EUROPEAN BOARD OF CARDIOTHORACIC SURGERY
Syllabus

April 2017

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Syllabus

Purpose

The primary aim of The European Board of Cardiothoracic Surgery (EBCTS) is to encourage common high standards and qualifications in cardiothoracic surgery in all European countries and beyond. This should potentially allow for the mutual recognition of these qualifications between European countries and elsewhere.

Standards

The standards are set to award certificates of the Board to surgeons who have attained levels of knowledge and proficiency that can be recognised as appropriate for independent specialist practice.

The EBCTS Syllabus describes the knowledge, skills and behaviours examined in the European Board of Cardiothoracic Surgery examinations.

The syllabus identifies the breadth of medical knowledge and clinical judgement as learning outcomes required for the Membership and Fellowship examinations of the EBCTS.
The standards of these two examinations are:

Membership of the European Board of Cardiothoracic Surgery (MEBCTS): *tests the scope of knowledge, clinical judgement and application of the principles and practice* of a surgeon to the standard expected at the end of their training in the generality of cardiothoracic surgery, ready to commence as an independent specialist (e.g. CCT level in UK).

The Membership examination must be successfully completed before continuing to:
Fellowship of the European Board of Cardiothoracic Surgery (FEBCTS): *tests the scope of knowledge, clinical judgement and application of the principles and practice* of an autonomous/independently practising surgeon to the standard expected in one or more areas of established specialist practice (adult cardiac surgery; thoracic surgery; congenital cardiac surgery alone or in combination). This surgeon would be expected to be independently 'emergency safe' in their chosen areas of specialist practice.

Examinations

The **Membership** examination will assess the **Level One** outcomes across the **entire** syllabus (General section, Adult Cardiac, Congenital and Thoracic Surgery) in the MCQ examination. Successful candidates will be awarded Membership of the European Board of Cardiothoracic Surgery (MEBCTS).

The **Fellowship** examination will assess **all** the **Level One** outcomes across the **entire** syllabus (General section, Adult Cardiac, Congenital and Thoracic Surgery) **in addition** to the **Level Two** outcomes within the **General and specific sub-specialty** area of the syllabus. This will be via oral viva examinations.

For example: A surgeon wishing to take the Fellowship examination in Adult Cardiac surgery would need to have passed the Membership examination and then elect to take the Adult Cardiac sub-specialty Fellowship examination. This candidate would need to be competent for all the Level One outcomes across the entire syllabus and only the Level Two outcomes for the General section and the Adult Cardiac surgery section of the syllabus. This principle is the same for candidates wishing to take the Fellowship examination in Congenital surgery and Thoracic surgery

Candidates may elect to take one or more sub-specialty examination (Adult Cardiac, Congenital or Thoracic surgery).

Successful candidates will be awarded Fellowship of the European Board of Cardiothoracic Surgery (sub-specialty) i.e. FEBCTS (Thoracic); FEBCTS (Cardiac); FEBCTS (Congenital).

1 - GENERAL SECTION

EBCTS Syllabus
GENERAL

1.1 - Professional behaviour, ethics and research

the candidate should be able to demonstrate:

Professionalism	
Membership (Level One)	Fellowship (Level Two)
1.1.1 Understanding of the multidisciplinary approach to patient care (e.g. Heart team and thoracic MDTs) and application of the principles of team based care	*1.1.6* Knowledge of bioethical principles in sub-specialty clinical practice
1.1.2 Knowledge of checklists and briefings to prevent adverse events (e.g. WHO checklist)	*1.1.7* Recognition of ethical issues in clinical practice and the ability to discuss, analyse and plan a strategy for managing common and complex ethical situations
1.1.3 Knowledge of the role of morbidity and mortality meetings to review clinical performance and patient safety	*1.1.8* Recognition of personal limits in complex clinical situations and the need for requesting further appropriate assistance when required
1.1.4 Knowledge of the principles and practice of obtaining informed consent	*1.1.9* Selection of effective communication strategies with patients and their carers to ensure their understanding and participation in complex decision-making (e.g. the consent process)
1.1.5 Selection of effective communication strategies to preserve patient safety and minimise the risk of medical error including human factors in surgery	
Supporting Clinical Practice	
Membership (Level One)	Fellowship (Level Two)
1.1.10 Knowledge of the basic concepts of clinical epidemiology, biostatistics and evidence based practice	*1.1.12* Analysis of study designs and research outcomes in areas of sub-specialty practice including original research findings, systematic reviews, meta-analyses and clinical practice guidelines
1.1.11 Knowledge and understanding of the role of audit, research, guidelines and standard setting in improving quality of care	

1.2 Principles of surgery and critical care

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
1.2.1 Knowledge of normal cardiopulmonary physiology and the role of treatment on the pathophysiology of cardiovascular and thoracic disease *1.2.2* Knowledge of the pathophysiological effects of major surgery (e.g. metabolic effects and wound healing) *1.2.3* Knowledge of clinical presentations and common variations of critically-ill cardiovascular and thoracic patients *1.2.4* Knowledge of prophylactic measures to prevent complications (e.g. nutritional support, deep venous thrombosis [DVT] prophylaxis) *1.2.5* Knowledge of antiplatelet agents and all anticoagulants and their relevance to Cardiothoracic surgical interventions *1.2.6* Knowledge of the diagnostic tests (including the advantages and disadvantages) for the evaluation of routine and critically-ill patients with cardiovascular and thoracic diseases (e.g. interpretation of haemodynamic data (Swan-Ganz)) *1.2.7* Knowledge of the ICU treatment options (including advantages and disadvantages) for critically-ill patients with cardiovascular and thoracic diseases pre-and post-operatively (e.g. pharmacology of inotropic agents) *1.2.8* Knowledge of routine ventilator management, temporary pacemakers and the principles of mechanical circulatory support (MCS) including IABP and their role in the critically ill patient[1] *1.2.9* Knowledge of basic outcome literature for critically-ill patients with cardiovascular and thoracic diseases *1.2.10* Knowledge of risk adjustment, scoring systems and outcome literature in critical care *1.2.11* Knowledge of basic life support and associated instrumentation (e.g. ET tube) *1.2.12* Knowledge of EACTS/STS/European Resuscitation Council guidelines to treat cardiac arrest after cardiac surgery).	*1.2.13* Knowledge of advanced MCS techniques
Clinical Judgment	
Membership (Level One)	Fellowship (Level Two)
1.2.14 Prioritisation and interpretation of diagnostic and physiological assessment tests for critically-ill patients with cardiovascular and thoracic diseases (e.g. pre- and post-operative) *1.2.15* Interpretation of the more common abnormalities and clinical presentations associated with critically-ill patients with cardiovascular and thoracic diseases (e.g. Echocardiography) *1.2.16* Ability to generate a differential diagnosis of conditions in critically-ill patients with cardiovascular and thoracic diseases (e.g. pulmonary embolism) *1.2.17* Adaptation of treatment options based on the understanding of pathophysiology (e.g. selection of inotropic drugs)	*1.2.24* Ability to identify and interpret complex abnormalities associated with critically-ill patients with cardiovascular and thoracic diseases pre-and post-surgery and plan appropriate treatment (e.g. haemofiltration, multi-organ failure management) *1.2.25* Ability to identify and form a management plan for complex ICU-related complications (e.g. ARDS and metabolic abnormalities) *1.2.26* Ability to identify the need for and plan treatment with advanced ventilatory care *1.2.27* Ability to identify the need for and plan treatment with advanced cardiac and respiratory support (e.g. ECMO, ECLS, MCS)

[1] Refer to End Stage Heart & Lung Failure

1.2.18	Identification of appropriate treatments with preventative care for critically-ill patients with cardiovascular and thoracic diseases (e.g. arrhythmias, nutrition, prophylactic antibiotics)	
1.2.19	Ability to recognise and identify appropriate treatment for post-operative low cardiac output (including the need and management plan for open chest resuscitation following cardiac surgery)	
1.2.20	Ability to recognise and identify appropriate treatment for pre- and post-operative respiratory failure	
1.2.21	Ability to recognise and plan treatment of the more common ICU related complications (e.g. line sepsis, DVT, ventilator acquired pneumonia, pneumothorax, dysrhythmias)	
1.2.22	Ability to generate a differential diagnosis in the setting of cardiac arrest for patients after cardiac surgery (e.g. tamponade, hypovolemia)	
1.2.23	Application of principles and techniques to achieve a safe emergent re-entry to the chest after cardiac surgery (including previous minimal access surgery)	

1.3 Chest Trauma

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
1.3.1 Knowledge of anatomy and pathophysiology of chest trauma including cardiac, intra-thoracic organs and junctional areas *1.3.2* Knowledge and understanding of blunt and penetrating chest trauma *1.3.3* Knowledge and understanding of other potential major injuries (e.g. cervical spine management, intra-abdominal bleeding) *1.3.4* Knowledge and understanding of immediate and non-immediate life-threatening chest injuries *1.3.5* Knowledge of circulatory resuscitation, coagulation pathways and haemostasis related to polytrauma *1.3.6* Knowledge of appropriate monitoring and diagnostic investigations including advantages and disadvantages for the evaluation of chest trauma (e.g. CT scanning) *1.3.7* Knowledge and understanding of various management strategies including advantages and disadvantages in chest trauma (e.g. ATLS ABC approach, pain management, endovascular options) *1.3.8* Knowledge and understanding of various surgical approaches based on suspected or documented injuries *1.3.9* Knowledge of guidelines related to the management of chest trauma (e.g. ATLS) *1.3.10* Knowledge of outcomes for major polytrauma	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
1.3.11 Ability to generate a differential diagnosis for chest and polytrauma and distinguish between immediate and non-immediate life-threatening chest injuries *1.3.12* Ability to prioritise and interpret diagnostic tests for chest trauma *1.3.13* Ability to identify and prioritise the appropriate treatment for patients with immediate and non-immediate life-threatening chest injuries *1.3.14* Application of the principles and techniques for various management strategies in chest trauma (e.g. monitoring and surveillance vs surgery) *1.3.15* Application of the principles and techniques for resuscitative, emergent and elective surgery in chest trauma (e.g. consideration of available resources, use of bilateral anterior thoracotomy) *1.3.16* Identification and management planning of the more common complications of blunt and penetrating chest trauma (e.g. delayed haemorrhage) *1.3.17* Ability to identify futile intervention and/or continuation of surgical and medical treatments in patients with severe chest trauma *1.3.18* Identification and management planning for the more common post-operative complications following surgery for chest trauma	

EBCTS Syllabus
GENERAL

1.4 Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
1.4.1 Knowledge of the components of cardiopulmonary bypass equipment including pulsatile and non-pulsatile pumps *1.4.2* Knowledge of cannulation techniques and options for cardiopulmonary bypass including Deep Hypothermic Circulatory Arrest (DHCA) *1.4.3* Knowledge of the physiology of myocardial protection, options for myocardial protection technique including cardioplegia solutions and delivery modes *1.4.4* Knowledge of coagulation pathways and associated pharmacology (e.g. Anti/Pro coagulants) *1.4.5* Knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g. pH stat, alpha stat, activated clotting time [ACT]) including Hypothermic Circulatory Arrest (HCA) *1.4.6* Knowledge of pathophysiological complications of cardiopulmonary bypass (e.g. bleeding, renal failure, pulmonary dysfunction) *1.4.7* Knowledge of strategies for technical issues related to the management of cardiopulmonary bypass (e.g. air in the heart, inadequate drainage, incomplete arrest) *1.4.8* Knowledge of management strategies of complex complications related to cardiopulmonary bypass (e.g. aortic dissection, air embolism) *1.4.9* Knowledge and understanding of intra-aortic balloon pump physiology and advanced cardiopulmonary support (e.g. Extracorporeal Membrane Oxygenation [ECMO]) *1.4.10* Knowledge of pharmacologic agents for the management of post cardiotomy haemodynamics (e.g. inotropes, vasodilators) *1.4.11* Knowledge of treatment strategies for post-operative sequelae of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, HIT)	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
1.4.12 Application of the principles of management for the post-operative consequences of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, heparin-induced thrombocytopenia [HIT]) *1.4.13* Application of the principles of management for post cardiotomy shock (e.g. inotropes, intra-aortic balloon pump [IABP], mechanical support) *1.4.14* Application of the principles of management for axillary, femoral, arterial or venous cannulation *1.4.15* Application of the principles and techniques of cannulation and institution and management of cardiopulmonary bypass including myocardial protection and weaning and decannulation in routine cases *1.4.16* Ability to recognise and plan the management of common early complications of cardiopulmonary bypass (e.g. coagulopathy, pump failure)	

2 - ADULT CARDIAC SURGERY SECTION

2.1 Principles of surgery and critical care

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
2.1.1 Knowledge of normal cardiopulmonary physiology and the role of treatment on the pathophysiology of cardiovascular and thoracic disease	*2.1.13* Knowledge of advanced MCS techniques
2.1.2 Knowledge of the pathophysiological effects of major surgery (e.g. metabolic effects and wound healing)	*2.1.14* Knowledge of advanced respiratory support and complex ventilation strategies
2.1.3 Knowledge of clinical presentations and common variations of critically-ill cardiovascular and thoracic patients	*2.1.15* Advanced knowledge of all available options to regain a safe perfusion status in complex cardiac arrest following cardiac surgery including cannulation strategies
2.1.4 Knowledge of prophylactic measures to prevent complications (e.g. nutritional support, deep venous thrombosis [DVT] prophylaxis)	
2.1.5 Knowledge of antiplatelet agents and all anticoagulants and their relevance to Cardiothoracic surgical interventions	
2.1.6 Knowledge of the diagnostic tests (including the advantages and disadvantages) for the evaluation of routine and critically-ill patients with cardiovascular and thoracic diseases (e.g. interpretation of haemodynamic data (Swan-Ganz))	
2.1.7 Knowledge of the ICU treatment options (including advantages and disadvantages) for critically-ill patients with cardiovascular and thoracic diseases pre-and post-operatively (e.g. pharmacology of inotropic agents)	
2.1.8 Knowledge of routine ventilator management, temporary pacemakers and the principles of mechanical circulatory support (MCS) including IABP and their role in the critically ill patient[1]	
2.1.9 Knowledge of basic outcome literature for critically-ill patients with cardiovascular and thoracic diseases	
2.1.10 Knowledge of risk adjustment, scoring systems and outcome literature in critical care	
2.1.11 Knowledge of basic life support AND Associated instrumentation (e.g. ET tube)	
2.1.12 Knowledge of EACTS/STS/European Resuscitation Council guidelines to treat cardiac arrest after cardiac surgery).	
Clinical Judgment	
Membership (Level One)	**Fellowship (Level Two)**
2.1.16 Prioritisation and interpretation of diagnostic and physiological assessment tests for critically-ill patients with cardiovascular and thoracic diseases (e.g. pre- and post-operative)	*2.1.26* Ability to identify and interpret complex abnormalities associated with critically-ill patients with cardiovascular and thoracic diseases pre-and post-surgery and plan appropriate treatment (e.g. haemofiltration, multi-organ failure management)
2.1.17 Interpretation of the more common abnormalities and clinical presentations associated with critically-ill patients with cardiovascular and thoracic diseases (e.g. Echocardiography)	*2.1.27* Ability to identify and form a management plan for complex ICU-related complications (e.g. ARDS and metabolic abnormalities)
2.1.18 Ability to generate a differential diagnosis of conditions in critically-ill patients with cardiovascular and thoracic diseases (e.g. pulmonary embolism)	*2.1.28* Ability to identify the need for and plan treatment with advanced ventilatory care
2.1.19 Adaptation of treatment options based on the understanding of pathophysiology (e.g. selection of inotropic drugs)	*2.1.29* Ability to identify the need for and plan treatment with advanced cardiac and respiratory support (e.g. ECMO, ECLS, MCS)
	2.1.30 Ability to identify the need for advanced escalated care in refractory cardiac arrest or in specific situations (e.g. use of ECLS/ECMO)
	2.1.31 Ability to judge the reasonable limits/futility of resuscitation

[1] Refer to End Stage Heart & Lung Failure

2.1.20	Identification of appropriate treatments with preventative care for critically-ill patients with cardiovascular and thoracic diseases (e.g. arrhythmias, nutrition, prophylactic antibiotics)	
2.1.21	Ability to recognise and identify appropriate treatment for post-operative low cardiac output (including the need and management plan for open chest resuscitation following cardiac surgery)	
2.1.22	Ability to recognise and identify appropriate treatment for pre- and post-operative respiratory failure	
2.1.23	Ability to recognise and plan treatment of the more common ICU related complications (e.g. line sepsis, DVT, ventilator acquired pneumonia, pneumothorax, dysrhythmias)	
2.1.24	Ability to generate a differential diagnosis in the setting of cardiac arrest for patients after cardiac surgery (e.g. tamponade, hypovolemia)	
2.1.25	Application of principles and techniques to achieve a safe emergent re-entry to the chest after cardiac surgery (including previous minimal Access surgery)	

2.2 Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.2.1 Knowledge of the components of cardiopulmonary bypass equipment including pulsatile and non-pulsatile pumps *2.2.2* Knowledge of the cannulation techniques and options for cardiopulmonary bypass including Deep Hypothermic Circulatory Arrest (DHCA) *2.2.3* Knowledge of the physiology of myocardial protection and options for myocardial protection technique including cardioplegia solutions and delivery modes *2.2.4* Knowledge of coagulation pathways and associated pharmacology (e.g. Anti/Pro coagulants) *2.2.5* Knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g. pH stat, alpha stat, activated clotting time [ACT]) including Hypothermic Circulatory Arrest (HCA) *2.2.6* Knowledge of the pathophysiological complications of cardiopulmonary bypass (e.g. bleeding, renal failure, pulmonary dysfunction) *2.2.7* Knowledge of the strategies for managing technical issues related to cardiopulmonary bypass (e.g. air in the heart, inadequate drainage, incomplete arrest) *2.2.8* Knowledge of the management strategies for complex complications related to cardiopulmonary bypass (e.g. aortic dissection, air embolism) *2.2.9* Knowledge and understanding of intra-aortic balloon pump physiology and advanced cardiopulmonary support (e.g. Extracorporeal Membrane Oxygenation [ECMO]) *2.2.10* Knowledge of pharmacologic agents for the management of post cardiotomy haemodynamics (e.g. inotropes, vasodilators) *2.2.11* Knowledge of treatment strategies for the post-operative sequelae of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, HIT)	*2.2.12* Knowledge of all antiplatelet and oral anticoagulants and their impact on bleeding associated with cardiopulmonary bypass *2.2.13* Knowledge of haemostatic agents available (e.g. Tranexamic acid and Aprotinin)
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.2.14 Application of the principles of management for the post-operative consequences of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, heparin-induced thrombocytopenia [HIT]) *2.2.15* Application of the principles of management for post cardiotomy shock (e.g. inotropes, intra-aortic balloon pump [IABP], mechanical support) *2.2.16* Application of the principles of management of axillary, femoral, arterial or venous cannulation *2.2.17* Application of principles and techniques of cannulation and institution and management of cardiopulmonary bypass, including myocardial protection and weaning and decannulation in routine cases *2.2.18* Ability to recognise and plan the management of common early complications of cardiopulmonary bypass (e.g. coagulopathy, pump failure)	*2.2.19* Application of the principles and techniques for cannulation and institution and management of cardiopulmonary bypass, including myocardial protection in all aspects of emergency and elective adult cardiac surgery including operating in the difficult chest (e.g. post irradiation, calcified aorta) *2.2.20* Application of the principles and techniques of advanced temporary circulatory support for cardiogenic shock (e.g. ECMO, short term ventricular assist devices) *2.2.21* Ability to recognise and lead the management of major and/or unusual complications associated with cardiopulmonary bypass (e.g. aortic dissection; massive air embolism) *2.2.22* Application of the principles of management for post-operative bleeding associated with new antiplatelet and oral anticoagulants including the use of advanced haemostatic therapies (e.g. NOVO factor VII)

2.3 Ischaemic Heart Disease

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.3.1 Knowledge and understanding of cardiothoracic and related anatomy, pathology and variations (e.g. Dominance and Anomalous vessels) *2.3.2* Knowledge of cellular and vascular physiology including changes accompanying ischaemic heart disease and the physiological effects of treatment *2.3.3* Knowledge of diagnostic tests including advantages and disadvantages for the evaluation of ischaemic heart disease *2.3.4* Knowledge and identification of the clinical presentations and common variations of ischaemic heart disease (e.g. unstable angina, acute myocardial infarction, silent ischemia) *2.3.5* Knowledge of treatment options (including advantages and disadvantages) for ischaemic heart disease (e.g. coronary artery bypass graft [CABG], percutaneous coronary intervention [PCI]) *2.3.6* Knowledge of risks, benefits and complications of different treatment options *2.3.7* Knowledge of the common complications of ischaemic heart disease *2.3.8* Ability to generate differential diagnosis of disease with similar presentations (e.g. esophageal and aortic problems, pleurisy) *2.3.9* Knowledge of ESC/EACTS guidelines for ischemic heart disease *2.3.10* Knowledge of basic outcome literature for ischaemic heart disease (e.g. SYNTAX Trial)	*2.3.11* Knowledge of complex variations in anatomy and pathology, including congenital (e.g. able to identify coronary anatomy in re-operative surgery) *2.3.12* Knowledge and understanding of current outcome literature for all aspects of ischaemic heart disease
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.3.13 Prioritisation and interpretation of diagnostic and physiologic assessment tests for patients with ischaemic heart disease *2.3.14* Interpretation of coronary angiography *2.3.15* Ability to select appropriate treatment options for a patient with ischaemic heart disease (e.g. institutes treatment per ESC/EACTS guidelines) *2.3.16* Ability to recognise and plan the management of common post-operative complications (e.g. cerebral vascular accident [CVA], shock, tamponade, interprets abnormal ECG) *2.3.17* Application of techniques and principles of how to perform a routine CABG (e.g. on pump, Off pump coronary bypass (OPCAB)) *2.3.18* Application of the principles and techniques of assessing and harvesting of conduits for CABG *2.3.19* Application of the principles and techniques of surgical opening and closing of the chest *2.3.20* Application of the principles and techniques of instituting and weaning patients from cardiopulmonary bypass *2.3.21* Application of the principles and techniques of myocardial protection for CABG surgery *2.3.22* Application of the techniques for proximal and distal coronary anastomoses	*2.3.23* Adaptation of therapeutic management based on the understanding of complex physiology and clinical presentations of ischaemic heart disease (e.g. post infarct ventricular septal defect [VSD], ischaemic mitral regurgitation) *2.3.24* Construction of a management plan for the treatment of complex patients with ischaemic heart disease (e.g. hybrid CABG) *2.3.25* Ability to recognise and plan the management of complex post-operative complications (e.g. need for advanced MCS) *2.3.26* Identification of an appropriate treatment option for patients with co-morbidities and complex heart disease (e.g. combined coronary and carotid disease) *2.3.27* Surgical planning with strategies for complex ischaemic heart disease (e.g. redo CABG, VSD, ischaemic mitral regurgitation, OPCAB)

2.4 Valvular Heart Disease

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
2.4.1 Knowledge of the anatomy and pathology of valvular heart disease including common variations	*2.4.9* Knowledge of complex (including congenital) variations in the anatomy and pathology of valvular heart disease
2.4.2 Knowledge of normal and abnormal valve physiology and the influence of treatment on valvular heart disease (including surgical treatment of atrial fibrillation)[1]	*2.4.10* Knowledge and understanding of current outcome literature for the medical, surgical and interventional treatment (including TAVI and minimally invasive techniques) of valvular heart disease including infective endocarditis
2.4.3 Knowledge of the clinical presentations, differential diagnoses and common variations of valvular heart disease including infective endocarditis	
2.4.4 Knowledge of the diagnostic tests (including advantages and disadvantages) available for evaluation of valvular heart disease (i.e. Echocardiography)	
2.4.5 Knowledge of the interventional treatment options (including advantages and disadvantages) for valvular heart disease (e.g. Repair vs replacement; open vs minimally invasive or percutaneous)	
2.4.6 Knowledge of the risks, benefits and complications of different treatments for valvular heart disease	
2.4.7 Knowledge of ESC/EACTS guidelines for valvular heart disease	
2.4.8 Knowledge of outcome literature for valvular heart disease (e.g. durability of mitral valve repair)	
Clinical Judgement	
Membership (Level One)	**Fellowship (Level Two)**
2.4.11 Prioritisation and interpretation of the diagnostic and physiologic assessment tests for patients with valvular heart disease (e.g. echocardiogram, cardiac catheterisation)	*2.4.20* Ability to identify complex clinical presentations and complications of valvular heart disease (e.g. staging of congestive heart failure)
2.4.12 Identification of the appropriate treatment options for a patient with valvular heart disease including infective endocarditis	*2.4.21* Ability to interpret complex abnormalities associated with valvular heart disease (e.g. hypertrophic obstructive cardiomyopathy)
2.4.13 Adaptation of a management plan based on the understanding of complex cardiac physiology (e.g. multi-valve pathology)	*2.4.22* Application of principles and techniques for complex valvular repair
2.4.14 Identification and selection of the appropriate treatment for complex patients with valvular heart disease (e.g. combined coronary artery disease, aortic aneurysm, or aortic root enlargement)	*2.4.23* Application of principles and techniques for transcatheter valve implantation (TAVI)
2.4.15 Ability to identify an appropriate surgical approach for each valve	*2.4.24* Application of principles and techniques for minimally invasive or robotic approaches to valvular heart disease
2.4.16 Application of the principles and techniques of surgical opening and closing the chest for valvular heart disease	*2.4.25* Application of principles and techniques for atrial fibrillation surgery in combination with valvular heart surgery[1]
2.4.17 Application of the principles and techniques for instituting and weaning of patients with valvular heart disease from cardiopulmonary bypass	*2.4.26* Application of principles and techniques for complex reconstructive surgery in endocarditis
2.4.18 Application of principles and techniques of myocardial protection for valvular heart surgery	*2.4.27* Ability to recognise and plan the management of complex post-operative complications following valvular heart surgery
2.4.19 Ability to recognise and plan the management of common post-operative complications following valve surgery (e.g. new heart block)	

[1] Refer to Surgery for Atrial Fibrillation

2.5 Thoracic Vascular Disease (and pulmonary embolism)

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.5.1 Knowledge of the anatomy and pathology of thoracic vascular disease including common variations	*2.5.8* Knowledge of complex variations in anatomy and pathology of thoracic vascular disease, acquired, congenital, and traumatic
2.5.2 Knowledge of the clinical presentations and common variations of thoracic vascular disease, acquired and traumatic	*2.5.9* Knowledge and understanding of current outcome literature for the treatment options (and their complications) in thoracic vascular disease
2.5.3 Knowledge of the diagnostic tests (including advantages and disadvantages) available for the evaluation of thoracic vascular disease	*2.5.10* Knowledge of the complications of pulmonary thrombo-endarterectomy and their management
2.5.4 Knowledge of the treatment options (including advantages and disadvantages) for thoracic vascular disease (including endovascular and open surgery)	
2.5.5 Knowledge of the complications related to the pathology and those associated with different treatment options for thoracic vascular disease including risks and benefits	
2.5.6 Knowledge of outcome literature for thoracic vascular disease	
2.5.7 Knowledge of the management of acute and chronic pulmonary thromboembolic disease including surgical intervention	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.5.11 Ability to generate a differential diagnosis for diseases with similar presentations to thoracic vascular disease (e.g. myocardial infarction, oesophageal spasm)	*2.5.20* Ability to identify complex clinical presentations and complications of thoracic vascular disease (acquired, congenital, and traumatic)
2.5.12 Interpretation of imaging techniques associated with thoracic vascular disease	*2.5.21* Application of the principles and techniques for the appropriate treatment of complex patients with thoracic vascular disease
2.5.13 Prioritisation and interpretation of an assessment plan for patients with elective and emergency thoracic vascular disease	*2.5.22* Application of the principles and techniques for perfusion and myocardial/neuroprotection in complex thoracic vascular surgery (including redo surgery)
2.5.14 Ability to recognise and plan the management (including adjunct treatments) for a patient with thoracic vascular disease (i.e. neuroprotection, spinal cord protection)	*2.5.23* Application of the principles and advanced surgical techniques for thoracic vascular surgery
2.5.15 Identification of appropriate treatment options including surgical approaches for patients with thoracic vascular disease (including peri-operative monitoring, perfusion and neuroprotective strategies)	*2.5.24* Application of the principles and techniques for endovascular aortic surgery
2.5.16 Application of the principles and techniques of surgical opening and closing of the torso and vascular access for thoracic vascular surgery	*2.5.25* Ability to recognise and plan the management of associated complex post-operative complications following thoracic vascular surgery (e.g. multisystem organ failure)
2.5.17 Application of the principles and techniques for instituting and weaning patients from cardiopulmonary bypass/left heart bypass for thoracic vascular surgery	*2.5.26* Application of the principles and techniques for pulmonary thrombo-endarterectomy
2.5.18 Ability to recognise and plan the management of common post-operative complications following thoracic vascular surgery	
2.5.19 Application of the principles and techniques for emergency pulmonary embolectomy including peri- and post-operative management (including complications)	

2.6 Surgery for atrial fibrillation

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.6.1 Knowledge of cardiac electrophysiology and the pathophysiological changes found in atrial dysrhythmias and their common clinical presentations	*2.6.10* Knowledge of complex clinical presentations of atrial dysrhythmias
2.6.2 Knowledge of the classification of atrial dysrhythmias	*2.6.11* Knowledge of complex surgical approaches for atrial fibrillation surgery
2.6.3 Knowledge of the impact of atrial fibrillation on the risk of thromboembolic events and secondary complications and risk scores to predict complications and guide therapy	*2.6.12* Knowledge and understanding of current outcome literature for surgical and interventional atrial fibrillation treatment (e.g. Hybrid treatments)
2.6.4 Knowledge of the risks, benefits and complications of different treatments for atrial fibrillation	*2.6.13* Knowledge of the role of atrial fibrillation surgery in complex patients and less common conditions (e.g. valvular surgery, HOCM)
2.6.5 Knowledge of the medical treatment options including pharmacology to treat atrial dysrhythmias (e.g. anti-coagulation)	
2.6.6 Knowledge of percutaneous and/or surgical treatment options including knowledge of different energy sources in individual patients	
2.6.7 Knowledge of the Maze procedure(s) and management of the left atrial appendage	
2.6.8 Knowledge of ESC/EACTS guidelines for the management of atrial fibrillation	
2.6.9 Knowledge of the outcome literature for atrial fibrillation surgery	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.6.14 Prioritisation and interpretation of an assessment plan and identification of an appropriate surgical treatment option for patients with atrial fibrillation	*2.6.18* Ability to construct a management plan and select appropriate treatment for patients with lone atrial fibrillation
2.6.15 Application of the principles and techniques of cannulation, cardiopulmonary bypass and myocardial protection in atrial fibrillation surgery	*2.6.19* Ability to construct a management plan and select appropriate treatment for patients in atrial fibrillation in complex situations (e.g. multi-valve pathology, ischaemic heart disease)
2.6.16 Application of the principles of common surgical treatments in atrial fibrillation (e.g. pulmonary vein ablation, bi-atrial Maze and left atrial appendage management)	*2.6.20* Ability to apply the principles and techniques for surgical and hybrid approaches to atrial fibrillation
2.6.17 Application of diagnostic tests and clinical follow-up after atrial fibrillation surgery	*2.6.21* Ability to recognise and plan the management of operative and post-operative complications associated with atrial fibrillation surgery

2.7 Pericardial disease

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.7.1 Knowledge and understanding of the anatomy, pathophysiology and clinical presentations of pericardial disease	*2.7.5* Knowledge and understanding of complex clinical presentations and interactions of pericardial disease (e.g. with other heart and liver conditions)
2.7.2 Knowledge of the diagnostic tests (including the advantages and disadvantages) for the evaluation of pericardial disease (e.g. right heart catheter, CT and MRI scan)	*2.7.6* Knowledge of the principles for undertaking surgical pericardiectomy including surgical access, techniques of cannulation, cardiopulmonary bypass and myocardial protection
2.7.3 Knowledge of potential treatment options (medical and surgical including VATS) including risks, benefits and complications for different pericardial diseases (e.g. inflammatory, neoplastic disease)	
2.7.4 Knowledge of European guidelines on pericardial disease (ESC)	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.7.7 Prioritisation and interpretation of diagnostic tests for patients with pericardial disease	*2.7.11* Ability to construct a management plan and select the appropriate treatment for complex patients with pericardial disease (e.g. liver dysfunction and tricuspid regurgitation)
2.7.8 Ability to generate a differential diagnosis for patients with varying presentations of pericardial disease	*2.7.12* Application of the principles and techniques for conducting surgery on complex surgical patients with pericardial disease (e.g. post-irradiation and extensive calcification)
2.7.9 Identification of an appropriate treatment option for patients with pericardial disease (e.g. pericardiectomy, pericardial window or pericardiocentesis and use of VATS)	*2.7.13* Ability to recognise and plan the management of complex post-operative complications (e.g. RV and LV failure)
2.7.10 Ability to recognise and plan the management of common post-operative complications following surgery of the pericardium	

2.8 Diseases of the myocardium (Hypertrophic cardiomyopathy)[1]

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.8.1 Knowledge of the genetics, anatomy and pathophysiology associated with hypertrophic cardiomyopathy (HOCM)	*2.8.7* Knowledge and understanding of complex clinical presentations and interactions in patients with HOCM and concomitant cardiac conditions
2.8.2 Knowledge of the common clinical presentations and complications associated with HOCM (including sudden death)	*2.8.8* Knowledge of surgical approaches and techniques for patients with HOCM (e.g. transaortic, trans-mitral, transapical)
2.8.3 Knowledge of diagnostic tests (including advantages and disadvantages) for the evaluation of patients with HOCM	*2.8.9* Knowledge and understanding of current outcome literature for HOCM surgery
2.8.4 Knowledge of potential treatment options for HOCM including pharmacology and different septal reduction therapies (including their results, complications and long term outcomes)	
2.8.5 Knowledge of ESC/EACTS guidelines for the management of patients with HOCM	
2.8.6 Knowledge of outcome literature for treatment options for HOCM	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.8.10 Prioritisation and interpretation of diagnostic tests for patients with HOCM	*2.8.15* Ability to construct a management plan and select appropriate treatment for complex patients with HOCM requiring multiple cardiac procedures (e.g. valve surgery)
2.8.11 Ability to generate a differential diagnosis for patients with HOCM	*2.8.16* Application of the principles and techniques of surgical options in HOCM (with intraoperative physiological measurements)
2.8.12 Identification of an appropriate treatment option for patients with HOCM including the application of principles and techniques of septal myectomy	*2.8.17* Ability to identify the need for additional intra-operative or post-operative procedures for complications associated with septal myectomy (e.g. VSD, MVR)
2.8.13 Application of the principles and techniques of cannulation, bypass and myocardial protection for patients with HOCM	
2.8.14 Ability to recognise and plan the management of the more common post-operative complications following septal myectomy (e.g. heart block, LV dysfunction)	

[1] Refer to End Stage Heart & Lung Failure

2.9 Diseases of the myocardium (Myocarditis and cardiomyopathy)[1]

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.9.1 Knowledge of the anatomy, pathophysiology and clinical presentations associated with myocarditis and/or all forms of cardiomyopathy *2.9.2* Knowledge of diagnostic tests to assess potential causes of myocarditis and/or all forms of cardiomyopathy (including biopsy and histopathology) *2.9.3* Knowledge of clinical stratification and the treatment options for myocarditis and/or all forms of cardiomyopathy (including medical, conventional surgery, transplantation and mechanical circulatory support)	*2.9.4* Knowledge of the surgical options available for maintaining cardiac and vital organ support during severe myocardial dysfunction associated with myocarditis and/or all forms of cardiomyopathy (e.g. ECMO, ECLS, Ventricular Assist Devices (VAD))
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.9.5 Prioritisation and interpretation of diagnostic tests for patients with myocarditis and/or all forms of cardiomyopathy *2.9.6* Ability to generate a differential diagnosis for patients presenting with myocarditis and/or all forms of cardiomyopathy *2.9.7* Ability to select the appropriate timing and treatment options for patients with myocarditis and/or all forms of cardiomyopathy (e.g. medical support, transplantation, MCS) *2.9.8* Application of the principles and techniques for instituting mechanical circulatory support for patients with myocarditis and/or all forms of cardiomyopathy *2.9.9* Ability to recognise and plan the management of the more common complications following institution of MCS (including ECMO) for myocarditis and/or all forms of cardiomyopathy	*2.9.10* Ability to interpret diagnostic tests and plan the management of complex patients with myocarditis and/or all forms of cardiomyopathy *2.9.11* Application of the principles and techniques of available conventional surgical options for patients with myocarditis and/or all forms of cardiomyopathy *2.9.12* Application of the principles and techniques for temporary mechanical circulatory support during the course of myocarditis and/or all forms of cardiomyopathy including the need to bridge patients to transplantation or destination VAD therapy *2.9.13* Ability to recognise and plan the management of complex complications following institution of MCS for myocarditis and/or all forms of cardiomyopathy *2.9.14* Ability to recognise the need for withdrawal of care/transfer to palliative care in patients with myocarditis and/or all forms of cardiomyopathy

[1] Refer to End Stage Heart & Lung Failure

2.10 Cardiac tumours

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.10.1 Knowledge of the different types of common cardiac tumours, their pathology and clinical presentations *2.10.2* Knowledge of the diagnostic tests (e.g. ECHO, MRI) including advantages and disadvantages for the evaluation of patients with cardiac tumours *2.10.3* Knowledge of treatment options for common cardiac tumours including risks, benefits and complications of surgery *2.10.4* Knowledge of the principles and techniques of surgical resection of cardiac tumours (e.g. myxoma) *2.10.5* Knowledge of the natural history and outcomes following surgery and other treatment options for patients with cardiac tumours	*2.10.6* Knowledge of complex types, features and treatment of all cardiac tumours *2.10.7* Knowledge and understanding of complex interactions between cardiac tumours and concomitant heart conditions (e.g. valvular disease, ischaemic heart disease)
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.10.8 Prioritisation and interpretation of diagnostic tests for patients with cardiac tumours *2.10.9* Identification of the appropriate treatment option for patients with cardiac tumours (based on the potential prognostic value of surgery) *2.10.10* Ability to identify an appropriate surgical strategy and apply the principles and techniques for conducting operations for the more common cardiac tumours *2.10.11* Application of the principles and techniques of cannulation, cardiopulmonary bypass and myocardial protection in surgery for cardiac tumours *2.10.12* Ability to recognise and plan the management of the common post-operative complications following surgery for cardiac tumours	*2.10.13* Ability to construct a management plan and select appropriate treatment for complex patients with cardiac tumours (e.g. valve involvement) *2.10.14* Application of the principles and techniques for conducting surgery on complex surgical patients with cardiac tumours (including cardiac reconstruction) *2.10.15* Ability to recognise and plan the management of complex post-operative complications after resection of cardiac tumours

2.11 End Stage Heart & Lung Failure

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.11.1 Knowledge and understanding of the pathophysiology, natural history and clinical presentations of common variations of heart and lung failure	*2.11.9* Knowledge of the diagnostic tests (including the advantages and disadvantages) for evaluation of heart and respiratory failure (e.g. VO_2 max and 12-minute walk test, PA catheter measurements, echocardiography, MRI)
2.11.2 Knowledge and understanding of the effect of treatment on the physiology of heart and respiratory failure (e.g. medical management; IABP; mechanical support)	*2.11.10* Knowledge of the variations in anatomy and pathology in patients requiring transplantation (e.g., adult with congenital heart disease requiring transplantation)[1]
2.11.3 Knowledge of the medical and surgical treatment options (including advantages and disadvantages) for heart and respiratory failure	*2.11.11* Knowledge of the criteria and indications for listing for heart transplantation
2.11.4 Knowledge of conventional surgical treatments for heart failure (e.g. LV remodelling, mitral valve annuloplasty, CABG)	*2.11.12* Knowledge of the significance and management of pulmonary hypertension pre-and post-heart transplant
2.11.5 Knowledge of the complications of mechanical cardiopulmonary support (e.g. bleeding, drive line infection)	*2.11.13* Knowledge of the management of the multi-organ donor including donor organ retrieval surgery
2.11.6 Knowledge of the common complications of heart and lung transplantation	*2.11.14* Knowledge of the risks, benefits and complications of the different treatments for end stage heart failure (e.g. conventional surgery vs transplantation vs VAD)
2.11.7 Knowledge of rejection and immunosuppression in heart and lung transplantation	*2.11.15* Knowledge of the issues associated with re-operative cardiac surgery (e.g. antigen load)
2.11.8 Knowledge of basic outcome literature for heart and respiratory failure and the various treatments (e.g. life expectancy after transplantation, results of long-term MCS)	*2.11.16* Knowledge of the outcome literature for all treatments and complications for end stage heart failure
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.11.17 Ability to prioritise and interpret diagnostic tests for patients with heart and respiratory failure	*2.11.21* Ability to apply the principles and techniques for undertaking conventional surgery and/or transplantation and/or MCS on patients with end stage heart failure
2.11.18 Ability to identify the signs of decompensation and the need for intervention for heart and respiratory failure	*2.11.22* Ability to apply the principles and techniques for undertaking heart transplantation in patients with abnormal anatomy
2.11.19 Ability to generate a differential diagnosis for patients with heart and/or respiratory failure	*2.11.23* Ability to recognise and develop a management plan for the complications of transplantation and mechanical cardiopulmonary support (e.g. RV failure, acute and chronic rejection, assist device failure)
2.11.20 Ability to select the appropriate treatment option for patients with end stage cardiac and pulmonary failure (e.g. selection criteria for transplantation or MCS)	

[1] Refer to Congenital Surgery

2.12 Chest Trauma

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
2.12.1 Knowledge of the anatomy and pathophysiology of chest trauma including cardiac, intra-thoracic organs and junctional areas	*2.12.11* Knowledge and understanding of complex variations of torso and polytrauma (e.g. head injuries)
2.12.2 Knowledge and understanding of blunt and penetrating chest trauma	*2.12.12* Knowledge and understanding of the impact of chest trauma in the physiologically compromised patient (e.g. elderly: pre-existing cardiac disease, emphysema)
2.12.3 Knowledge and understanding of other potential major injuries (e.g. cervical spine management, intra-abdominal bleeding)	*2.12.13* Knowledge of damage control resuscitation and damage control surgery
2.12.4 Knowledge and understanding of immediate and non-immediate life-threatening chest injuries	*2.12.14* Knowledge of the use of cardiopulmonary bypass, echocardiography and cardiac surgical techniques for penetrating cardiac injuries
2.12.5 Knowledge of circulatory resuscitation, coagulation pathways and haemostasis related to polytrauma	*2.12.15* Knowledge of minimal access Video Assisted Thoracic Surgery (VATS) techniques for diagnostic and therapeutic interventions.
2.12.6 Knowledge of appropriate monitoring and diagnostic investigations including advantages and disadvantages for the evaluation of chest trauma (e.g. CT scanning)	*2.12.16* Knowledge and understanding of chest wall injuries and stabilisation
2.12.7 Knowledge and understanding of the various management strategies including advantages and disadvantages in chest trauma (e.g. ATLS ABC approach, pain management, endovascular options)	
2.12.8 Knowledge and understanding of various surgical approaches based on suspected or documented injuries	
2.12.9 Knowledge of guidelines related to the management of chest trauma (e.g. ATLS)	
2.12.10 Knowledge of the outcomes for major polytrauma	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
2.12.17 Ability to generate a differential diagnosis for chest and polytrauma and distinguish between immediate and non-immediate life-threatening chest injuries	*2.12.25* Ability to distinguish complex clinical presentations of torso and polytrauma
2.12.18 Ability to prioritise and interpret diagnostic tests for chest trauma	*2.12.26* Ability to prioritise, adapt and construct an emergent or elective strategy for patients with complex torso and polytrauma including interaction with other specialties
2.12.19 Ability to identify and prioritise the appropriate treatment for patients with immediate and non-immediate life-threatening chest injuries	*2.12.27* Ability to identify and adapt appropriate thoracic and cardiac surgical interventions for complex injuries based on the pathophysiology of the patient
2.12.20 Application of the principles and techniques for various management strategies in chest trauma (e.g. monitoring and surveillance vs surgery)	*2.12.28* Application of the principles and techniques of VATS and open thoracic surgery
2.12.21 Application of the principles and techniques for resuscitative, emergent and elective surgery in chest trauma (e.g. consideration of available resources, use of bilateral anterior thoracotomy)	*2.12.29* Application of the principles and techniques of cardiac surgery including use of cardiopulmonary bypass, myocardial protection and intraoperative TOE
2.12.22 Identification and management planning of the more common complications of blunt and penetrating chest trauma (e.g. delayed haemorrhage)	*2.12.30* Ability to recognise and manage the intra-operative complications of lung and cardiac trauma (e.g. systemic air embolism) and the application of surgical techniques to prevent them
2.12.23 Ability to identify futile intervention and/or continuation of surgical and medical treatments in patients with severe chest trauma	*2.12.31* Identification and management planning for complex post-operative complications following chest trauma in the ICU (e.g. use of advanced respiratory and circulatory support)
2.12.24 Identification and management planning for the more common post-operative complications following surgery for chest trauma	

EBCTS Syllabus
ADULT CARDIAC SURGERY

COMMON AND ADVANCED ADULT CARDIAC SURGERY CONDITIONS

PREOPERATIVE AND POSTOPERATIVE CARE

- Preoperative medication - effects, side effects and interactions of common cardiovascular medications. Anticoagulant drugs including NOACs and contemporary antiplatelet agents
- Preoperative risk factors
- Monitoring in the Intensive Care unit (invasive/non-invasive/cardiac output measurement)
- Circulatory management (Inotropes/vasodilators/mechanical circulatory support)
- Complications of cardiac surgery and their management (tamponade, renal failure, arrhythmias, wound infections, sepsis)
- Pathophysiology of coagulation - management of post-operative bleeding and transfusion (blood, blood components and clotting factors). Blood conservation
- STS/EACTS protocol for the management of arrests after cardiac surgery

ETHICS, RESEARCH AND OUTCOMES

- Ethical aspects of surgical practice – informed consent
- Scientific methods which apply to basic and clinical research – data collection and analysis.
- Statistics - statistical tests commonly used in the literature, limitations and deficiencies

PULMONARY EMBOLISM

- Investigations (CTPA, TOE, V/Q scanning)
- Thromboembolic prophylaxis
- Thrombolysis
- Surgical management of pulmonary embolism

CARDIOPULMONARY BYPASS

- Central and peripheral cannulation
- Principles of cardiopulmonary bypass and its safe operation including anticoagulation/reversal
- Membrane and bubble oxygenators
- Roller and vortex pumps
- Heparin bonded circuits
- Priming solutions
- Physiology of cardiopulmonary bypass and the derangements caused by its use
- Left and right heart bypass
- Deep hypothermic circulatory arrest
- Antegrade and retrograde cerebral perfusion
- Cardioplegia and its delivery

MECHANICAL CIRCULATORY SUPPORT (MCS)

- Intra-aortic balloon pumps – physiological effects
- Short term mechanical support systems (Impella, centrifugal pumps)
- Long term mechanical support devices (indications, devices, complications, outcomes)
- Bridging to heart transplantation, recovery and destination therapy
- Anticoagulation management with MCS

ECMO

- ECMO configurations – venoarterial and venovenous
- Management and complications of ECMO
- Principles of weaning patients from ECMO
- Withdrawal of support

EBCTS Syllabus
ADULT CARDIAC SURGERY

VALVULAR HEART DISEASE

- Normal and pathological anatomy of the atrioventricular and semilunar valves
- Natural history, pathophysiology, and clinical presentation of major valvular lesions
- Interpretation of echocardiography and cardiac catheterisation in valvular heart disease
- Non-operative/interventional therapeutic options for valvular disease including balloon dilatation, TAVI and Mitraclip.
- Surgical indications according to published major guidelines
- Principles and techniques of repair and replacement of cardiac valves and the aortic root
- Applications of minimally invasive techniques
- Choice of prosthetic valve type (xenografts, homografts, autografts, sutureless valves)
- Management of the small aortic root
- Patient –prosthesis mismatch
- Complications of valvular heart surgery – acute and long term – including prostheses
- Management of endocarditis including indications for surgery, management of aortic root abscess and other local complications

CORONARY ARTERY DISEASE

- Pathology of Atherosclerosis
- Pathophysiology of the coronary circulation
- Evaluation and investigation of patients with coronary artery disease
- Normal and variant anatomy of the coronary circulation and its imaging
- Indications for surgery according to published guidelines
- Techniques of coronary artery bypass surgery using various conduits
- Risks and complications of coronary artery bypass operations, coronary angiography, and percutaneous coronary artery balloon angioplasty
- Preoperative and postoperative care of patients undergoing coronary artery bypass grafting
- Short and long term outcomes
- Acute and chronic complications of ischaemic heart disease – ruptured papillary muscle, ventricular aneurysm and ventricular septal defects
- Management of concomitant carotid artery disease
- Off pump surgical techniques – technique and outcomes
- Minimal invasive coronary surgery (MIDCAB)

SURGERY FOR ATRIAL FIBRILLATION

- Aetiology and physiology of atrial fibrillation
- Non-operative treatment of Atrial dysrythmias
- Surgical techniques - Pulmonary vein isolation, Cox-Maze lesions, minimally invasive surgery
- Energy sources for ablation of atrial fibrillation
- Risk prediction and prevention of stroke
- Surgical management of the left atrial appendage

ABNORMALITIES OF THE AORTA AND GREAT VESSELS (including Thoraco-Abdominal Aneurysms)

- Aetiology and pathophysiology of acute and chronic diseases of the thoracic aorta
- Evaluation and investigation of acute and chronic diseases of the thoracic aorta
- Operative, non-operative and hybrid management of thoracic aortic disease - EVAR
- Cardiopulmonary bypass strategies and cerebral/spinal protection

CARDIAC TUMOURS

- Pathophysiology of primary and metastatic cardiac tumours,
- Types of cardiac tumours
- Diagnostic methods
- Surgical management

MYOCARDITIS, CARDIOMYOPATHY, HYPERTROPHIC OBSTRUCTIVE CARDIOMYOPATHY

- Pathology and aetiology of diseased myocardium
- Acute myocarditis
- Types and pathophysiology of cardiomyopathy
- Investigation and evaluation
- Surgery for the treatment of cardiomyopathy and alternative interventional techniques

EBCTS Syllabus
ADULT CARDIAC SURGERY

CARDIOVASCULAR TRAUMA[1]

- Pathophysiology of thoracic trauma
- Investigation and evaluation of trauma patients
- Physiology of deceleration injuries to the thoracic aorta
- Aortic transection
- Importance and relevance of concomitant injuries
- Management of cardiac and aortic trauma by surgery of other interventional techniques
- Cardiac contusion
- Penetrating cardiac injury

CARDIAC TRANSPLANTATION AND HEART FAILURE SURGERY

- Evaluation and assessment of heart failure
- Prognosis of heart failure
- Management – medical, AICD, short and long term mechanical support
- Bridging to heart transplantation
- Conventional surgery for heart failure – mitral valve surgery, revascularisation, ventricular remodelling
- Donor assessment and heart preservation
- Assessment and acceptance criteria for cardiac transplantation
- Technique of cardiac transplantation
- Primary graft dysfunction and ECMO support
- Immunosuppressive therapy and rejection – biopsy
- Complications of heart transplantation

LUNG TRANSPLANTATION AND LUNG FAILURE SURGERY[1]

- Evaluation and assessment of lung failure
- Prognosis of lung failure
- Management – medical, Novalung and ECMO support
- Bridging to lung transplantation
- Lung volume reduction surgery
- Donor assessment and lung preservation
- Assessment and acceptance criteria for lung transplantation
- Technique of lung transplantation – single, bilateral, heart-lung, lobar
- Primary graft dysfunction and ECMO support
- Immunosuppressive therapy and rejection – bronchial biopsy
- Complications of lung transplantation

ABNORMALITIES OF THE PERICARDIUM[1]

- Physiology of increased pericardial fluid and pericardial constriction
- Pericardial cysts and tumours
- Diagnosis and management of pericardial disease
- Malignant pericardial effusions and management
- Operative management of benign and malignant pericardial neoplasms
- Surgery for drainage of pericardial fluid
- Surgery for pericardial constriction
- Complications of pericardial surgery

[1] Refer to Thoracic Surgery Topics

3 - CONGENITAL SURGERY SECTION

EBCTS Curriculum
CONGENITAL CARDIAC SURGERY

3.1 Cardiopulmonary Bypass, Myocardial Protection and Temporary Circulatory Support in Congenital Cardiac Surgery

Competency - the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
3.1.1 Knowledge of the components of cardiopulmonary bypass equipment including pulsatile and non-pulsatile pumps	*3.1.12* Knowledge of bypass components for neonates and children
3.1.2 Knowledge of cannulation techniques and options for cardiopulmonary bypass including Deep Hypothermic Circulatory Arrest (DHCA)	*3.1.13* Knowledge of cannulation techniques and management of bypass in complex neonates and children
3.1.3 Knowledge of the physiology of myocardial protection and options for myocardial protection (including cardioplegia solutions and delivery modes)	*3.1.14* Knowledge of myocardial protection strategies in neonates and children
3.1.4 Knowledge of coagulation pathways and associated pharmacology (e.g. Anti/Pro coagulants)	*3.1.15* Knowledge of the role and implications of DHCA and selective perfusion in neonates and children
3.1.5 Knowledge of acid-base and anticoagulation management on cardiopulmonary bypass (e.g. pH stat, alpha stat, activated clotting time [ACT]) including Hypothermic Circulatory Arrest (HCA)	*3.1.16* Knowledge of the specific risks and complications of cardiopulmonary bypass in neonates and children including advanced monitoring techniques
3.1.6 Knowledge of the pathophysiological complications of cardiopulmonary bypass (e.g. bleeding, renal failure, pulmonary dysfunction)	*3.1.17* Knowledge of modified and continuous ultrafiltration during congenital cardiac surgery
3.1.7 Knowledge of the strategies for managing technical issues related to cardiopulmonary bypass (e.g. air in the heart, inadequate drainage, incomplete arrest)	*3.1.18* Knowledge of advanced cardiopulmonary support in neonates and children including ECLS and ECMO
3.1.8 Knowledge of the management strategies for complex complications related to cardiopulmonary bypass (e.g. aortic dissection, air embolism)	
3.1.9 Knowledge and understanding of intra-aortic balloon pump physiology and advanced cardiopulmonary support (e.g. Extracorporeal Membrane Oxygenation [ECMO])	
3.1.10 Knowledge of pharmacologic agents for the management of post cardiotomy haemodynamics (e.g. inotropes, vasodilators)	
3.1.11 Knowledge of the treatment strategies for the post-operative sequelae of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, HIT)	
Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
3.1.19 Application of the principles of management for the post-operative consequences of cardiopulmonary bypass (e.g. low cardiac output syndrome, coagulopathies, arrhythmias, heparin-induced thrombocytopenia [HIT])	*3.1.24* Application of the principles and techniques for cannulation, institution and management of cardiopulmonary bypass including myocardial protection in all aspects of emergency and elective congenital cardiac surgery (including unusual venous and arterial anatomy and re-operative surgery)
3.1.20 Application of the principles of management of post cardiotomy shock (e.g. inotropes, intra-aortic balloon pump [IABP], mechanical support)	*3.1.25* Application of the strategies for management of re-operative surgery in children and adults with congenital heart disease
3.1.21 Application of the principles of management of axillary, femoral, arterial or venous cannulation	*3.1.26* Application of the principles and techniques for advanced temporary circulatory support for cardiogenic shock and respiratory failure (e.g. ECLS, ECMO, short term ventricular assist)
3.1.22 Application of the principles and techniques of cannulation, institution and management of cardiopulmonary bypass including myocardial protection, weaning and decannulation in routine cases	*3.1.27* Ability to recognise and lead the management of major and/or unusual complications associated with cardiopulmonary bypass in children and adults (e.g. aortic dissection; massive air embolism)
3.1.23 Ability to recognise and plan the management of the common early complications of cardiopulmonary bypass (e.g. coagulopathy, pump failure)	

3.2 CONGENITAL

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	Fellowship (Level Two)
3.2.1 Knowledge of basic anatomy and pathology of congenital heart disease (including the foetal circulation)	*3.2.12* Knowledge of applied cardiac embryology and anatomy (including sequential segmental analysis of morphology)
3.2.2 Knowledge of the clinical presentations of common congenital heart disease	*3.2.13* Knowledge of the general physiology of the neonate and the child
3.2.3 Knowledge of the common conditions and clinical presentations of Adult Congenital Heart disease	*3.2.14* Knowledge of advanced cardiac physiology including shunt calculation
3.2.4 Knowledge and understanding of the physiological changes accompanying congenital heart disease	*3.2.15* Knowledge of conduction abnormalities and electrophysiology in childhood
3.2.5 Knowledge of the diagnostic tests (including advantages and disadvantages) available for evaluating congenital heart disease	*3.2.16* Knowledge of all complex combinations of and between anatomy and pathophysiology in congenital heart disease
3.2.6 Knowledge of the pathophysiological consequences of congenital heart disease on treatment options (e.g., elevated PVR)	*3.2.17* Knowledge of applied pharmacology (including anti-coagulation) in childhood
3.2.7 Knowledge of the basic treatment options (including advantages and disadvantages) for congenital heart disease (e.g., medical therapy, palliative vs. definitive operations)	*3.2.18* Knowledge of risk stratification and data collection systems in congenital cardiac surgery
3.2.8 Knowledge of the variations in anatomy and pathology in common conditions (e.g. ASD, VSD, PDA and coarctation)	*3.2.19* Knowledge across the full range of congenital cardiac surgery conditions[1]
3.2.9 Knowledge of the basics of the single ventricle pathway	*3.2.20* Knowledge of advanced surgical techniques and strategies across the spectrum of congenital cardiac surgery[2]
3.2.10 Knowledge of the risks, benefits and complications of common treatment options	*3.2.21* Knowledge and application of strategies for complex re-operative surgery
3.2.11 Knowledge of congenital tracheal anomalies and associated conditions	*3.2.22* Knowledge and application of strategies for hybrid interventions (with cardiology) in congenital heart disease
	3.2.23 Knowledge across the full range of adult congenital cardiac surgery conditions[3]
	3.2.24 Knowledge of advanced surgical techniques and strategies across the spectrum for Adult Congenital Heart disease[4]
	3.2.25 Knowledge of the principles of heart and lung transplantation in childhood[5]
	3.2.26 Knowledge of the issues of transplantation in adults with congenital heart disease[6]
	3.2.27 Knowledge of advanced paediatric intensive care
	3.2.28 Knowledge and management of tracheal disease in childhood
	3.2.29 Knowledge of the consent process in paediatric, adolescent and adult surgery (*See professional behaviour section)*

[1] See Congenital appendix 1
[2] See Congenital appendix 2
[3] See Congenital appendix 3
[4] See Congenital appendix 4
[5] Refer to End Stage Heart & Lung Failure
[6] Refer to End Stage Heart & Lung Failure

EBCTS Curriculum
CONGENITAL CARDIAC SURGERY

Clinical Judgement	
Membership (Level One)	Fellowship (Level Two)
3.2.30 Interpretation of common abnormalities associated with congenital heart disease, with echocardiography	*3.2.36* Interpretation of complex abnormalities associated with congenital heart disease
3.2.31 Ability to generate a differential diagnosis of common congenital heart conditions with similar presentations	*3.2.37* Interpretation of pre-, peri- and post-operative echocardiography
3.2.32 Application of treatments on the pathophysiology of congenital heart disease (e.g. reduction of PVR)	*3.2.38* Ability to distinguish between simple and complex congenital heart disease
3.2.33 Ability to identify different clinical presentations of elective vs. emergency cases	*3.2.39* Ability to diagnose complex congenital heart disease in neonates, children and adults
3.2.34 Ability to identify the appropriate treatment for common conditions of congenital heart disease (e.g., selection of palliative vs. definitive)	*3.2.40* Identification and application of strategies for complex re-operative surgery
3.2.35 Ability to recognise the common complications of congenital heart surgery (e.g., residual VSD, heart block)	*3.2.41* Ability to plan the management of and devise an operative strategy for the full range of congenital cardiac surgery conditions[1]
	3.2.42 Ability to plan the management of and devise an operative strategy for the full range of adult congenital cardiac surgery conditions[2]
	3.2.43 Application of risk stratification and data collection systems

[1] see Congenital appendices 1 & 2

[2] see Congenital appendices 3 & 4

3.3 Principles of surgery and critical care

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
3.3.1 Knowledge of normal cardiopulmonary physiology and the role of treatment on the pathophysiology of cardiovascular and thoracic disease	*3.3.13* Knowledge of advanced MCS techniques
3.3.2 Knowledge of the pathophysiological effects of major surgery (e.g. metabolic effects and wound healing)	*3.3.14* Knowledge of advanced respiratory support and complex ventilation strategies
3.3.3 Knowledge of clinical presentations and common variations of critically-ill cardiovascular and thoracic patients	*3.3.15* Advanced knowledge of all available options to regain a safe perfusion status in complex cardiac arrest following cardiac surgery including cannulation strategies
3.3.4 Knowledge of prophylactic measures to prevent complications (e.g. nutritional support, deep venous thrombosis [DVT] prophylaxis)	
3.3.5 Knowledge of antiplatelet agents and all anticoagulants and their relevance to Cardiothoracic surgical interventions	
3.3.6 Knowledge of the diagnostic tests (including the advantages and disadvantages) for the evaluation of routine and critically-ill patients with cardiovascular and thoracic diseases (e.g. interpretation of haemodynamic data (Swan-Ganz))	
3.3.7 Knowledge of the ICU treatment options (including advantages and disadvantages) for critically-ill patients with cardiovascular and thoracic diseases pre-and post-operatively (e.g. pharmacology of inotropic agents)	
3.3.8 Knowledge of routine ventilator management, temporary pacemakers and the principles of mechanical circulatory support (MCS) including IABP and their role in the critically ill patient[1]	
3.3.9 Knowledge of basic outcome literature for critically-ill patients with cardiovascular and thoracic diseases	
3.3.10 Knowledge of risk adjustment, scoring systems and outcome literature in critical care	
3.3.11 Knowledge of basic life support AND Associated instrumentation (e.g. ET tube)	
3.3.12 Knowledge of EACTS/STS/European Resuscitation Council guidelines to treat cardiac arrest after cardiac surgery).	
Clinical Judgment	
Membership (Level One)	**Fellowship (Level Two)**
3.3.16 Prioritisation and interpretation of diagnostic and physiological assessment tests for critically-ill patients with cardiovascular and thoracic diseases (e.g. pre- and post-operative)	*3.3.26* Ability to identify and interpret complex abnormalities associated with critically-ill patients with cardiovascular and thoracic diseases pre-and post-surgery and plan appropriate treatment (e.g. haemofiltration, multi-organ failure management)
3.3.17 Interpretation of the more common abnormalities and clinical presentations associated with critically-ill patients with cardiovascular and thoracic diseases (e.g. Echocardiography)	*3.3.27* Ability to identify and form a management plan for complex ICU-related complications (e.g. ARDS and metabolic abnormalities)
3.3.18 Ability to generate a differential diagnosis of conditions in critically-ill patients with cardiovascular and thoracic diseases (e.g. pulmonary embolism)	*3.3.28* Ability to identify the need for and plan treatment with advanced ventilatory care
3.3.19 Adaptation of treatment options based on the understanding of pathophysiology (e.g. selection of inotropic drugs)	*3.3.29* Ability to identify the need for and plan treatment with advanced cardiac and respiratory support (e.g. ECMO, ECLS, MCS)
	3.3.30 Ability to identify the need for advanced escalated care in refractory cardiac arrest or in specific situations (e.g. use of ECLS/ECMO)
	3.3.31 Ability to judge the reasonable limits/futility of resuscitation

[1] Refer to End Stage Heart & Lung Failure

3.3.20	Identification of appropriate treatments with preventative care for critically-ill patients with cardiovascular and thoracic diseases (e.g. arrhythmias, nutrition, prophylactic antibiotics)	
3.3.21	Ability to recognise and identify appropriate treatment for post-operative low cardiac output (including the need and management plan for open chest resuscitation following cardiac surgery)	
3.3.22	Ability to recognise and identify appropriate treatment for pre- and post-operative respiratory failure	
3.3.23	Ability to recognise and plan treatment of the more common ICU related complications (e.g. line sepsis, DVT, ventilator acquired pneumonia, pneumothorax, dysrhythmias)	
3.3.24	Ability to generate a differential diagnosis in the setting of cardiac arrest for patients after cardiac surgery (e.g. tamponade, hypovolemia)	
3.3.25	Application of principles and techniques to achieve a safe emergent re-entry to the chest after cardiac surgery (including previous minimal Access surgery)	

EBCTS Syllabus
CONGENITAL CARDIAC SURGERY

Appendix 1

Common and Advanced congenital cardiac surgery conditions

- Atrial Septal Defects (ASD)
- Ventricular Septal Defects (VSD)
- Aortic valve disease including sub and supra aortic stenosis
- Congenital mitral valve disease
- Total anomalous pulmonary venous drainage
- Atrioventricular septal defects
- Fallots tetralogy
- Pulmonary atresia including intact septum, VSD and major aortopulmonary collateral arteries (MAPCAs)
- Transposition of the great arteries (TGA)
- Congenitally corrected transposition
- Double outlet right ventricle (DORV)
- Vascular rings
- Truncus arteriosus (TA)
- Coarctation and Interrupted aortic arch
- Isomerism
- Functionally univentricular circulation
- One and a half type circulation
- Hypoplastic left heart syndrome
- Aorto-pulmonary window
- Anomalous coronary arteries
- Advanced cardio-respiratory failure in childhood
- Congenital tracheal anomalies and associated conditions

Appendix 2

Common and Advanced surgical techniques and strategies in congenital cardiac surgery

- Patent Ductus Arteriosus (PDA) closure
- ASD closure
- VSD closure including multiple VSD's
- Repair of partial and complete Atrio-Ventricular Septal Defect (AVSD)
- Repair of tetralogy of Fallot
- All types of systemic-pulmonary artery shunts
- Management of cavo-pulmonary shunts
- Management of Fontan circulation and total cavo-pulmonary connection
- Pulmonary artery banding
- Repair of pulmonary atresia
- MAPCA surgery
- Management of hypoplastic left heart syndrome including Norwood procedure
- Closure of aorto-pulmonary window
- Repair of truncus arteriosus
- Repair of partial and total anomalous pulmonary venous drainage
- Repair of anomalous coronary arteries
- DORV repair
- Arterial switch
- Management of TGA/VSD/Pulmonary Stenosis (PS) including Rastelli, REV and Nikaidoh procedures
- Double switch and Rastelli-Senning procedure
- Repair of vascular rings
- Repair of coarctation and interrupted aortic arch
- Surgery for aortic valve and aortic root pathology including Ross procedure
- Surgery for sub and supra aortic valve stenosis
- Surgery for mitral valve repair (congenital)
- Cannulation and management of ECLS including ECMO and ventricular support
- Tracheal surgery

EBCTS Syllabus
CONGENITAL CARDIAC SURGERY

Appendix 3

Common and Advanced adult congenital cardiac surgery conditions

- Atrial Septal defects
- Pulmonary regurgitation and post Fallot's intervention
- Tricuspid valve disease including Ebstein's anomaly
- Atrioventricular defects in adults
- Conduit degeneration and stenosis
- Aortic root pathology and the small left outflow tract
- Mitral valve surgery
- Bicuspid aortic valve disease
- Failing Fontan circulation
- Atrial and ventricular arrhythmias

Appendix 4

Common and Advanced surgical techniques and strategies in adult congenital cardiac surgery

- Multiple re-do median sternotomy
- Pulmonary valve replacement and management of the Right Ventricular Outflow Tract (RVOT)
- Repair of ASD and partial AVSD
- Conduit replacement
- Coarctation repair in the adult including extra-anatomic repair
- Aortic root surgery including valve sparing root replacement
- Aortic valve repair and aortic root enlargement
- Surgery on the Left Ventricular Outflow Tract (LVOT)
- Tricuspid valve repair (including cone) and replacement
- Fontan conversion surgery
- Arrhythmia surgery

ETHICS, RESEARCH AND OUTCOMES

- Ethical aspects of surgical practice – informed consent
- Scientific methods which apply to basic and clinical research – data collection and analysis.
- Statistics - statistical tests commonly used in the literature, limitations and deficiencies

4 - THORACIC SURGERY SECTION

EBCTS Syllabus
THORACIC SURGERY

4.1 Lung and Airway

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
4.1.1 Knowledge of basic and common variations of anatomy and pathology	*4.1.9* Knowledge of complex variations in anatomy and pathology, including congenital malformations
4.1.2 Knowledge of pulmonary physiology including the changes accompanying benign, malignant and traumatic disorders and the effects of treatment	*4.1.10* Knowledge of diagnostic procedures in complex/multiple disorders
4.1.3 Knowledge of the clinical presentations and common variations of benign, malignant and traumatic disorders	*4.1.11* Knowledge of medical and surgical treatment options for complex benign, malignant and traumatic disorders (e.g. endobronchial valves in emphysema)
4.1.4 Knowledge of diagnostic and/or staging tests (including advantages and disadvantages) available for the evaluation of benign, malignant and traumatic disorders	*4.1.12* Knowledge of complex complications for benign, malignant, and traumatic disorders and their treatments
4.1.5 Knowledge of treatment options, including advantages and disadvantages, for benign, malignant and traumatic disorders	*4.1.13* Knowledge of the principles and techniques used in robotic lung resections
4.1.6 Knowledge of the risks, benefits and complications of different treatment options	*4.1.14* Knowledge and understanding of the outcome literature for benign and malignant disorders including survival rates for advanced lung diseases
4.1.7 Knowledge of relevant guidelines for treatment (e.g. ESTS and ACCP)	*4.1.15* Knowledge of the principles and practice of lung transplantation
4.1.8 Knowledge and understanding of outcomes for benign and malignant disorders (e.g. morbidity and mortality)	*4.1.16* Knowledge of mechanisms of foreign bodies inhalation and tracking down the airways
	4.1.17 Knowledge of types of foreign bodies in the airways (e.g. Coins, beads, pins and peanuts)
Clinical Judgement	
Membership (Level One)	**Fellowship (Level Two)**
4.1.18 Ability to distinguish common clinical presentations and the complications of benign, malignant and traumatic disorders	*4.1.27* Ability to distinguish complex clinical presentations and complications of benign, malignant and traumatic disorders
4.1.19 Identification of common diagnostic abnormalities associated with benign, malignant and traumatic disorders	*4.1.28* Ability to construct a diagnostic and assessment plan for patients with complex abnormalities associated with benign, malignant and traumatic disorders including subsequent prioritisation of management
4.1.20 Ability to generate a differential diagnosis for lung and airway diseases with similar presentations	*4.1.29* Adaptation of the therapeutic management of a patient based on the understanding of the physiology of various disease states
4.1.21 Prioritisation and interpretation of subsequent diagnostic/assessment tests for common benign, malignant and traumatic disorders	*4.1.30* Identification of an appropriate treatment option for complex patients with benign, malignant and traumatic disorders
4.1.22 Identification of the appropriate treatment for a patient with benign, malignant and traumatic disorders	*4.1.31* Application of the principles and techniques used in advanced diagnostic and therapeutic endoscopy (e.g. EBUS, stenting, navigational bronchoscopy)
4.1.23 Application of the principles and techniques of routine endoscopic skills (e.g. rigid and flexible bronchoscopy)	*4.1.32* Application of the principles and techniques for complex open lung resection (e.g. Pancoast tumour, sleeve resections)
4.1.24 Application of principles and techniques used in routine open lung resections	*4.1.33* Application of the principles and techniques for complex VATS resections
4.1.25 Application of principles and techniques used in basic video-assisted thoracoscopic surgery (VATS) procedures	*4.1.34* Application of the principles and techniques for tracheal resection and repair
4.1.26 Ability to recognise and plan the management of common post-operative complications of routine surgery	*4.1.35* Application of the principles and practice of lung volume reduction surgery (LVRS)
	4.1.36 Application of the principles and techniques for undertaking lung transplantation on patients with end stage respiratory failure
	4.1.37 Application of the principles, practice and complications of advanced mechanical respiratory support (e.g. VV and VA ECMO, NovaLung)
	4.1.38 Ability to Identify and plan the management of complex post-operative and disease-related complications including advanced conventional respiratory support
	4.1.39 Application of the principles and techniques for removal of foreign bodies and management of potential complications (e.g. Peanut extraction)

4.2 Chest Wall/Pleura/Mediastinum/Diaphragm[1]

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
4.2.1 Knowledge of the anatomy and pathology of the chest wall, pleura, mediastinum and diaphragm including common variations of benign, malignant and traumatic disorders	*4.2.9* Knowledge of complex variations in anatomy and pathology including congenital malformations of the chest wall, pleura, mediastinum and diaphragm
4.2.2 Knowledge of the physiology of the chest wall, pleura, mediastinum and diaphragm including changes accompanying benign, malignant and traumatic disorders and the effects of treatment	*4.2.10* Knowledge of diagnostic procedures in complex/multiple disorders
4.2.3 Knowledge of clinical presentations and common variations of benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm (including mediastinal tumours)	*4.2.11* Knowledge of alternative methods for chest wall reconstruction for benign, malignant, and traumatic disorders
4.2.4 Knowledge of diagnostic and staging tests including advantages and disadvantages for the evaluation of disorders of the chest wall, pleura, mediastinum and diaphragm (including tumour markers)	*4.2.12* Knowledge of medical and surgical treatment options for complex benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm (including adjuvant therapy)
4.2.5 Knowledge of treatment options (medical and surgical) including advantages and disadvantages for benign, malignant and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm	*4.2.13* Knowledge of the complications of complex benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm
4.2.6 Knowledge of the risks, benefits and complications of treatment options (medical therapy, chemotherapy, radiotherapy and surgical) for benign and malignant disorders of the chest wall, pleura, mediastinum and diaphragm	*4.2.14* Knowledge of autonomic neural disorders and their medical and surgical management (e.g. primary hyperhidrosis)
4.2.7 Knowledge of guidelines for the treatment of Chest Wall/Pleura/Mediastinum/Diaphragm disorders (e.g. BTS, ESTS and MARS trial)	*4.2.15* Knowledge and understanding of outcome literature for benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm
4.2.8 Knowledge and understanding of outcomes for benign and malignant disorders (e.g. morbidity and mortality)	
Clinical Judgement	
Membership (Level One)	**Fellowship (Level Two)**
4.2.16 Ability to distinguish common clinical presentations and complications of benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm	*4.2.24* Ability to distinguish complex clinical presentations and complications of benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm
4.2.17 Identification of common diagnostic abnormalities associated with benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm	*4.2.25* Ability to construct a diagnostic and assessment plan for patients with complex abnormalities associated with benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm including subsequent prioritisation of management
4.2.18 Ability to generate a differential diagnosis of conditions with similar presentations	*4.2.26* Identification of the appropriate treatment option for complex patients with benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm
4.2.19 Prioritisation and Interpretation of subsequent diagnostic/assessment tests for routine benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm	

[1] Refer to Pericardial Disease Level One

4.2.20 Identification of appropriate treatment options for a patient with benign, malignant, and traumatic disorders of the chest wall, pleura, mediastinum and diaphragm *4.2.21* Application of the principles and techniques for endoscopic, ultrasound guidance and minimally invasive skills *4.2.22* Application of the principles and techniques for basic VATS and open procedures (e.g. VATS pleurectomy, open decortication, anterior mediastinotomy, thymectomy) *4.2.23* Ability to recognise and plan the management of the more common post-operative complications of routine surgery of the chest wall, pleura, mediastinum and diaphragm	*4.2.27* Adaptation of the therapeutic management of a patient based on an understanding of the physiology of various disease states (e.g. myasthenia gravis) *4.2.28* Application of the principles and techniques for open and VATS procedures for complex pleural, mediastinal and diaphragmatic disorders *4.2.29* Application of the principles and techniques for alternative methods of chest wall resection *4.2.30* Application of the principles and techniques for the surgical management of mesothelioma *4.2.31* Ability to construct a strategy for the management of patients with autonomic neuronal disorders (e.g. VATS sympathectomy) *4.2.32* Identification and management planning of complex post-operative and disease-related complications including advanced conventional respiratory support

4.3 Oesophageal Disease

the candidate should be able to demonstrate

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
4.3.1 Knowledge of the anatomy and pathology of the oesophagus including common variations	*4.3.11* Knowledge of complex (including congenital) variations in anatomy, pathology and physiology of the oesophagus
4.3.2 Knowledge and understanding of the physiology of the oesophagus and changes accompanying benign and malignant disorders	*4.3.12* Knowledge of diagnostic and staging tests (including advantages and disadvantages) for the evaluation of benign and malignant disorders (e.g. manometry, pH testing, EUS)
4.3.3 Knowledge of the clinical presentations of benign and malignant disorders of the oesophagus	*4.3.13* Knowledge of the impact of staging on the management of malignant disease of the oesophagus
4.3.4 Knowledge of invasive and non-invasive diagnostic tests for the evaluation of the oesophagus	*4.3.14* Knowledge of treatment options (including advantages and disadvantages) for complex benign and malignant disorders (e.g. surgery vs. chemotherapy/radiotherapy for malignancy)
4.3.5 Knowledge of common complications for benign and malignant disorders (e.g. oesophageal perforation)	*4.3.15* Knowledge of advanced endoscopic skills and procedures (EMR, EUS, stenting)
4.3.6 Knowledge of the treatment options for common benign and malignant disorders of the oesophagus	*4.3.16* Knowledge of complex oesophageal resections including colonic interposition grafts
4.3.7 Knowledge of the effects of treatment on the physiology of motility disorders	*4.3.17* Knowledge and understanding of the outcome literature for the various treatment options for oesophageal disease
4.3.8 Knowledge of the risks, benefits and complications of common treatment options (e.g. medical and surgical)	*4.3.18* Knowledge of mechanisms and types of foreign body ingestion and impaction in the oesophagus
4.3.9 Knowledge of guidelines for the treatment of benign and malignant disorders of the oesophagus (e.g. AUGIS)	
4.3.10 Knowledge of outcomes for benign and malignant disorders of the oesophagus	
Clinical Judgement	
Membership (Level One)	**Fellowship (Level Two)**
4.3.19 Ability to generate a differential diagnosis of oesophageal disease with similar presentations (e.g. achalasia vs. pseudo-achalasia; coronary syndrome vs. oesophageal spasm)	*4.3.24* Ability to prioritise diagnostic/assessment tests for routine benign and malignant oesophageal disease (e.g. Barium swallow vs. EUS vs. endoscopy)
4.3.20 Application of the principles and techniques of routine flexible endoscopic skills (e.g. upper GI endoscopy)	*4.3.25* Application of the principles and techniques of the range of oesophageal endoscopic procedures (e.g. rigid oesophagoscopy)
4.3.21 Identification of an appropriate treatment plan for patients with benign and malignant disorders	*4.3.26* Identification of an appropriate treatment plan for patients with complex benign and malignant disorders
4.3.22 Application of the principles and techniques of routine laparoscopic surgery	*4.3.27* Application of the principles and techniques for common oesophageal resections
4.3.23 Ability to recognise and plan the management of common post-operative complications of oesophageal surgery (e.g. anastomotic leak)	*4.3.28* Application of the principles and techniques for the surgical management of oesophageal perforation/trauma
	4.3.29 Ability to recognise and plan the management of complex post-operative complications of oesophageal surgery
	4.3.30 Application of the principles and techniques for removal of oesophageal foreign (e.g. food bolus obstruction, chicken and fish bone, denture)
	4.3.31 Application of the principles and techniques in the post-operative management of foreign body complications e.g. oesophageal perforation

4.4 Chest Trauma

the candidate should be able to demonstrate:

Medical Knowledge	
Membership (Level One)	**Fellowship (Level Two)**
4.4.1 Knowledge of the anatomy and pathophysiology of chest trauma including cardiac, intra-thoracic organs and junctional areas	*4.4.11* Knowledge and understanding of complex variations of torso and polytrauma (e.g. head injuries)
4.4.2 Knowledge and understanding of blunt and penetrating chest trauma	*4.4.12* Knowledge and understanding of the impact of chest trauma in the physiologically compromised patient (e.g. elderly: pre-existing cardiac disease, emphysema)
4.4.3 Knowledge and understanding of other potential major injuries (e.g. cervical spine management, intra-abdominal bleeding)	*4.4.13* Knowledge of damage control resuscitation and surgery
4.4.4 Knowledge and understanding of immediate and non-immediate life-threatening chest injuries	*4.4.14* Knowledge of the use of cardiopulmonary bypass, echocardiography and cardiac surgical techniques for penetrating cardiac injuries
4.4.5 Knowledge of circulatory resuscitation, coagulation pathways and haemostasis related to polytrauma	*4.4.15* Knowledge of minimal access Video Assisted Thoracic Surgery (VATS) techniques for diagnostic and therapeutic interventions.
4.4.6 Knowledge of appropriate monitoring and diagnostic investigations including advantages and disadvantages for the evaluation of chest trauma (e.g. CT scanning)	*4.4.16* Knowledge and understanding of chest wall injuries and stabilisation
4.4.7 Knowledge and understanding of various management strategies including advantages and disadvantages in chest trauma (e.g. ATLS ABC approach, pain management, endovascular options)	
4.4.8 Knowledge and understanding of various surgical approaches based on suspected or documented injuries	
4.4.9 Knowledge of guidelines related to the management of chest trauma (e.g. ATLS)	
4.4.10 Knowledge of outcomes for major polytrauma	
Clinical Judgement	
Membership (Level One)	**Fellowship (Level Two)**
4.4.17 Ability to generate a differential diagnosis for chest and polytrauma and distinguish between immediate and non-immediate life-threatening chest injuries	*4.4.25* Ability to distinguish complex clinical presentations of torso and polytrauma
4.4.18 Ability to prioritise and interpret diagnostic tests for chest trauma	*4.4.26* Ability to prioritise, adapt and construct an emergent or elective strategy for patients with complex torso and polytrauma including interaction with other specialties
4.4.19 Ability to identify and prioritise the appropriate treatment for patients with immediate and non-immediate life-threatening chest injuries	*4.4.27* Ability to identify and adapt appropriate thoracic and cardiac surgical interventions for complex injuries based on the pathophysiology of the patient
4.4.20 Application of the principles and techniques for the various management strategies in chest trauma (e.g. monitoring and surveillance vs surgery)	*4.4.28* Application of the principles and techniques of VATS and open thoracic surgery
4.4.21 Application of the principles and techniques for resuscitative, emergent and elective surgery in chest trauma (e.g. consideration of available resources, use of bilateral anterior thoracotomy)	*4.4.29* Application of the principles and techniques of cardiac surgery including use of cardiopulmonary bypass, myocardial protection and intraoperative TOE
4.4.22 Identification and management planning of the more common complications of blunt and penetrating chest trauma (e.g. delayed haemorrhage)	*4.4.30* Ability to recognise and manage the intra-operative complications of lung and cardiac trauma (e.g. systemic air embolism) and the application of surgical techniques to prevent them
4.4.23 Ability to identify futile intervention and/or continuation of surgical and medical treatments in patients with severe chest trauma	*4.4.31* Identification and management planning for complex post-operative complications following chest trauma in the ICU (e.g. use of advanced respiratory and circulatory support)
4.4.24 Ability to recognise and plan the management of common post-operative complications following surgery for chest trauma	

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THORACIC SURGERY

Common and Advanced Thoracic Surgery Conditions

PREOPERATIVE AND POSTOPERATIVE CARE

- Preoperative medication - effects, side effects and interactions of common cardiovascular medications. Anticoagulant drugs including NOACs and contemporary antiplatelet agents
- Preoperative risk factors
- Monitoring in the Intensive Care unit and High Dependency Unit
- Complications of thoracic surgery and their management (bleeding, air leak, arrhythmias, sepsis)
- Pathophysiology of coagulation - management of post-operative bleeding and transfusion (blood, blood components and clotting factors). Blood conservation

NON-NEOPLASTIC LUNG AND AIRWAY DISEASE

- Lung Infections including microbiology
- Chronic obstructive lung disease;
- End stage lung disease; pathophysiology and natural history
- Pulmonary fibrosis; pathophysiology and natural history
- Pathophysiology and alterations of pulmonary function due to bronchospasm;
- Mechanisms by which foreign bodies reach the airways and subsequent pathophysiology
- The causes and pathophysiology of haemoptysis;

NEOPLASTIC LUNG AND AIRWAY DISEASE

- The natural history, types of lung and airways neoplasms
- Histological appearances of the major types of neoplasms
- TNM staging of lung carcinoma and its application to the diagnosis, therapeutic planning, and management of patients with lung carcinoma
- Adjuvant therapy for lung neoplasms;
- Benign lung neoplasms; Pathology and natural history
- Solitary lung nodules; Pathology and natural history
- Pulmonary metastases. Types and pathophysiology

DISEASES OF THE PLEURA

- Pneumothorax types; aetiology and pathophysiology
- Pleural effusions; aetiology and pathophysiology
- Malignant diseases of the pleura
- Mesothelioma pathology and biological behaviour
- Empyema (with and without bronchopleural fistula) natural history and pathophysiology

CHEST WALL

- Chest wall anatomy and pathophysiology
- Major flaps of the chest wall and their vascular pedicles

DISEASES OF THE MEDIASTINUM

- Mediastinal infections and their management - Primary and Post-operative
- Benign and malignant mediastinal neoplasms
- Anterior mediastinal tumours - types and pathophysiology
- Middle mediastinal tumours - types and pathophysiology
- Posterior mediastinal tumours – types and pathophysiology

ABNORMALITIES OF THE PERICARDIUM[1]

- Physiology of increased pericardial fluid and pericardial constriction
- Pericardial cysts and tumours
- Diagnosis and management of pericardial disease
- Malignant pericardial effusions and management
- Operative management of benign and malignant pericardial neoplasms
- Surgery for drainage of pericardial fluid
- Surgery for pericardial constriction
- Complications of pericardial surgery

DIAPHRAGM

- Congenital abnormalities of the diaphragm
- Diaphragmatic hernias
- Diaphragmatic paralysis

[1] Refer to Adult Cardiac Surgery Topics

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LUNG TRANSPLANTATION[1]

- Evaluation and assessment of lung failure
- Prognosis of lung failure
- Management – medical, Novalung and ECMO support
- Bridging to lung transplantation
- Lung volume reduction surgery
- Donor assessment and lung preservation
- Assessment and acceptance criteria for lung transplantation
- Technique of lung transplantation – single, bilateral, heart-lung, lobar
- Primary graft dysfunction and ECMO support
- Immunosuppressive therapy and rejection – bronchial biopsy
- Complications of lung transplantation

OESOPHAGEAL DISEASE

- Congenital disorders
- Benign neoplasms – histology and pathophysiology
- Malignant neoplasms – histology and pathophysiology
- Motility disorders of Oesophagus – pathophysiology
- Hiatus Hernias and gastro – oesophageal reflux

THORACIC TRAUMA[2]

- Chest wall trauma including rib fractures and flail chest
- Tracheobronchial and pulmonary trauma - blunt and penetrating
- Diaphragmatic trauma - blunt and penetrating
- Oesophageal trauma – blunt and penetrating

[1] Refer to Adult Cardiac Surgery Topics

[2] Refer to Cardiovascular Trauma

EBCTS Syllabus

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ABBREVIATIONS

yo	year-old
m	male
f	female
b	black
w	white
L	left
R	right
hx	History
h/o	history of
cc	cubic centimetre
cm	centimetre
c/o	complaining of
kg	kilogram
NL	normal limits
m	meter
mg	milligram
ml	millilitre
WNL	within normal limits
Ø	without or no
ºC	degree Celsius
+	positive
-	negative
AAA	Abdominal aortic aneurysm
Abd	abdomen
ABG	Arterial blood gases
ACLS	Advanced cardiac life support
AF	Atrial fibrillation
AFib	Atrial fibrillation
AICD	Automatic Implantable Cardioverter Defibrillator
AIDS	acquired immune deficiency syndrome
AP	anteroposterior
ARDS	adult respiratory distress syndrome
ASAP	as soon as possible
ASD	Atrial septal defect
AV	Atrioventricular
BBB	Bundle Branch Block
BIVAD	Biventricular Assist Device
BMI	body mass index
BPM	Beats per minute
BSA	Body surface area
BUN	blood urea nitrogen
CABG	coronary artery bypass grafting
CAV	Cardiac Allograft Vasculopathy
CBC	complete blood count
CCO	Continuous Cardiac Output
CCS	Canadian Cardiovascular Society (Classification)
CCU	cardiac care unit

CCICU	Cardiac Care Intensive Care Unit
CK-MB	creatine kinase myocardial band
CHF	Congested Heart Failure
cig	cigarettes
CHF	congestive heart failure
CI	Cardiac index
CO	Cardiac output
COPD	chronic obstructive pulmonary disease
CPR	cardiopulmonary resuscitation
CSA	Chronic Stable Angina
CT	computed tomography
CVA	cerebrovascular accident
CVP	central venous pressure
Cx	Circumflex coronary artery
CXR	chest x-ray
D/C	discontinue or discharge
DHCA	Deep Hypothermia Circulatory Arrest
DM	diabetes mellitus
DNR	do not resuscitate
DTR	deep tendon reflexes
DVT	deep venous thrombosis
ECG	electrocardiogram
EKG	electrocardiogram
ED	emergency department
EMT	emergency medical technician
ENT	ears, nose, and throat
EOM	extraocular muscles
ER	emergency room
ETOH	alcohol
Ext	extremities
F	Fahrenheit
FH	family history
FVC	Forced Vital Capacity
FRC	functional residual capacity
GI	gastrointestinal
GU	genitourinary
HCA	Hypothermic circulatory arrest
HEENT	head, eyes, ears, nose, and throat
HCM	Hypertrophic cardiomyopathy
HCV	hepatitis C virus
HIV	human immunodeficiency virus
HOCM	Hypertrophic obstructive cardiomyopathy
HPI	history of present illness
HTN	hypertension
H&P	history and physical examination
IABP	Intra-aortic balloon pump
ICD	Implantable Cardioverter Defibrillator
ICU	Intensive Care Unit
ID	infectious diseases

IE	Infective endocarditis
IDDM	insulin-dependent diabetes mellitus
IM	intramuscularly
IV	intravenously
JVD	jugular venous distention
KUB	kidney, ureter, and bladder
LAD	Left anterior descending coronary artery
LAP	Left atrial pressure
LBBB	Left bundle branch block
LC	left circumflex
LIMA	left internal mammary artery
LITA	left internal thoracic artery
LMP	last menstrual period
LP	lumbar puncture
LV	left ventricle
LVAD	left ventricular assist device
LVEDP	left ventricular end-diastolic pressure
LVEDV	left ventricular end-diastolic volume
LVEF	Left ventricular ejection fraction
LVESV	left ventricular systolic volume
LVOT	Left ventricular outflow tract
MACCE	Major adverse cardiac and cerebrovascular events
MI	myocardial infarction
MRI	magnetic resonance imaging
MVA	motor vehicle accident
MVO2	Mixed Venous O2 Saturation
Neuro	neurologic
NIDDM	non-insulin-dependent diabetes mellitus
NKA	no known allergies
NKDA	no known drug allergy
NQWMI	Non-Q Wave Myocardial Infarction
NSR	normal sinus rhythm
PA	pulmonary artery
PAP	pulmonary artery pressure
PCI	Percutaneous Coronary Intervention
PCO2	partial pressure of carbon dioxide
PERLA	pupils equal, react to light and accommodation
PEEP	- positive end expiratory pressure
PDA	Patent ductus arteriosus
po	orally
PO2	partial pressure oxygen
POD	postoperative day (e.g. POD2: second postoperative day)
Post-op	postoperative (after surgery)
PPM	Permanent Pacemaker
Pre-op	preoperative (before surgery)
PT	prothrombin time
PTCA	Percutaneous, Transluminal Coronary Angioplasty
PTT	partial prothrombin time
PVC	Premature Ventricular Contraction

PWP	pulmonary wedge pressure
RBC	red blood cell
RCA	right coronary artery
RIMA	Right internal mammary artery
RITA	Right internal thoracic artery
RBBB	Right Bundle Branch Block
RBC	red blood cells
RV	right ventricle
RVAD	right ventricular assist device
RVOT	right ventricular outflow tract
SA	Sinoatrial
SD	Sudden death
SH	social history
STAT	immediately
TAPVC	Total Anomalous Pulmonary Venous Connection
TIA	transient ischemic attack
U/A	urinalysis
URI	upper respiratory tract infection
US	ultrasound
V-Fib	Ventricular fibrillation
VSD	Ventricular septal defect
VSS	vital signs stable
VT	Ventricular Tachycardia
WBC	white blood cells
WNL	within normal limits