A CURRICULUM FOR HIGHER SURGICAL TRAINING IN CARDIOTHORACIC SURGERY

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1. AIMS

1.1 To provide a comprehensive balanced training in Cardiothoracic surgical practice enabling trainees satisfactorily completing the training programme to undertake independent practice in the specialty of Cardiothoracic surgery.

1.2 To produce specialists in Cardiothoracic surgery who will advance the practice of Cardiothoracic surgery and improve the quality and delivery of Cardiothoracic surgical care to their patients.

2. SCOPE OF CARDIOTHORACIC SURGERY

2.1 The specialty of Cardiothoracic surgery encompasses those conditions affecting:

- the heart and intrathoracic great vessels
- the lungs and trachea
- the oesophagus
- other mediastinal structures
- the chest wall

2.2 The practice of Cardiothoracic surgery includes the diagnosis, pre-operative care and assessment, operative treatment and post-operative care of patients affected by the above conditions.

3. COMPONENTS OF A SURGICAL TRAINING PROGRAMME IN CARDIOTHORACIC SURGERY

The precise content of training will vary between individual training programmes. Some flexibility is appropriate and is available to suit career intentions of the individual trainee. While a particular trainee may spend the majority of training in one or other aspect of the speciality (cardiac or non cardiac thoracic surgery) he or she must spend at least one year's full time training in each of the major aspects of the specialty.

3.1 Basic Surgical Training

Entry criteria	:	GMC/IMC registration
Duration	:	2 years (minimum)
Composition	:	4 – 6 months individual SHO posts
	:	Mandatory 6 months general surgery
Exit Criteria	:	Satisfactory trainer reports
	:	Passing the collegiate exam

3.2 Higher Surgical Training

Entry criteria	:	Successful completion of Basic Surgical Training including the appropriate exam Mandatory 6 months Cardiothoracic surgery (1 year desirable) Recommended 4-6 months ITU experience
Duration:	:	6 years training in educationally approved posts
Composition	:	Each trainee must spend at least 1 year in full time training in both cardiac and non cardiac thoracic surgery within the 6 year training period. At least 1 year in non cardiac thoracic surgery should take place during years 1 – 3. Ideally this should be one continuous year but exceptionally could be composed of two 6 month modules. Appropriate exposure should be available in related specialties such as cardiology, respiratory medicine and perfusion
Exit Criteria	:	Satisfactory trainer reports with evidence of suitable progression through the training scheme and of competence and performance. Passing the Intercollegiate Board examination.

Obtaining the exit criteria will lead to the award of the Certificate of Completion of Specialist Training (CCST).

3.3 Academic Experience/Research

A period of time spent in full time academic experience/research outwith clinical duties is regarded as highly desirable and should preferably include training and experience in scientific methods, statistical analysis etc. This should be for a minimum of 12 months but may be longer. The research experience may be undertaken before, during or after the period of specialist training.

3.4 Options in Higher Surgical Training in Cardiothoracic Surgery

The following flexible options will apply to the overall 6 year higher training period in Cardiothoracic surgery.

3.4.1 Up to 1 year spent in full time research

3.4.2 Up to 1 year spent in full time clinical work in an approved overseas Cardiothoracic surgical unit (prospective approval necessary).

These options are not an automatic right but may be exercised at the discretion of the SAC. In particular, time spent in research will only be recognised if this research has resulted in significant peer reviewed publications and/or a Higher Degree.

Similarly, time spent overseas will only be recognised if satisfactory reports are received from the nominated supervisor.

In exceptional circumstances more than 1 year spent abroad in full time clinical work may be recognised.

4.1 CONTENT OF TRAINING

The content of individual years of the training programme period should reflect the seniority of the trainee and should provide progressive training in all aspects of cardiothoracic surgical practice. An Educational Contract should be agreed at the commencement of training and the setting and achieving of targets should be discussed and agreed between the individual trainee and his or her trainers. Targets should be realistic and should cover all aspects of cardiothoracic surgical practice including:

- contemporary basic science
- pre-operative assessment and case selection – attendance at medical/surgical conferences
- operative surgery
- intensive care and on-call emergencies
- general post-operative care
- out-patient clinics
- audit
- research – including preparation of scientific papers for peer reviewed journals
- teaching: intra-disciplinary and intra-specialty teaching
  attendance at 'Training the Trainers' course is strongly recommended
- management training
- attendance at post-graduate courses, meetings and presentation of papers
- Communication skills

5. TARGET GUIDELINES

Training will be divided into two main periods with general Cardiothoracic training occurring in years 1 – 3 and more specialised training in years 4 – 6 involving a number of specialised modules.

Trainees will not be expected to study all of the modules but, depending on the practise they hope to pursue in their consultant career, may study one to three modules.

For guidelines related to the knowledge of congentital heart disease expected from both the general and specialist trainee please see section 5.2.4, page 12.

5.1 YEARS 1 - 3

TO BE PROFICIENT

Insertion of monitoring lines
Harvesting of conduits
Bronchoscopy: rigid and fibreoptic
Tracheostomy
Techniques of pleural aspiration and drainage including rib resection and intercostal drainage
Thoracotomy and Sternotomy
- open and close

Insertion of IABP
Re-opening for haemorrhage
Pleurectomy/Pleurodesis
Lung biopsy by open and VATS techniques
Basic VATS techniques such as pleural biopsy and pleurodesis

BE FAMILIAR WITH (AT LEAST HAVE ASSISTED AT)

Coronary artery bypass graft
Valve replacement
Mediastinal exploration by cervical mediastinoscopy and anterior mediastinotomy
Lung resection for benign and malignant disease
Decortication
Correction of pectus deformities
Thymectomy for myasthenia and tumours
Pulmonary metastasectomy

EXPECTED BASIC KNOWLEDGE

Physiology
Acid-base balance
Haemostatic mechanisms
Haemodynamics
Respiratory/gastric/oesophageal function
Metabolic response to trauma

Anatomy
Heart, pericardium, mediastinal structures
Tracheobronchial tree and lungs
Chest wall and diaphragm

Pathology
Knowledge of pathology of disease affecting heart, lungs and mediastinum

Pharmacology
Analgesics
Antibiotics
Anticoagulants
Inotropes
Anti-arrhythmics
H_2 antagonists
Proton pump inhibitors
Bronchodilators
Principles of chemotherapy

Microbiology
Infection in cardiac and thoracic surgery
Including tuberculosis and allied organisms
Antisepsis

Immunology of Transplantation and rejection

YEARS 1-3 (cont)

CLINICAL KNOWLEDGE

Evidence base for cardiac and thoracic surgery
An ability to understand and evaluate surgical reports from literature
Audit methodology
Mortality, morbidity and survival following surgical treatment of common thoracic malignancies
Principles of intensive care
Complications of surgery
Clinical investigations including cardiac catheterisation, echocardiography, nuclear medicine and imaging including thoracic imaging techniques
Principles of management of pleural collections such as pneumothorax, effusions, chyle and pus
Staging for common thoracic malignancies and multi-disciplinary management of common thoracic malignancies
Myocardial protection
Perfusion and circulatory support
Resuscitation
Rehabilitation

5.2 YEARS 4 – 6

5.2.1 CARDIAC SURGERY

TO BE PROFICIENT

CABG including re-do
Valve surgery
Combined valve and grafts
Left ventricular aneurysmectomy

TO BE FAMILIAR WITH

Pericardiectomy
Surgery for aortic dissection
Aortic root replacement
Surgery for complications of myocardial infarction

CLINICAL KNOWLEDGE

As for years 1 – 3 but with obviously more detailed understanding of literature and evidence base

TARGET NUMBER OF OPERATIONS

The difficulties inherent in a prescriptive approach to the number of cases carried out by an individual surgeon in training is appreciated. It is felt that some guidelines would be useful. Competency is likely to be achieved with the following operative exposure:

Coronary artery bypass grafting	:	100
Aortic valve replacement	:	15
Mitral valve replacement	:	10

5.2.2 THORACIC SURGERY

TO BE PROFICIENT

Lung resection including basic bronchoplastic techniques
Decortication
Correction of pectus deformities
Video-assisted techniques
Pulmonary metastasectomy
Chest wall resection and prosthetic replacement
Mediastinal exploration by cervical mediastinoscopy and anterior mediastinotomy
Resection for mediastinal tumours
Thymectomy for Myasthenia
Surgery for emphysema and its complications

TO BE FAMILIAR WITH

Oesophageal surgery for benign and malignant conditions
Tracheal resection for benign and malignant disease
Thoracoplasty
Surgery for apical tumours of the lung and thoracic inlet
Techniques for the relief of airway and oesophageal obstruction
Systematic nodal dissection

CLINICAL KNOWLEDGE

Similar to that at years 1 – 3 with increased understanding of evidence base. More detailed knowledge of tumour biology and gastro-intestinal physiology would also be expected.

TARGET NUMBER OF OPERATIONS

The same comments as regards suggested numbers of operations apply as in cardiac surgery. However, it is felt that competence would be achieved with the following operative exposure:

Bronchoscopy	:	20
Oesophagoscopy	:	10
Mediastinoscopy/otomy	:	15
Lobectomy	:	10
Pneumonectomy	:	3
Chest wall resection	:	2
Bronchoplastic resection	:	2
Pulmonary metastasectomy	:	5
Decortication	:	5
Pectus correction	:	3
Pleurectomy	:	10
Mediastinal resection	:	3
Surgery for emphysema	:	3
Thymectomy for myasthenia	:	3
VATS procedures	:	15

5.2.3 TRANSPLANTATION

FAMILIARITY EXPECTED

Cardiac transplantation
Single and double lung transplantation
Heart/lung transplantation
Multi-organ donor retrieval
Monitoring of rejection including biopsy technique

CLINICAL KNOWLEDGE

Mechanisms and management of rejection
Management of sepsis post-transplantation
Organ preservation
Indications for and clinical use of mechanical circulatory support

TARGET NUMBER OF OPERATIONS

The same comments apply but it is expected that competence would be achieved with the following exposure:

Cardiac transplants	:	10
Lung transplants	:	2
Multi-organ donor retrieval	:	25
Myocardial biopsies	:	30

5.2.4 SURGERY FOR CONGENITAL HEART DISEASE (See note on page 7)

5.2.4.1 GENERAL CARDIOTHORACIC TRAINEE

FAMILIARITY WITH MANAGEMENT OF

PDA
ASD
VSD (including PA banding)
Coarctation
Shunts (systemic and cavo-pulmonary)

BASIC KNOWLEDGE/THEORY KNOWLEDGE OF

Circulatory changes at birth
Cardiac catheterisation (including shunt calculations)
Pulmonary vascular disease
Principles of paediatric ICU (including nitric oxide)
Principles of echocardiography for CHD

UNDERSTAND PRINCIPLES OF

Transposition of the great arteries
Fontan procedure
Tetralogy of Fallot
Hypoplastic left heart
Single ventricle circulation

5.2.4.2 SPECIALIST TRAINEE

TECHNICAL COMPETENCE IN

PDA
ASD
VSD
PAVSD
Valve surgery (aortic, mitral, pulmonary, tricuspid)
Shunts (systemic and cavo-pulmonary)
Tetralogy of Fallot/PA + VSD
Fontan procedures
Extra cardiac conduits

CLINICAL/BASIC SCIENCE KNOWLEDGE

Embryology of heart and lungs
Classification of CHD
Investigation of CHD (cardiac catheterisation/TOE/TTE)
Cardiopulmonary transplantation for CHD

FAMILIARITY WITH

(Ideally will have performed but it is assumed that a mentoring system will be in place for newly appointed Consultants so that these less common procedures will be performed in partnership).

Interrupted aortic arch
Total anomalous pulmonary venous drainage
Complete atrio-ventricular septal defect
Transposition of the great arteries (arterial switch but have knowledge of Senning and Mustard)
Rastelli
Norwood
Double outlet right ventricle
Truncus arteriosus
PA + VSD + MAPCAS