MODULE 6

Anaesthesia for Neurosurgery

**Duration required:** A minimum 30 sessions (½ days) of clinical experience is required for anaesthesia for neurosurgery — TE10 (2003) Recommendations for Vocational Training Programs

**Trainee’s Aims**

In Module 6 clinical experience is gained from anaesthesia for neurosurgery.

The **aim of Module 6** is for Trainees to acquire a series of clinical abilities and skills in the perioperative care of patients undergoing neurosurgery and related surgery. These include conducting or assisting in anaesthesia and perioperative care for:

- Neurosurgery
- Spinal surgery
- Neuroradiological procedures
- Head injuries

**Learning Objectives**

These are what the Trainee needs to learn. They are presented as:

- Knowledge
- Clinical management (“knows how”) that applies knowledge and clinical skills to manage the patient
- Skills (clinical and technical)
- Attitudes and behaviours

**Knowledge — Basic Sciences**

Trainees are required to revise the relevant subjects in the Basic Sciences as set out in the ANZCA document Syllabus for the Basic Sciences in Anaesthesia and Intensive Care (1st edition 1995), and as updated on the ANZCA website. Trainees are expected to apply Basic Science principles in clinical practice.

Basic science subjects relevant to this Module include:

- Neuro anatomy
  - Central nervous system
  - Spinal cord and meninges
  - Ventricular system and flow of CSF
  - Blood supply to brain and spinal cord
  - Cranial vault and spinal column
- Cerebral blood flow
- Cerebral blood volume
- Cerebral metabolism
- Cerebrospinal fluid dynamics and physiology
- Intracranial pressure
- Blood-brain barrier
- Physiology and metabolism of normal and abnormal brain and spinal cord
- Physiological and metabolic effects of anaesthesia on brain and spinal cord
- Abnormal water and sodium homeostasis
- Nociception
- Temperature and CNS function
Pharmacology relevant to neuroanaesthesia:
- Sedatives
- Hypnotics
- Analgesics
- Inhalation agents
- Neuromuscular blocking drugs
- Anticholinesterases
- Neuroprotection
- Diuretics
- Hypotensive agents
- Vasopressors
- Corticosteroids
- Drug interactions with neuromuscular disorders

Knowledge — Clinical Measurement and Monitoring
Trainees are required to understand the principles of clinical measurement and monitoring in neuroanaesthesia, including techniques and clinical importance. Knowledge is expected in:
- Haemodynamic and respiratory monitoring
- Cerebral blood flow
- Intracranial pressure (ICP) and cerebral perfusion pressure
- Cerebral metabolism

Knowledge — Education and Self-Development
Trainees are required to understand the education and self-development principles learned during Modules 1, 2 and 3, especially those of adult learning, self-directed learning, and lifelong learning, and maintain their Learning Portfolio.

Clinical Management
Trainees are expected to understand relevant principles, apply knowledge in practice, and to demonstrate abilities in the anaesthesia management of patients for neurological and spinal surgery. These include:

Professional Practice
- Complying with the relevant policies, recommendations, and guidelines in professional practice such as the relevant ANZCA and J FICM professional documents (see Appendix)
- Understanding principles of:
  - Organisation of a neurosurgical anaesthesia service including a trauma anaesthesia service and a neuroradiological and imaging anaesthesia service
  - Intensive Care and High-Dependency Units for neurological patients

Interventions to Minimise Cerebral Damage
- Principles of cerebral protection
- Haemodynamic stability
- Fluid and osmotic therapy
- Management of intracranial hypertension
- Sedation and ventilatory support
Anaesthesia for Neurosurgery

- Understanding the assessment, anaesthesia and perioperative care of patients for:
  - Intra cerebral vascular surgery
  - Extra cerebral vascular surgery
  - Supratentorial surgery
  - Posterior fossa surgery
  - Pituitary surgery
  - Epilepsy surgery
  - ‘Awake craniotomy’
  - Craniofacial and craniobasal surgery
  - Spinal surgery
  - Emergency spinal cord decompression
  - Paediatric neurosurgery (see Module 8)
  - Procedures for the management of chronic pain (see Module 10)
  - Imaging and interventional radiological procedures

- Principles, role and management of procedures, problems, or events associated with anaesthesia for neurosurgery:
  - Positioning for neurosurgery
  - Use of inhalation or total intravenous general anaesthesia
  - Induced hypotension
  - Induced hypertension
  - Hypothermia
  - Sitting position
  - Air embolism; precautions, diagnosis and management
  - Injury of head, spinal column and neurological injuries
  - Epilepsy and other neurological disorders
  - Paediatric considerations

Skills — Clinical Skills

In this Module, Trainees will provide safe anaesthesia for neurosurgery.

Trainees will revise pre-assessment skills, including taking an appropriate history and performing an appropriate physical examination (including airway assessment, cardiovascular, respiratory and neurological examinations) to assess the patient’s status.

Technical skills in which Trainees are required to be competent include:

- Skills learned in Modules 1 and 2
- Pre-anaesthesia preparation for neuroanaesthesia
- Monitoring in neuroanaesthesia - setting up and calibration, placement of cannulae, interpretation of variables
- Post-anaesthesia care and post neurosurgical care
- Protocols and drills for:

Skills — Educational Skills

Trainees are expected to build on the educational skills in Modules 1 to 3 and develop the following:

- A review of their personal learning plan as specified in their Learning Portfolio
- Identification of the factors which lead to deviation from the original learning plan
- A learning plan in the Learning Portfolio in which basic science teaching is linked to clinical practice
The Trainee should acquire the following core skills.

**During Basic Training**
- Maintaining a Learning Portfolio
- Developing a study plan for the rest of the training period
- Reviewing study plans and correcting for deviations (e.g., catching up on deficient knowledge or experience)
- Reflecting on previous learning experiences with the aid of the Learning Portfolio
- Linking basic science teaching with clinical practice
- Studying effectively
- Participating in small-group learning and educational activities
- Being aware of decision-making processes
- Managing time effectively for study, work and home/leisure
- Giving and receiving feedback
- Developing insight into personal limitations
- Using the Internet including email
- Conducting and appraising literature searches
- Appraising journal articles including the application of statistics
- Carrying out oral presentations and professional communication. Specific skills in communication are outlined in Modules 2, 11 and 12

**During Advanced Training**
- Reviewing study plans and correcting for deviations (e.g., catching up on deficient knowledge or experience)
- Reflecting on previous learning experiences with the aid of the Learning Portfolio
- Comprehending how decisions are made
- Determining what information should be accepted or rejected in decision-making
- Determining the value of information from various sources and the importance of cross validation
- Assessing professional performance
- Conducting and appraising literature searches
- Appraising journal articles including the application of statistics
- Applying the principles of evidence-based medicine to clinical practice
- Carrying out oral presentations and professional communication. Specific skills in communication are outlined in Modules 2, 11 and 12
- Presenting quality assurance exercises or projects
- Developing facilitation skills, such as tutoring in small-group learning and conducting small-group meetings

**Attitudes and Behaviours**
Trainees are expected to develop the attitudes and behaviours that are obligatory in specialist medical practice.

Core attitudes and behaviours that Trainees must cultivate during the whole period of FANZCA training include the following.

**Specialist Practice**
- To attain the attributes of a specialist as a:
  - Medical expert
  - Communicator
  - Collaborator
  - Manager
  - Health advocate
  - Scholar and teacher
  - Professional
• To practise good communication with colleagues, patients and others
• To work as a member of a team, but to assume responsibilities and/or delegate duties as a team leader when necessary
• To commit to, and believe in, a culture of safety and ethical, high quality care
• To accept that medical knowledge and skills are not the only requirements of specialist practice
• To be aware of medicolegal obligations relating to medical practice
• To have insight into one’s own limitations, abilities and areas of expertise
• To commit to lifelong continuing professional development

Professionalism and Ethics
To commit to, and believe in the ethical and professional principles of:
• Altruism: the best care for the patient must be the principal driving force of practice
• Patient autonomy: patients’ ability to determine their treatment
• Beneficence: the principle of “doing good” to patients
• Non-maleficence: the principle of not doing harm to patients
• Fidelity: faithfulness to one’s duties and obligations. This principle underlies excellence in patient care, confidentiality, telling the truth, a commitment to continuing professional development and lifelong learning and not to neglect patient care
• Social justice: the right of all patients to be fairly treated
• Utility: the principle of doing the most good for the greatest number of people
• Duty to oneself in terms of personal health care and maintenance of competence to practise
• Accountability: the anaesthetist is responsible for his/her actions
• Honour and integrity in all conduct, including the generation and use of resources
• Respect for others, including a responsibility to work as a team and to practise conflict resolution
• Appropriate response to clinical error

Patient Considerations
To commit to, and believe in, the rights of patients with respect to:
• Autonomy
• Confidentiality of the doctor-patient relationship
• Appropriate, excellent clinical care, including preoperative assessment
• Informed consent
• Comprehension of the risks of anaesthesia techniques
• Appropriate care irrespective of race, culture, gender and socio-economic status

Research Considerations
• To value rigorous educational and scientific processes
• To distinguish between practice with a sound scientific basis and that which requires further objective assessment
• To commit to the ethical principles of research
**Assessment**

The Module 6 Supervisor will validate the Trainee’s completion of the module in accordance with the process outlined in College Professional Document TE2. This will involve the Trainee assessing whether she/he has achieved the core aims (Trainee’s aims) of the module and fulfilled the minimum clinical experience. The Module 6 Supervisor will review the Trainee’s Learning Portfolio as part of this assessment.

The Supervisor of Training and other Consultants will evaluate the Trainee’s overall performance in the In-Training Assessment (ITA) process. Aspects of clinical performance, education skills and attitudes will be reviewed. The ITA will remain a formative assessment conducted every six months, independent of Module assessment.

The Primary and Final Examinations will be summative assessments of the Trainee. Knowledge of basic sciences, clinical measurement and monitoring in Module 6 will be assessed in the Primary Examination. Clinical management and clinical skills in this Module will be assessed in the Final Examination.

The Learning Portfolio is an integral tool for self-assessment (as well as for recording clinical experience and developing study plans). The Trainee is expected to self-evaluate his/her education skills and learning experience from the Learning Portfolio. For example, the Learning Portfolio should show the Trainee’s progress through the Module, as records of clinical experience (sessions), technical skills learned, topics reviewed and oral presentations delivered.