

Consensus Document of the European Society of Anaesthesiology (ESA) and the European Association of Cardiothoracic Anaesthesiology (EACTA) for European Education and Training in Anaesthesia for Cardiothoracic and Major Vascular Surgery

A Proposal for Accreditation of Educational and Training Programmes

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Introduction

The aim of this proposal is to give information and guidance to institutions, educators, intending specialists and other interested parties as to the structure and content of a training programme in anaesthesia for cardiothoracic and major vascular surgery for certified anaesthesiologists aiming to undertake independent practice in those areas.

For many years anaesthesia for cardiothoracic and vascular surgery has been considered too complex and advanced to be amenable to this process. Each individual institution has developed a series of protocols and practical processes which were uniquely sensitive to their circumstances and which, through a process of considerable development and refinement, improved the care of patients. Best practice was often identified by this process, which was in essence anecdotal rather than evidence based.

More recently, the process of research and audit has given us a greater understanding of best practice, through an evidence based process. We can therefore be much more confident in the fundamental principles of how to manage anaesthesia and perioperative care in these complex patients.

This understanding of the evidence base gives us the confidence to be substantially less proscriptive in our recommendations than before. We have a clearer idea of what actually does matter, and what is easily left to the practice preference of the individual, the institution(s), the region or even the nation. Indeed a considerable degree of variation is inevitable, since there is still considerable variability in the availability of drugs and techniques throughout Europe.

Accreditation; Recognition for regulatory or academic purposes?

In the majority of European countries, anaesthesia is recognized by the regulatory authorities as a single specialty, and a diploma or other qualification is given in recognition of specialist status. This qualification has a significant regulatory purpose in identifying qualified specialists. The diploma in anaesthesia may be awarded by a variety of bodies including universities, frequently with national agreements between the universities or other institutions. This ensures equal standards throughout a given nation state. Alternatively, a national specialist qualification may be awarded by a single authority or College,

The institutions awarding qualifications are recognised as “competent authorities” for regulatory purposes. Although specific areas of anaesthesia form part of the syllabus, the qualifications

themselves are usually “generalist” in nature, and in most countries individuals undergoing further training in cardiothoracic anaesthesia will be of junior specialist status, i.e. following the award of a generalist regulatory qualification.

The base qualification in anaesthesia is therefore the only qualification recognized by the regulatory authorities. We have no intention whatsoever of recommending any change to this. The recognition we are seeking is academic recognition from our peers for training programmes, not regulatory recognition for either individuals or institutions.

We believe that a process of accreditation of educational and training programmes serves essential functions. Primarily, these are to give specialists the confidence that they are learning and practicing anaesthesia to the highest of standards, and most importantly, to ensure that those specialists of experience and standing in the field will train others such that the highest standards of anaesthetic practice are available to the people of Europe.

Once a programme is accredited, it would be expected that intending specialists would be able to be identified as having successfully completed a programme accredited by an appropriate peer-reviewed organization, in this case a joint body of the European Association of Cardiothoracic Anaesthesiologists and European Society of Anaesthesiologists.

As specialists with a primary interest in this clinical area both EACTA and the ESA are fully prepared to initiate this process. However, in due course we would welcome the interest and participation of other interested parties within Europe.

From the following, it will be apparent that many major institutions may be able to fulfil all the necessary criteria and develop an accredited training programme within a single institution. However, some may benefit from a process of formal collaboration with others, either within or across regional or national boundaries. We believe that the most important factors are the quality and comprehensive nature of the training programme. Where this is best accomplished by collaboration between institutions, we believe that this should be actively encouraged.

Definition and Scope of the Programme

Cardiothoracic and vascular anaesthesiology is devoted to the preoperative, intraoperative and postoperative care of adult and paediatric patients undergoing cardiac, thoracic and vascular surgery and related invasive procedures.

Duration and Scope of Education

Training in adult or paediatric cardiothoracic or vascular anaesthesiology requires certain core intellectual and clinical skills for safe and effective practice. It is not necessary to be proscriptive about how long trainees should take to acquire these skills. Normally, they will be acquired during or shortly after the satisfactory completion of a nationally approved training programme in anaesthesiology.

Education in cardiothoracic and major vascular anaesthesiology requires a structured training programme, the contents of which should be identifiable at the onset of the period of training. It should not be interrupted by frequent and/or prolonged periods of secondment to other areas, in order to maximize the effect of a concentrated period of training.

The majority of the training in cardiothoracic anaesthesiology must be spent in caring for patients in the operating room, other anesthetizing locations and intensive care or other postoperative care units. The training should include experience in providing anaesthesia for cardiac, thoracic and vascular surgical procedures. It may also include anaesthesia for non-operative diagnostic and interventional cardiac and thoracic procedures outside of the operating room.

Pre-anaesthesia preparation and post-anaesthesia care, pain management and advanced cardiac life support should also be included.

Goals and Objectives

The training programme in cardiothoracic and vascular anaesthesiology must be structured to ensure optimal patient care while providing trainees with the opportunity to develop skills in clinical care and clinical judgment, teaching, and research. The anaesthesiologist with special skills in these areas should be proficient in providing anaesthetic care using a range of techniques for patients with cardiac, thoracic or major vascular diseases undergoing cardiac surgery with and without extracorporeal circulation, surgery on the thoracic aorta, pulmonary and mediastinal surgery, non-operative diagnostic and interventional cardiac and thoracic procedures and electrophysiological procedures. Proficiency in providing anaesthetic care for patients undergoing major vascular surgery including surgery to the carotid arteries and the abdominal aorta will also be required.

In addition, he/she should develop skills in the conduct of preoperative patient evaluation and interpretation of cardiovascular and pulmonary diagnostic test data, haemodynamic and respiratory monitoring, perioperative echocardiography, management of cardiopulmonary bypass (CPB), pharmacological and mechanical haemodynamic support, perioperative critical care including ventilatory support, and perioperative pain management. To meet these goals, the programme should provide exposure to the wide variety of clinical problems in cardiothoracic and vascular patients that are necessary for the development of these clinical skills.

Institutional Organization

Institutional Policy

There should be a clearly defined policy governing the educational resources committed to the cardiothoracic anaesthesiology programme, such that these resources can be easily verified.

Faculty Qualifications and Responsibilities

Programme Director

The programme director must have a broad clinical background and should be appropriately trained and of sufficient seniority to carry out the task. It would be expected that the programme director has a strong educational background, preferably a strong research background and be aware of the current issues related to the specialty by virtue of membership of one or more specialist professional societies or organizations.

She/he has responsibility for the training programme subject to the approval of the head of department or other supervisory body. She/he must devote sufficient time to provide substantial leadership to the programme and supervision for the trainees.

Responsibilities of the Programme Director

preparation, periodic review and, if necessary, revision of a written outline of the educational goals of the programme with respect to the knowledge, skills and other attributes required of trainees for successful participation in the programme. This written outline must be distributed to trainees and members of the teaching staff. It should be readily available for review, and indeed may be reviewed as and when facilities and clinical workloads change. It may be expanded to form a “prospectus” for the institution.

- participation in the selection of candidates for appointment to the programme in accordance with institutional and departmental policies and procedures.

- co-ordination of the teaching staff and other programme personnel.

- ensure that trainees are provided with prompt, reliable systems for communication and interaction with supervisory specialists as necessary. These must be available at all times and may vary in accordance with national guidelines.

- preparation of an accurate statistical and narrative description of the programme. This could also form part of a “prospectus”.

Faculty

Although the number of faculty members involved in teaching trainees in cardiothoracic and vascular anaesthesiology may vary; it is recommended that at least three faculty members should be involved. A ratio of no less than one full-time equivalent faculty member to one resident should be maintained.

The faculty must possess expertise in the care of cardiothoracic and vascular patients and must have a continuous and meaningful role in the training programme. A variety of skills will be required to deliver the programme (see below) which should ideally include teaching in multidisciplinary conferences by faculty in cardiology, cardiothoracic surgery, vascular surgery intensive care and pulmonary medicine.

Clinical and Educational Facilities and Resources

The following resources and facilities are necessary for the programme. However, these may not be required for the full duration, and where necessary may form part of an external rotation which should be considered ad hoc

a) Intensive care or other appropriately designated units for both surgical and nonsurgical cardiothoracic and vascular patients.

b) An emergency department in which patients are managed 24 hours a day.

c) Operating rooms adequately designed and equipped for the management of cardiothoracic and vascular surgery patients.

d) A postoperative care area adequately designed and equipped for the management of such patients.

- e) Cardiothoracic patients in sufficient volume and variety to provide a broad educational experience for the programme.
- f) Physicians with special training and/or experience in cardiovascular and pulmonary disease, echocardiography including TOE, clinical cardiac electrophysiology, cardiac, thoracic and major vascular surgery.
- g) Monitoring and advanced life support equipment representative of current levels of technology.
- h) Allied health staff and other support personnel.
- i) Facilities that are readily available at all times to provide prompt laboratory measurement pertinent to the care of cardiothoracic and vascular surgery patients.
- j) Facilities that are readily available at all times to provide prompt non-invasive and invasive diagnostic and therapeutic cardiothoracic procedures. These include but are not limited to echocardiography, cardiac stress testing, cardiac catheterization, electrophysiological testing and therapeutic intervention, cardiopulmonary scanning procedures and pulmonary function testing.
- h) Conveniently located library facilities, space for research, and teaching conferences in the relevant aspects of anaesthesia..

Educational Programme

Goals and Objectives

The director and teaching staff must prepare and comply with the written goals of the programme. All educational components should be related to the programme goals. The programme design should be submitted as part of the accreditation process and a written statement of the educational objectives must be given to each trainee at the start of the programme.

Clinical Components

The resident in cardiothoracic and vascular anaesthesiology should gain clinical experience in the following areas of care of patients with cardiothoracic diseases. Resources should be available to provide the minimum clinical experience for each resident as shown below:

1. Adult Cardiothoracic Anaesthesiology Residency

a) Required Core should include the following;

- up to 2 years of operating room clinical activity providing a minimum of 100 surgical procedures involving adult patients and requiring CPB. At least 30 cases should be for procedures other than isolated CABG. Experience should include revascularization without CPB.
- sufficient experience to independently manage intra-aortic balloon counterpulsation.
- It is required that the trainee has experience managing adult cardiothoracic surgical patients in a critical care setting. This experience may include the management of non-surgical cardiothoracic patients.

b) It is strongly recommended that the trainee should have experience of the following;

- in the management of adult patients for cardiac pacemaker and automatic implantable cardiac defibrillator placement, active involvement in the management of patients with ventricular assist devices, active involvement in the anesthetic management of adult patients undergoing surgery on the thoracic aorta, surgical treatment of cardiac arrhythmias, cardiac catheterization and cardiac electrophysiologic diagnostic/therapeutic procedures.
- Clinical experience within the training period should include successful completion of a perioperative echocardiography education according to established training objectives. These should include completion of a local, national, European or other accreditation process that verifies theoretical knowledge and practical skills.
- Practical and theoretic knowledge of systems of red cell salvage.

c) It is suggested

- that clinical experience in the management of cases under deep hypothermic circulatory arrest should be available.
- It is also suggested that there should be elective rotations which may include up to two months in total (none less than 2 weeks in duration) from the following categories:
 - Inpatient or outpatient cardiology,
 - invasive cardiology,
 - inpatient or outpatient pulmonary medicine
 - medical or surgical critical care,
 - extracorporeal perfusion technology
 - and paediatric cardiothoracic anesthesia.

2. Thoracic Anaesthesia Programme

a) Required Core.

It is expected that available resources would allow trainees to complete a minimum of 50 major cases in order to gain the necessary intellectual and technical skills. The following should be available;

- assessment and preoperative preparation of patients undergoing a full range of thoracic surgery
- training in endobronchial techniques and single lung ventilation.
- intraoperative management of patients undergoing thoracic surgery, including oesophageal surgery and pulmonary resection
- anaesthesia for diagnostic procedures
- postoperative care of the thoracic surgery patient.

b) It is strongly recommended

- that fibre-optic bronchoscopy (FOB), thoracic epidural or other comparable techniques of acute pain management be available.

3. Vascular Anaesthesia Programme

a) Required Core

It is expected that resources should be available to provide trainees with a minimum of 50 major cases (supra inguinal) in order to gain the necessary intellectual and technical skills. Included in this programme are the following;

- assessment and preoperative preparation of patients undergoing carotid or abdominal aortic surgery
- intraoperative management of patients undergoing suprainguinal arterial surgery as described above.
- postoperative care of the patient recovering from major vascular surgery

b) The following are strongly recommended

- Anaesthesia for endovascular procedured stents and other descending thoracic anaesthesia
- Theoretical and practical considerations for endovascular procedures

c) The following are suggested

- evoked potential or other neurological monitoring during major vascular surgery

4.. Paediatric Cardiothoracic Anaesthesiology Training

After consideration the consensus group felt that wider consultation would be necessary to form recommendations about the contents of a paediatric training programme. It is possible that paediatric cardiac anaesthesia is not yet amenable to this process. However, in any event wider consultation with cardiologists, surgeons and anaesthesiologists will be required in order to determine the best way forward.

Formal or Structured Teaching

The didactic curriculum, provided through lectures, conferences and workshops should supplement clinical experience as necessary in order for the trainee to acquire the knowledge to care for their patients.

The components should include a wide curriculum with emphasis on how cardiothoracic diseases affect the administration of anaesthetic and perioperative care.

Many institutions may be able to provide a comprehensive teaching programme “in house”. However, others will not. Therefore EACTA and the ESA will make available a programme of lectures and other teaching courses. The proposed content is found in appendix A.

A local training programme should offer as many of the following as possible

Cardiothoracic anaesthesiology and intensive care conferences, interactive conferences, hands-on workshops, morbidity and mortality conferences, cardiac catheterization and echocardiography conferences, cardiothoracic surgery case review conferences, journal reviews and research seminars, multidisciplinary conferences in cardiovascular medicine, pulmonary medicine, cardiothoracic surgery, vascular surgery and paediatrics relevant to cardiothoracic anaesthesiology.

A programme should have the facilities to ensure that a trainee should be able to complete a minimum of one academic assignment during their training period. Academic projects may include preparation and publication of review articles, book chapters, manuals for teaching or clinical practice, clinical research or other academic activities. It is anticipated that each project should be pursued to the point of publication.

A programme should be able to ensure that a faculty member is in charge of each project. It would be expected that a proposed programme would be able to provide evidence of ongoing academic activity of the type described above.

Evaluation

It is strongly recommended that the faculty responsible for the training programme provide critical evaluations of each resident's progress every 6 months. This could take the form of an appraisal with each trainee and should discuss the trainees professional attitude and character attributes, fund of knowledge, clinical judgment and clinical skills, as well as specific tasks and skills for patient management and critical analysis of any relevant clinical situations.

The faculty and trainee should agree a joint evaluation both of the trainees progress and the training programme, and devise a plan for addressing any perceived difficulties or deficiencies.

Training programmes should encourage trainees to provide a written confidential evaluation of the programme.

Trainees should be involved in programmes of quality assurance and risk management.

Periodic evaluation of training objectives should be encouraged, and trainees should be encouraged to participate in this process.

Each centre should be able to maintain a register of those trainees who have entered and successfully completed a training programme in order to continue its accreditation as a training centre. At the end of the training period, it would be appropriate for an accredited centre to acknowledge in writing successful completion of a trainees training.

APPENDIX A

Embryological development of the cardiothoracic structures

Pathophysiology, pharmacology and clinical management of patients with cardiac disease including cardiomyopathy, heart failure, cardiac tamponade, ischemic heart disease, acquired and congenital valvular heart disease, congenital heart disease, electrophysiologic disturbances and neoplastic and infectious cardiac diseases.

Pathophysiology, pharmacology and clinical management of patients with respiratory diseases including pleural, bronchopulmonary, neoplastic, infectious and inflammatory diseases.

Pathophysiology, pharmacology and clinical management of patients with thoracic vascular, tracheal, esophageal and mediastinal diseases including infectious, neoplastic and inflammatory processes

Non-invasive cardiovascular evaluation: electrocardiography, transthoracic echocardiography, TEE, stress testing, cardiovascular imaging. TEE training must be based upon formal national or international guidelines.

Cardiac catheterization procedures and diagnostic interpretation; invasive cardiac catheterization procedures including angioplasty, stenting and transcatheter laser and mechanical ablations

Non-invasive pulmonary evaluation: pulmonary function tests, blood gas and acid-base analysis, oximetry, capnography, pulmonary imaging

Pre-anaesthetic evaluation and preparation of cardiothoracic patients

Pharmacokinetics and pharmacodynamics of medications prescribed for medical management of cardiothoracic patients

Perianesthetic monitoring: non-invasive and invasive (intra-arterial, central venous, pulmonary artery, mixed venous saturation, cardiac output)

Pharmacokinetics and pharmacodynamics of anaesthetic medications prescribed for cardiothoracic patients

Extracorporeal circulation including, myocardial preservation, effects of CPB on pharmacokinetics and pharmacodynamics, cardiothoracic, respiratory, neurological, metabolic, endocrine, haematological, renal and thermoregulatory effects of CPB and coagulation/anticoagulation before, during and after CPB

Pharmacokinetics and pharmacodynamics of medications prescribed for management of haemodynamic instability: inotropes, chronotropes, vasoconstrictors, vasodilators

Circulatory assist devices: intra-aortic balloon counter pulsation, left and right ventricular assist devices and biventricular assist devices

Cardiac surgical procedures: adult and paediatric, minimally invasive, myocardial revascularization, valve repair and replacement, pericardial, neoplastic procedures and heart and/or lung transplantation

Thoracic aortic surgery: ascending, transverse and descending aortic surgery with circulatory arrest, CPB employing low flow and or retrograde perfusion

Oesophageal surgery: varices, neoplastic, colon interposition, foreign body, stricture

Pulmonary surgery: thoroscopic or open; lung reduction, bronchopulmonary lavage, one lung ventilation, lobectomy, pneumonectomy and bronchoscopy: fiberoptic, rigid, laser resection

Post anaesthetic critical care of cardiothoracic surgical patients

Ventilators

Pain management of cardiothoracic surgical patients

Research methodology/statistical analysis

Quality assurance/improvement

Ethical and legal issues

Practice management