<b>Intrathoracic transplantation and surgery for heart failure</b>									
<b>OBJECTIVE</b>									
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.									
<b>KNOWLEDGE</b>									
<b>BASIC KNOWLEDGE</b>									
<b>Pathophysiology</b>									
Haemodynamics of heart failure.		X				X	X		1
Molecular mechanisms underlying heart failure.		X				X	X		1
Mechanisms and outcomes of respiratory failure.		X				X	X		1
Causes of cardiac failure.		X				X	X		1
Causes of respiratory failure.		X				X	X		1
<b>Immunology</b>									
Major and minor histocompatibility antigen systems.		X				X	X		1
Mechanisms of immune activation and pathological consequences for transplanted organs.		X				X	X		1
<b>Pharmacology</b>									
Modes of action of commonly used drugs in heart failure:		X				X	X		1
<b>CLINICAL KNOWLEDGE</b>									
Indications for, contraindications to and assessment for heart transplantation.		X				X	X		1
Indications for, contraindications to and assessment for lung and heart/lung transplantation.		X				X	X		1
Indications for ECMO		X				X	X		1
Indications for VAD		X				X	X		1
Criteria for brain stem death, management of the brain-dead donor, criteria for matching donor and recipient.		X				X	X		1
Management of patients after intrathoracic organ transplantation, including complications		X				X	X		1
Results of heart transplantation, lung transplantation and non-transplant interventions for heart failure.		X				X	X		1
Resynchronisation therapy: techniques and indications		X				X	X		1
<b>CLINICAL SKILLS</b>									
<b>HISTORY AND EXAMINATION</b>									
Cardiovascular system and general history and examination including conduit, drug history, identification of comorbidity and risk assessment	X	X					X		1.3
<b>DATA INTERPRETATION</b>									
Routine haematology and biochemical investigations		X				X	X		1
Interpretation of haemodynamic data		X				X	X		1
Chest radiograph		X				X	X		1
ECG including exercise ECG		X				X	X		1
Coronary angiography		X					X		1
Cardiac catheterisation data		X					X		1
Echocardiography including 2D, Doppler and TOE and stress echo		X					X		1
MR assessment of ventricular function and viability		X					X		1
Nuclear cardiology		X					X		1
<b>PATIENT MANAGEMENT</b>									
Cardiopulmonary resuscitation		X					X		1
Management of brain-dead donor		X					X		1
Diagnosis and treatment of cardiac arrhythmias		X				X	X		1
Management of post cardiac surgical patient		X					X		1
Management of complications of surgery		X					X		1
Management of rejection		X				X	X		1
Cardiac rehabilitation		X					X		1
Blood transfusion and blood products		X				X	X		1
Wound infection and sternal disruption		X					X		1
Diagnosis and treatment of cardiac arrhythmias		X					X		1
<b>TECHNICAL SKILLS AND PROCEDURES</b>									
<b>OPERATIVE MANAGEMENT</b>									
<b>Transplantation</b>									
Transvenous myocardial biopsy			X						1
Donor Retrieval				X					1
Ex-vivo donor organ management				X					1

Implantation of heart				X					1
Implantation of lung				X					1
Implantation of heart/lung block				X					1
<b>Surgery for heart failure</b>									
Surgical revascularisation for ischaemic cardiomyopathy				X					1
Ventricular reverse remodelling surgery				X					1
Mitral valve repair for cardiac failure				X					1
Cannulation for ECMO				X					1
Implantation of epicardial electrodes for resynchronisation therapy				X					1
Implantation of extracorporeal VAD				X					1
Implantation of intracorporeal VAD				X					1

<b>Management of Benign Oesophageal Disorders</b>									
<b>OBJECTIVE</b>									
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.									
<b>KNOWLEDGE</b>									
<b>BASIC KNOWLEDGE</b>									
<b>Physiology</b>									
Gastric and oesophageal cellular physiology			X				X	X	1
Mechanical and cellular defence mechanisms in oesophagus		X					X	X	1
Oesophageal mucosal injury and modulation		X					X	X	1
Effects of acid pepsin and biliary reflux		X					X	X	1
Oesophago-gastric physiology and assessment including pH monitoring		X					X	X	1
Oesophageal motility measurement in achalasia, diffuse spasm and non-specific motility syndromes		X					X	X	1
<b>Anatomy</b>									
Embryology of the foregut.		X					X	X	1
The oesophagus and its anatomical relationships from cricopharyngeus to cardia, including details of blood supply and lymphatic drainage.		X					X	X	1
Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage.		X					X	X	1
Anatomy of the colon, including its anatomical relationships, blood supply and lymphatic drainage.		X					X	X	1
<b>Pathology</b>									
Inflammation and wound healing.		X					X	X	1
Oesophageal injury response and variations in response.		X					X	X	1
The inflammation, metaplasia, dysplasia cancer sequence.		X					X	X	1
Neurological deficits / aetiology of oesophageal dysmotility disorders.		X					X	X	1
Para-oesophageal hernias		X					X	X	1
<b>Pharmacology</b>									
Drugs used in the treatment of gastro-oesophageal reflux disorder and oesophageal dysmotility.		X					X	X	1
<b>Microbiology</b>									
The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder.		X					X	X	1
The rationale of bacterial eradication treatment		X					X	X	1
<b>CLINICAL KNOWLEDGE</b>									
Diagnosis, investigation and treatment of benign oesophageal disorders.		X					X	X	1
Radiology, endoscopy, 24 hour pH monitoring and oesophageal function tests.		X					X	X	1
Risk assessment and stratification.		X						X	1
Open, laparoscopic and thoracoscopic surgery of the oesophagus.		X						X	1
Relative merits of conservative and operative treatment.		X						X	1
Alternative management of achalasia including dilatation and botox injection.		X						X	1
The indications for surgery in paraoesophageal hernia.		X						X	1
Endoscopic dilatation techniques		X						X	1
<b>CLINICAL SKILLS</b>									
<b>HISTORY AND EXAMINATION</b>									
General and specific history and examination including previous surgery, drug history, identification of comorbidity and risk assessment	X							X	1,3
<b>DATA INTERPRETATION</b>									
Routine haematology and biochemical investigation		X					X	X	1
Interpretation of oesophageal motility and pH monitoring data		X					X	X	1
Chest radiograph and contrast imaging		X					X	X	1
Cardio-pulmonary assessment including exercise tests		X					X	X	1
<b>PATIENT MANAGEMENT</b>									
Management of post thoracotomy or laparotomy surgical patient		X						X	1
Management of complications of surgery		X						X	1
Diagnosis and management of oesophageal perforation or anastomotic leak.		X						X	1
Blood transfusion and blood products		X					X	X	1
Wound infection and wound disruption		X						X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>									
<b>OPERATIVE MANAGEMENT (Benign)</b>									
Oesophago-gastro-duodenoscopy			X						1
Rigid oesophagoscopy			X						1
Oesophageal dilatation			X						1
Open and laparoscopic fundoplication and cardiomyotomy				X					1
Mobilisation of oesophagus, stomach and colon				X					1
Oesophageal anastomosis				X					1
Management of oesophageal perforation: Boerhaave's or endoscopic				X					1

<b>Management of Oesophageal Neoplasia</b>									
<b>OBJECTIVE</b>									

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 subspecialty either as part of general cardiothoracic training or as an introduction to further advanced training in this area.								
<b>KNOWLEDGE</b>								
<b>BASIC KNOWLEDGE</b>								
<b>Physiology</b>								
Gastric and oesophageal cellular physiology		X				X	X	1
Mechanical and cellular defence mechanisms in oesophagus		X				X	X	1
Oesophageal mucosal injury and modulation		X				X	X	1
Effects of acid pepsin and biliary reflux		X				X	X	1
<b>Anatomy</b>								
The oesophagus and its anatomical relationships from cricopharyngeus to cardia including details of blood supply and lymphatic drainage.		X				X	X	1
Anatomy of the stomach, including its anatomical relationships, blood supply and lymphatic drainage.		X				X	X	1
Anatomy of the colon, including its blood supply and its anatomical relationships		X				X	X	1
<b>Pathology</b>								
Inflammation and wound healing.		X				X	X	1
Oesophageal injury response and variations in response.		X				X	X	1
The aetiology and epidemiology of oesophageal cancer		X				X	X	1
Metaplasia-dysplasia sequence.		X				X	X	1
<b>Pharmacology</b>								
Adjuvant and neoadjuvant chemotherapy.		X				X	X	1
<b>Microbiology</b>								
The role of Helicobacter Pylori in gastritis and gastroesophageal reflux disorder.		X				X	X	1
The rationale of bacterial eradication treatment		X				X	X	1
<b>CLINICAL KNOWLEDGE</b>								
Diagnosis, investigation and treatment of oesophageal disorders.		X				X	X	1
Radiology, endoscopy and oesophageal function tests.		X				X	X	1
Risk assessment and stratification.		X					X	1
Diagnostic tests, including contrast oesophageal imaging, CT Scanning, abdominal ultrasonography endoscopic ultrasonography and PET scanning.		X					X	1
Treatment options and outcomes of treatment		X					X	1
Oesophageal resection		X					X	1
Palliative procedures		X					X	1
Other therapies including radiotherapy, laser, stent and photodynamic therapy		X					X	1
Screening and prevention.		X					X	1
<b>CLINICAL SKILLS</b>								
<b>HISTORY AND EXAMINATION</b>								
General and specific history and examination including previous surgery, drug history, and identification o comorbidity and risk assessment.	X	X					X	1,3
<b>DATA INTERPRETATION</b>								
Routine haematology and biochemical investigations		X				X	X	1
Interpretation of Chest radiograph, contrast swallow and CT Scan		X				X	X	1
Cardio-pulmonary assessment including exercise tests.		X				X	X	1
<b>PATIENT MANAGEMENT</b>								
Management of post thoracotomy or laparotomy surgical patient.		X					X	1
Management of complications of surgery		X					X	1
Blood transfusion and blood products		X				X	X	1
Wound infection and wound disruption		X					X	1
Diagnosis and management of oesophageal perforation or anastamotic leak.		X					X	1
<b>TECHNICAL SKILLS AND PROCEDURES</b>								
<b>OPERATIVE MANAGEMENT (Malignant)</b>								
Oesophago-gastro-duodenoscopy			X					1
Assessment by thoracoscopy laparoscopy and mediastinoscopy				X				1
Rigid oesophagoscopy and bronchoscopy			X					1
Oesophageal dilatation and stent placement			X					1
Mobilisation of oesophagus, stomach and colon				X				1
Oesophageal resection				X				1
Oesophageal reconstruction including interposition techniques				X				1