

# **Neurosurgery Syllabus**

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# 1. Specialty Overview

## Overview of Neurosurgery

Neurosurgery encompasses the diagnosis, assessment and surgical management of disorders of the nervous system. The specialty developed in the first half of the twentieth century through the treatment of cranial trauma and intracranial mass lesions. Subsequent advances in microsurgical techniques, non-invasive imaging, neuro-anaesthesia, intensive care, image-guided surgery, and the introduction of sophisticated radio-oncological and interventional treatments have changed and widened the scope of neurosurgical practice. The British Neurosurgical Training Programme reflects developments taking place in the clinical neurosciences and the requirements of national service delivery.

## Neurosurgical Services

Neurosurgical services in the United Kingdom are provided from regional neuroscience centres serving populations of between 1 and 3.5 million. Most regional centres offer a comprehensive range of adult services. Rare and complex disorders are managed at a supra-regional level in units with specialist expertise.

The Neurosurgical Workforce Plan envisages a UK-wide workforce of 325-350 WTE consultants by 2015 to meet the projected demands for service delivery and training. Neurosurgery has always been both a consultant-led and consultant-provided service. Fewer than 5% of trained neurosurgeons work in the SAS grades.

Emergency and urgent work accounts for more than 50% of neurosurgical caseload. Almost all neurosurgical consultants are involved in the delivery of emergency services and must therefore be competent to manage a wide range of adult conditions and to provide basic emergency paediatric care.

Specialist elective care is provided by neurosurgeons with special interest training, usually working in multi-disciplinary teams with colleagues in the clinical neurosciences, neuro-oncology, endocrinology and surgical disciplines including otolaryngology, maxillofacial, plastic and orthopaedic surgery.

## Consultant Practice

Neurosurgeons appointed as NHS Consultants will be competent to manage unselected emergency and urgent admissions to a regional neurosurgical unit. They will be capable of taking full responsibility for the continuing care of patients in a neurosurgical unit. In particular

they will be proficient in all aspects of the clinical and emergency operative management of patients presenting with the essential neurosurgical conditions.

### **Essential Competencies**

To be eligible for the award of a CCT in Neurosurgery or to be considered for a Certificate of Eligibility for Specialist Registration trainees and applicants will be competent in all aspects of the clinical management of patients presenting with the following essential conditions:

- Cranial trauma
- Spontaneous intracranial haemorrhage
- Hydrocephalus
- Intracranial tumours
- CNS infections
- Spinal trauma
- Benign intradural tumours
- Malignant spinal cord Compression
- Degenerative spinal disorders
- Emergency paediatric care

Trainees and applicants will be competent to undertake the full range of emergency and urgent operative procedures specified in the final training stage curriculum set out in Table 1. They must demonstrate sufficient operative experience to be able to undertake these procedures without supervision and to manage operative difficulties and complications (Competence level 4).

### **Elective and Specialised Care Competencies**

To be eligible for the award of a CCT in Neurosurgery or to be considered for a Certificate of Eligibility for Specialist Registration trainees and applicants will have acquired the skills, knowledge and professional attributes to participate in the provision of specialist elective services with appropriate support and mentoring. They will have demonstrated the potential to lead a clinical team and to undertake increasingly advanced specialist practice with post-CCT professional development.

The major areas of specialist practice in neurosurgery are summarised below. Consultants may develop expertise in several complementary disciplines.

- **Paediatric neurosurgery.** Paediatric neurosurgery accounts for 10-15% of all neurosurgical activity and is concentrated in larger centres to ensure appropriate levels of activity and expertise. The discipline involves the management of developmental

disorders of the neuraxis including craniofacial anomalies and spinal dysraphism; all forms of hydrocephalus; intrinsic tumours of the brain and spine and a wide range of rarer pathologies. Paediatric neurosurgeons often contribute to the management of related disorders such as hydrocephalus, spinal dysraphism and epilepsy presenting in young adults.

- **Neuro-oncology.** The management of malignant intrinsic tumours of the nervous system remains a major challenge. Gradual progress has followed the refinement of surgical techniques using radiological and functional guidance; improvements in adjuvant chemotherapy and radiotherapy; greater understanding of the molecular biology of CNS tumours and better organisation of oncology services. Further advances are likely to be based on advances in basic oncological science and the sophisticated delivery of intra-lesional therapies.
- **Functional neurosurgery.** Functional neurosurgery involves the surgical management of a wide range of neurological problems including intractable pain, epilepsy, spasticity and movement disorders. Traditional ablative surgery is being replaced by deep brain and spinal cord stimulation. Research into neuromodulation using gene therapy, biological vectors and pharmacological agents offers the prospect of effective treatment for neurodegenerative diseases and disabling psychiatric conditions.
- **Neurovascular surgery.** The advent of advanced endovascular techniques in the early 1990s has fundamentally changed the practice of neurovascular surgery. Most simple intracranial aneurysms are now managed by endovascular coiling such that aneurysm surgery is no longer part of general neurosurgical practice. Neurovascular surgeons work closely with their interventional colleagues dealing with complex aneurysms, vascular malformations and occlusive cerebrovascular disease.
- **Skull-base surgery.** Technical advances in microsurgery, surgical approaches and reconstructions have been incorporated into the routine practice of surgeons dealing with disorders of the skull-base including common tumours such as meningiomas, acoustic neuromas and pituitary adenomas. Skull-base surgery is often undertaken jointly with neuro-otological, plastic and maxillo-facial surgeons. Adjuvant treatments with sophisticated radiosurgery and fractionated stereotactic radiotherapy have improved clinical outcomes for patients with skull-base tumours
- **Spinal surgery.** Spinal surgery is now the largest subspecialty in neurosurgery and accounts for more than 50% of the operative workload of some departments. Many departments offer a comprehensive service for primary and secondary spinal malignancy, spinal trauma, spinal pain and degenerative spinal disorders. A small number of neurosurgeons in the UK are exclusively spinal surgeons. The demand for spinal surgery grows steadily, particularly in the elderly population.

- **Traumatology.** Head injury remains a major cause of death and disability in children and young adults. Recent research confirms that prompt neurosurgical intervention and neurointensive care lead to substantially better outcomes. British neurosurgeons with a special interest in head injury have made important contributions to head injury research and management.

## Academic Neurosurgery

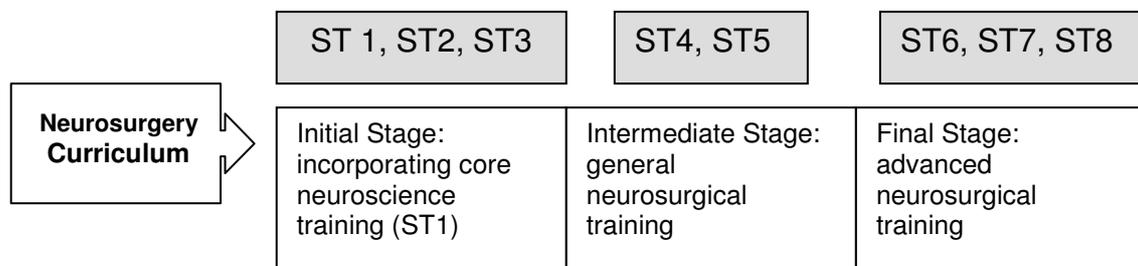
The neurosurgical curriculum will accommodate a range of academic training pathways. The core neuroscience knowledge embodied in ST1 will provide an essential foundation for an academic career. ST 2 & 3 provide opportunities for specific training in areas relevant to a trainee's emerging academic interests e.g pathophysiology applied to neurointensive care. The intermediate training stage will consolidate a trainee's clinical and operative competencies. Full-time academic research or training fellowships to thesis level may be undertaken between the initial, intermediate and final training stages or flexibly within the final stage. The specialist interest year will usually form part of advanced training in the trainee's academic field of interest.

Academic trainees will be expected to meet all of the essential competencies defined in the curriculum before award of a CCT in Neurosurgery.

## Neurosurgical Training Programme

### Summary

The Neurosurgical Training Programme reflects developments taking place in the basic and applied clinical neurosciences and the requirements of service delivery. It contains eight indicative years (ST1-ST8) in three stages. The first year of the initial stage establishes a foundation of core knowledge in the clinical neurosciences - core neuroscience training. The intermediate stage provides two years in full-time general neurosurgical training (ST4 & 5). The final three-year stage (ST 6, 7 & 8) incorporates a year of special interest training.



The emphasis will change, as trainees progress through the programme, from acquiring core neuroscience knowledge and

competencies in ST 1 to developing technical operative skills and surgical judgement in the final stage. Transition from the initial to intermediate neurosurgical training will depend on trainees acquiring the necessary clinical and operative competences, receiving satisfactory in-training assessments and passing an examination of essential knowledge in the basic and applied neurosciences, surgical science and clinical neurosurgery. The MRCS will be adapted to meet these requirements.

The transition from intermediate to final neurosurgical training will take place when trainees have achieved the appropriate clinical and operative competencies. They will be competent to manage a wide range of emergency neurosurgical presentations and will have demonstrated the ability to acquire microsurgical skills. Trainees whose clinical or professional skills are unsatisfactory will be referred for targeted training and will not start final training.

The acquisition of operative skills and experience will accelerate in the final phase of training. Units will concentrate advanced training in the hands of their senior trainees who will spend more of their time in the operating theatre with proportionately less commitment to ward management and general outpatient clinics.

The specialist interest year may be taken flexibly during final training. However, trainees will not start specialist interest training until their programme director is satisfied with their general neurosurgical training and their acquisition of microsurgical and advanced operative skills

**Table1. Schedule of Essential Operative Competencies**

This table summarises the level of operative competence which should be attained at each stage of training using the four point scale: 1 – has observed; 2 – can do with assistance; 3 – can do whole but may need assistance; 4 – competent to do whole without assistance and manage complications.

	<b>Initial</b>	<b>Intermediate</b>	<b>Final</b>
• <b>Surgical Approaches</b>			
• Burr hole	3	4	4
• Craniotomy – convexity	2	3	4
• Craniotomy – pterional	1	3	4
• Craniotomy – midline supratentorial	1	3	4
• Craniotomy – midline posterior fossa	2	3	4
• Transsphenoidal approach	1	2	4
• Lateral posterior fossa	1	2	4
• Lumbar fenestration	2	4	4

• Laminectomy	2	3	4
<b>• General Procedures</b>			
• Insertion of lumbar drain	3	4	4
• Tapping/draining of CSF reservoir	3	4	4
• Application of skull traction	2	4	4
• Image Guidance/Stereotaxy set up	2	4	4
<b>• Management of cranial trauma</b>			
• Insertion of Intracranial (ICP) monitor	3	4	4
• Burr hole evacuation of CSDH	3	4	4
• Elevation of depressed skull fracture	2	4	4
• Craniotomy for traumatic haematoma (ICH)	2	3	4
<b>• Management of spontaneous intracranial haemorrhage</b>			
• Craniotomy for spontaneous intracerebral haematoma (ICH supratentorial)	1	3	4
• Craniotomy for spontaneous intracerebellar haematoma (ICH infratentorial)	1	3	4
<b>• Management of hydrocephalus</b>			
• Insertion of ventricular drain/access device	3 2	4 3	4 4
• Insertion of VP shunt	1	2	4
• Revision of VP shunt			
<b>• Management of intracranial tumours</b>			
• Supratentorial tumour biopsy	2	3	4
• Craniotomy for supratentorial intrinsic tumour/metastasis	1	3	4
• Craniotomy for posterior fossa intrinsic tumour/metastasis	1	2	4
• Craniotomy for convexity meningioma	1	3	4
<b>• Management of intradural spinal tumours</b>			
• Excision of intradural extramedullary tumour	1	2	4
<b>• Management of degenerative spinal disorders</b>			

• Lumbar microdiscectomy	1	3	4
• Anterior cervical discectomy	1	3	4
• <b>Emergency paediatric care</b>			
• Insertion of EVD	1	2	4
• Evacuation of intracranial haematoma (ICH)	1	2	4

## 2. Initial Stage

### Four point scales

What the 4 point scale means for Knowledge

1. Knows of
2. Knows basic concepts
3. Knows generally
4. Knows both specifically and broadly

What the 4 point scale means for **Clinical Skills** and **Technical Skills and Procedures**

1. Has observed
2. Can do with assistance
3. Can do whole but may need assistance
4. Competent to do whole without assistance, including managing complications

## 2.1 Overview

### Initial Training Stage ST1 – ST3

During the initial training stage neurosurgical trainees will acquire a broad foundation of theoretical knowledge; clinical experience, skills and competence in:

- Basic and applied clinical neurosciences
- Basic neurosurgical care
- Neuro-intensive care
- Emergency (A&E) medicine
- Complementary surgical disciplines

On completion of initial neurosurgical training, trainees will be competent in all aspects of the assessment and initial clinical management of the major disorders of the nervous system specified in the core neuroscience syllabus.

They will be competent in the resuscitation, assessment, operative preparation and post-operative care of patients presenting with core neurosurgical conditions. They will be competent to undertake a range of basic procedures without direct supervision.

### Core Neuroscience Training: ST1

The first year of the training programme will concentrate on core neuroscience training. During this year trainees will consolidate their knowledge and understanding of the applied neurosciences underpinning clinical practice.

#### Core Neuroscience Knowledge

- **Applied neuroanatomy:** embryology and mal-development of the neuraxis; anatomy of the skull, brain, and spine; anatomy of the autonomic and peripheral nervous system
- **Neurophysiology:** functional neurophysiology of the cortex, basal ganglia, brainstem, cerebellum, cranial nerve function, autonomic nervous system, spinal cord and peripheral nerves; principles of clinical neurophysiology
- **Pathophysiology of intracranial disorders:** cerebral blood flow and metabolism, cerebral oxygenation, intracranial pressure, intracranial compliance, CSF dynamics
- **Neuropharmacology:** the principles of neuropharmacology including the mechanism of action, pharmacodynamics and interactions of anticonvulsants, analgesics, anaesthetics, anti-emetics, antibiotics, and anticoagulants

- **Neuropathology:** including the pathology of infection, inflammation, ischaemia, neoplasia and trauma affecting the nervous system
- **Neuro-oncology:** the principles of radiation biology and chemotherapy
- **Neuroradiology:** the principles, application and interpretation of plain radiography, computed tomography and magnetic resonance imaging of the neuraxis
- **Neuropsychology:** the principles of neuropsychological assessment; psychological problems due to structural lesions (e.g. frontal lobe syndrome); common post-traumatic disorders; assessment of competence – application of the Mental Health Act
- **Neurological rehabilitation:** the principles of neurological rehabilitation including strategies to optimise the recovery of cognition, communication, continence, selective movement, gait, self-care, psychological stability, social adjustment and employment
- **Medical ethics:** an understanding of the ethical issues arising in the management of patients with neurological disorders with particular reference to patient confidentiality, informed consent, assessment of competence, withdrawal of treatment decisions, organ transplantation; the ethical basis of clinical research
- **Neurogenetics:** an understanding of the principles of neurogenetics and their application to clinical practice
- **Epidemiology:** an understanding of the epidemiology of neurological disorders

### **Management of Common Neurological Disorders**

Trainees will be able to resuscitate when necessary; assess through a full neurological history and examination; establish a differential diagnosis; initiate and interpret investigations for patients presenting with:

- Impaired consciousness and non-traumatic coma (including blackouts \*, collapse\*, seizures\* and confusion\*)
- Headache – acute\* and chronic
- Weakness and paralysis (including falls, dizziness and unsteadiness\*)
- Pain and sensory loss (including acute back pain)
- Disorders of hearing and vision
- Language and speech disturbance
- Swallowing disorders
- Disorders of sphincter and sexual function
- Movement disorder
- Disorders of memory, cognition and behaviour

Conditions marked \* form part of the "Top 20" Common Medical Presentations defined in the Curriculum for General Internal Medicine (Acute)

### **Clinical Placements and Teaching in ST1**

Clinical placements for ST 1 neurosurgical trainees will include:

- One six-month full-time attachment in neurosurgery and one six-month attachment in an acute neurology service incorporating experience in clinical neurophysiology and neuro-rehabilitation or
- Four month attachments in neurosurgery, neurology and neuro-intensive care providing the same clinical experience as above.

Teaching for ST1 neurosurgical training will include:

- Regular exposure to neuroradiology and neuropathology through multi-disciplinary team meetings and case discussions.
- A core neuroscience teaching programme incorporating the core neuroscience subjects with an emphasis on the assessment and management of the common neurological presentations.

### **Initial Neurosurgical Training ST 2 & 3**

During ST 2 & 3 trainees will concentrate on acquiring generic surgical skills and knowledge, together with specific competencies in the non-operative and operative management of the core neurosurgical conditions.

### **Generic Surgical Skills and Knowledge**

- **Physiology:** including the physiology of homeostasis, thermoregulation, metabolic pathways, blood loss, sepsis, fluid balance and fluid replacement therapy, metabolic abnormalities
- **Pathology:** including the pathology of inflammation, wound healing, cellular injury, vascular disorders, disorders of growth, differentiation, and morphogenesis, tumours, surgical immunology, surgical haematology
- **Microbiology:** including the microbiology of surgically-important micro-organisms, sources of infection, asepsis and antisepsis, sterilisation, antibiotics and high risk patient management
- **Basic surgical skills:** including incision and suturing, tissue handling and retraction, haemostasis, knotting and ligature, surgical assistance and exposure
- **Surgical care:** including pre, intra and postoperative management; assessment and management of the multiply-injured patient, management of bleeding diatheses; prevention

and treatment of thromboembolism; nutritional care; pain management and palliative care

## **Basic Clinical Neurosurgery**

On completion of the initial training stage trainees will be competent in all aspects of the basic non-operative care of neurosurgical in-patients with particular reference to common neurosurgical presentations (see below). They will understand the importance of recognising and preventing secondary insults to the central nervous system. They will be capable of resuscitating, assessing and initiating the management of patients deteriorating as a result of intracranial and systemic complications. They will demonstrate sound judgement when seeking more senior support, prioritising medical interventions and escalating the level of medical care.

- **Cranial trauma:** including the resuscitation, assessment, investigation and continuing care of head-injured patients; the prevention and detection of secondary intracranial and systemic insults; insertion of an intracranial pressure monitor; burrhole drainage of a chronic subdural haematoma;
- **Spontaneous intracranial haemorrhage:** including the resuscitation, assessment and investigation of patients suffering a subarachnoid haemorrhage; the management of post-haemorrhagic hydrocephalus; the detection and management of delayed cerebral ischaemia; the management of systemic complications; diagnostic lumbar puncture
- **Hydrocephalus:** in particular the management of hydrocephalus complicating intracranial haemorrhage, head injury and intracranial space-occupying lesions; insertion and taping of CSF reservoirs; insertion and maintenance of lumbar and external ventricular drains
- **Intracranial tumours:** including the assessment and peri-operative management of patients with intracranial tumours; the detection and management of post-operative cerebral swelling, intracranial haematomas and intracranial sepsis; the management of post-operative seizures; the management of post-operative metabolic and endocrine disorders
- **Acute spinal disorders:** including the assessment and peri-operative management of patients presenting with spinal cord, cauda equina and spinal root compression: the management of spinal shock; the ward management of patients with spinal instability; the detection and initial management of postoperative complications including compressing haematomas, CSF fistula and spinal sepsis

## **Clinical Placements in ST2 & 3**

The timing of clinical placements in ST2 & 3 is flexible and at the discretion of the programme director. The following principles apply:

- All trainees will undertake at least one full-time, six month placement in neurosurgery in ST2 & 3
- By the end of ST3 all trainees will have undertaken a minimum of twelve months' full-time training in basic neurosurgery
- Trainees will undertake one or more placements in complementary surgical disciplines up to a maximum of twelve months
- By the end of ST3 trainees will have obtained four months experience in an emergency department (A & E) receiving multiply-injured patients, head-injury patients of all severities and patients presenting with acute neurological disorders
- By the end of ST3 all trainees will have had direct involvement in the care of patients receiving neuro-intensive care. This may be obtained as part of an ST1 programme or through placements in ST 2 & 3

## 2.2 Conditions

### Core Neuroscience knowledge ST1

#### Applied neuroanatomy

##### Embryology and maldevelopment

**Objective**

*To understand basic neuroembryology and its relevance to clinical practice*

**Knowledge**

4 Embryogenesis of the brain and spinal cord

4 Embryogenesis of supporting structures - skull and vertebral column

4 Common anatomical variations and developmental abnormalities

**Clinical Skills**

N/A

**Technical Skills**

N/A

**Professional Skills**

Generic

##### Anatomy of the skull

**Objective**

*To understand the anatomy of the skull*

**Knowledge**

4 Structure, blood supply, innervation, surface and three-dimensional relationships of the:

- scalp
- skull
- meninges
- orbit
- cranial fossae
- cranial foraminae
- cranial nerves

**Clinical Skills**

N/A

**Technical Skills**

N/A

**Professional Skills**

Generic scholar

##### Anatomy of the brain

**Objective**

*To understand the structural anatomy of the brain*

**Knowledge**

4 Cortical topography

- 4 Projection and association tracts
- 4 Organisation of the basal ganglia
- 4 Structure, organisation and connections of the cerebellum, pons and brainstem
- 4 Cranial nerves and their relationships
- 4 Visual and auditory pathways
- 4 Ventricular system and choroid plexus
- 4 Subarachnoid space and cisterns
- 4 Circle of Willis and principle regional and segmental blood supply
- 4 Venous drainage and dural sinuses

**Clinical Skills**

N/A

**Technical Skills**

N/A

**Professional Skills**

Generic scholar

**Anatomy of the spine**

**Objective**

*To understand the anatomy of the spine*

**Knowledge**

- 4 Structure, blood supply, innervation, surface and three-dimensional relationships of the:
  - vertebral column
  - spinal cord: ascending and descending tracts
  - spinal nerve roots
  - cauda equina

**Clinical Skills**

N/A

**Technical Skills**

N/A

**Professional Skills**

Generic scholar

**Anatomy of the autonomic and peripheral nervous system**

**Objective**

*To understand the anatomy of the autonomic and peripheral nervous system*

**Knowledge**

- 4 Sympathetic and parasympathetic pathways
- 4 Visceral and pelvic innervation: control of sphincter function
- 4 Brachial plexus
- 4 Lumbosacral plexus
- 4 Course, distribution and innervation of the major peripheral nerves

**Clinical Skills**

N/A

**Technical Skills**

N/A

**Professional Skills**

Generic scholar

## Neurophysiology

### Functional neurophysiology

#### Objective

*To understand the functional organisation and integration of the central nervous system*

#### Knowledge

- 4 Structure and function of neurones and glial cells
- 4 Synaptic function, action potentials and axonal conduction
- 4 Higher cerebral functions
- 4 Sleep and coma
- 4 Memory and disorders of the limbic system
- 4 Control of motor function: ascending and descending pathways, basal ganglia and cerebellar function
- 4 The special senses
- 4 Functions of the autonomic nervous system
- 4 Hypothalamic-pituitary function

#### Clinical Skills

N/A

#### Technical Skills

N/A

#### Professional Skills

Generic scholar

### Principles of clinical neurophysiology

#### Objective

*To understand the basic principles of clinical neurophysiology*

#### Knowledge

- 4 Principles of electroencephalography
- 4 Principles of somatosensory, motor and brainstem evoked potential monitoring
- 4 Peripheral neuropathies and entrapment neuropathies including:
  - structure and function of peripheral nerves
  - use of nerve conduction studies
- 4 Disorders of the neuromuscular junction including:
  - structure and function of smooth and striated muscle
  - use of electromyographic studies

#### Clinical Skills

3 Interpretation of the results of EEG, EMG and NC studies

#### Technical Skills

None specified

#### Professional Skills

Generic

## Pathophysiology of intracranial disorders

### Pathophysiology of intracranial disorders

#### Objective

*To understand the pathophysiology of intracranial disorders*

#### Knowledge

- 4 Cerebral blood flow and metabolism
- 4 Cerebral autoregulation and vasospasm
- 4 Blood brain barrier and cerebral odema
- 4 Intracranial pressure dynamics
- 4 Cerebral ischaemia and neuroprotection
- 4 CSF hydrodynamics - production and absorption

#### Clinical Skills

N/A

#### Technical Skills

N/A

#### Professional Skills

Generic scholar

## Neuropharmacology

### Principles of neuropharmacology

#### Objective

*To understand the principles of neuropharmacology*

#### Knowledge

- 4 Receptor and ion channel function
- 4 Neuropeptides and neurotransmitters
- 4 Principles of pharmacological neuroprotection
- 4 The pharmacology of anaesthetic agents, muscle relaxants, barbiturates, anticonvulsants and corticosteroids including:
  - mechanisms of action
  - pharmacodynamics
  - interactions

#### Clinical Skills

N/A

#### Technical Skills

N/A

#### Professional Skills

Generic scholar

## Neuropathology and Neuro-oncology

### Principles of neuropathology

#### Objective

*To understand the neuropathology of infection, inflammation, ischaemia, neoplasia and trauma affecting the nervous system*

#### Knowledge

- 4 Acute and chronic inflammatory processes in the CNS including demyelination
- 4 Bacterial, fungal and parasitic meningitis, encephalitis and abscess formation
- 4 Viral encephalitis
- 4 Slow viruses, CJD and vCJD
- 4 HIV associated infections, tumours and leucoencehalopathies
- 4 Cytopathology of neurones and glial in response to ischaemia, hypoxia and trauma
- 4 Diffuse axonal injury
- 4 Macroscopic brain and spinal cord injury including effects of brain shift, herniation and raised ICP
- 4 Classification, epidemiology and pathology of CNS tumours
- 4 Tumour biology, cell kinetics, tumour markers, immunocytochemistry

#### Clinical Skills

N/A

#### Technical Skills

None specified

#### Professional Skills

Generic scholar

## Neuroradiology

### **Principles of neuroradiology**

#### **Objective**

*To understand the principles of neuroradiological imaging of the structure and function of the nervous system*

#### **Knowledge**

Under review

#### **Clinical Skills**

N/A

#### **Technical Skills**

N/A

#### **Professional Skills**

Generic scholar

## Neuropsychology

### Principles of neuropsychology

#### Objective

*The principles of neuropsychological assessment; psychological problems due to structural lesions (e.g. frontal lobe syndrome); common post-traumatic disorders; assessment of competence – application of the Mental Health Act*

#### Knowledge

None

#### Clinical Skills

None

#### Technical Skills

None

#### Professional Skills

None

## Neurological Rehabilitation

### Principles of neurological rehabilitation

#### Objective

*The principles of neurological rehabilitation including strategies to optimise the recovery of cognition, communication, continence, selective movement, gait, self-care, psychological stability, social adjustment and employment*

#### Knowledge

No content

#### Clinical Skills

No content

#### Technical Skills

No content

#### Professional Skills

No content

## Medical ethics

### Medical ethics

#### Objective

*To understand the ethical issues that commonly arise in the management of patients with neurological disorders*

#### Knowledge

4 Criteria for the diagnosis of brainstem death

3 Diagnosis and management of persistent vegetative states

3 Prognosis in chronic progressive neurological disorders

3 Professional and statutory framework governing living directives and end-of-life decisions

#### Clinical Skills

3 Ability to empathise with and support patients and carers

#### Technical Skills

None specified

#### Professional Skills

Generic

## Neurogenetics

### Principles of neurogenetics

#### Objective

*To understand the principles of neurogenetic studies and their relevance to clinical practice*

#### Knowledge

- 3 Inherited neurological disorders
- 3 Genetic control of neural connectivity
- 3 Inborn errors of metabolism
- 3 Molecular genetics of CNS tumours

#### Clinical Skills

N/A

#### Technical Skills

N/A

#### Professional Skills

Generic scholar

## Epidemiology

### **Epidemiology of neurological conditions**

#### **Objective**

*To understand the epidemiology of neurological disorders*

#### **Knowledge**

None

#### **Clinical Skills**

None

#### **Technical Skills**

None

#### **Professional Skills**

None

## Management of Common Neurological Conditions ST1

### Impaired consciousness and non-traumatic coma

#### Objective

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with impaired consciousness and non-traumatic coma*

#### Knowledge

4 The aetiology, pathophysiology and differential diagnosis of altered consciousness and coma due to:

- meningitis
- encephalitis
- intracranial haemorrhage
- acutely raised ICP
- hydrocephalus
- hypoxaemia and ischaemia
- cardiogenic shock
- hypoglycaemia
- epilepsy
- metabolic encephalopathies
- drugs and toxins

#### Clinical Skills

4 Neurological assessment and initial resuscitation of patients in coma or with impaired consciousness

4 Indications for intubation and ventilation

4 Treatment of seizures

4 Establishing a neurological differential diagnosis

4 Planning and interpreting scans and other investigations

4 Presentation and summary of cases

#### Technical Skills

4 Maintenance of airway

3 Endotracheal intubation

3 Central venous cannulation

4 Lumbar puncture

#### Professional Skills

Generic

### Headache - acute and chronic

#### Objective

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with acute and chronic headache*

#### Knowledge

The aetiology and differential diagnosis of acute and chronic headache

including headache associated with:

- benign headache syndromes
- migraine, cluster headache and related syndromes
- space occupying lesions
- meningitic disorders
- intracranial haemorrhage
- trigeminal neuralgia
- atypical craniofacial pain syndrome

Indications for investigation including scanning, lumbar puncture and angiography

### **Clinical Skills**

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

### **Technical Skills**

4 Lumbar puncture

### **Professional Skills**

Generic

## **Weakness and paralysis**

### **Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with weakness and paralysis*

### **Knowledge**

4 Common causes of ocular, cranial nerve, limb, trunk and respiratory muscle weakness

### **Clinical Skills**

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

### **Technical Skills**

None specified

### **Professional Skills**

Generic

## **Dizziness, unsteadiness and falls**

### **Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with dizziness, unsteadiness and falls*

### **Knowledge**

4 Common causes of cerebellar, vestibular, extrapyramidal and autonomic dysfunction

**Clinical Skills**

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Pain and sensory loss**

**Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with pain and sensory loss*

**Knowledge**

4 Common causes of musculoskeletal, neurogenic and neuropathic pain and sensory loss

**Clinical Skills**

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Hearing disorder**

**Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with hearing loss*

**Knowledge**

No content

**Clinical Skills**

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations including pure tone audiograms  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Visual disorder****Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with visual disorders*

**Knowledge**

4 Patterns of visual loss in relation to common bulbar, retrobulbar, sellar, parasellar and optic pathway disorders

4 Analysis of diplopia and nystagmus in relation to common cranial nerve and brainstem disorders

**Clinical Skills**

4 Neurological history taking

4 Neurological examination

4 Use of computerised visual field assessment

4 Detailed fundoscopy

4 Establishing a neurological differential diagnosis

4 Planning investigation

4 Interpretation of scans and other investigations

4 Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Language and speech disturbance****Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with disturbances of language and speech*

**Knowledge**

2 Role of speech and language therapists in assessment and treatment

**Clinical Skills**

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

**Technical Skills**

No content

**Professional Skills**

No content

## Swallowing disorders

### Objective

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with swallowing disorders*

### Knowledge

2 Indications for laryngoscopy, videofluoroscopy, nasogastric and percutaneous gastric feeding

### Clinical Skills

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

### Technical Skills

None specified

### Professional Skills

Generic

## Disorders of the Sphincteric and sexual function

### Objective

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with sphincteric disorders*

### Knowledge

No content

### Clinical Skills

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

### Technical Skills

None specified

### Professional Skills

Generic

## Movement disorder

### Objective

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with movement disorders*

### Knowledge

4 Parkinson's disease

4 Iatrogenic movement disorders

2 Dystonic syndromes

2 Choreiform syndromes

### Clinical Skills

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Memory and cognitive disorders**

**Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with disorders of memory and cognition*

**Knowledge**

No content

**Clinical Skills**

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Behavioural disorders**

**Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with behavioural disorders*

**Knowledge**

4 The common acute and chronic presentations of organic and psychiatric behavioural disorders relating to alcohol and drug abuse, encephalitis, organic dementia, and psychosis

**Clinical Skills**

Neurological history taking  
Neurological examination  
Establishing a neurological differential diagnosis  
Planning investigation  
Interpretation of scans and other investigations  
Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

**Anxiety and depression****Objective**

*To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with anxiety and depression*

**Knowledge**

No content

**Clinical Skills**

Neurological history taking

Neurological examination

Establishing a neurological differential diagnosis

Planning investigation

Interpretation of scans and other investigations

Presentation and summary of cases

**Technical Skills**

None specified

**Professional Skills**

Generic

## Generic Surgical Skills and Knowledge - All Specialties (ST2 & ST3)

### Basic sciences

#### Objective

*Underpinning basic science knowledge appropriate for the practice of surgery.*

*Applied anatomy: Knowledge of anatomy appropriate for surgery*

*Physiology: Knowledge of physiology relevant to surgical practice*

*Pathology: Knowledge of pathological principles underlying system specific pathology*

*Microbiology: Knowledge of microbiology relevant to surgical practice*

*Radiology: Knowledge of diagnostic and interventional radiology*

#### Knowledge

Applied anatomy:

4 Development, organs and structures, surface and imaging anatomy of thorax, abdomen, pelvis, perineum, limbs, neck as appropriate for surgical operations

Physiology:

4 Homeostasis

3 Thermoregulation

3 Metabolic pathways

4 Blood loss

4 Sepsis

4 Fluid balance and fluid replacement therapy

3 Metabolic abnormalities

Pathology:

4 Inflammation

4 Wound healing

4 Cellular injury

4 Vascular disorders

4 Disorders of growth, differentiation and morphogenesis

4 Tumours

3 Surgical immunology

3 Surgical haematology

Microbiology:

- 4 Surgically important microorganisms
- 4 Sources of infection
- 4 Asepsis and antisepsis
- 4 Sterilisation
- 4 Antibiotics
- 4 High risk patient management

Radiology:

3 Principles of diagnostic and interventional radiology

**Clinical Skills**

No content

**Technical Skills**

No content

**Professional Skills**

No content

**Basic surgical skills**

**Objective**

*Acquisition of basic surgical skills in instrument and tissue handling.*

*Incision of skin and subcutaneous tissue: Ability to incise superficial tissues accurately with suitable instruments.*

*Closure of skin and subcutaneous tissue: Ability to close superficial tissues accurately.*

*Knot tying: Ability to tie secure knots.*

*Haemostasis: Ability to achieve haemostasis of superficial vessels.*

*Tissue retraction: Use of suitable methods of retraction.*

*Use of drains: Knowledge of when to use a drain and which to choose.*

*Tissue handling: Ability to handle tissues gently with appropriate instruments.*

*Skill as assistant: Ability to assist helpfully, even when the operation is not familiar.*

**Knowledge**

Incision of skin and subcutaneous tissue:

- 4 Langer's lines
- 4 Healing mechanism
- 4 Choice of instrument

- 4 Safe practice
- 4 Basic Surgical Skills course

Closure of skin and subcutaneous tissue:

- 4 Options for closure
- 4 Suture and needle choice
- 4 Safe practice

Knot tying:

- 4 Choice of material

Haemostasis:

- 4 Techniques

Tissue retraction:

- 4 Choice of instruments

Use of drains:

- 4 Indications
- 4 Types
- 4 Management/removal

Tissue handling:

- 4 Choice of instruments

### **Clinical Skills**

Incision of skin and subcutaneous tissue:

- 4 Ability to use scalpel, diathermy and scissors

Closure of skin and subcutaneous tissue:

- 4 Accurate and tension free apposition of wound edges

Knot tying:

- 4 Single handed
- 4 Double handed
- 4 Instrument
- 4 Superficial
- 4 Deep

Haemostasis:

4 Control of bleeding vessel (superficial)

4 Diathermy

4 Suture ligation

4 Tie ligation

4 Clip application

Tissue retraction:

4 Tissue forceps

4 Placement of wound retractors

Use of drains:

4 Insertion

4 Fixation

4 Removal

Tissue handling:

4 Appropriate application of instruments and respect for tissues

Skill as assistant:

4 Anticipation of needs of surgeon when assisting

**Technical Skills**

No content

**Professional Skills**

No content

## **The assessment and management of the surgical patient**

### **Objective**

*Ability to assess the patient and manage the patient, and propose surgical or non-surgical management.*

### **Knowledge**

No content

### **Clinical Skills**

3 Surgical history and examination (elective and emergency)

3 Construct a differential diagnosis

3 Plan investigations

3 Clinical decision making

3 Case work up and evaluation; risk management

3 Active participation in MDTs

3 Taking consent for intermediate level intervention; emergency and elective

3 Written clinical communication skills

3 Interactive clinical communication skills: patients

3 Interactive clinical communication skills: colleagues

### **Technical Skills**

No content

## Professional Skills

No content

### Perioperative care

#### Objective

*Ability to manage patient care in the perioperative period.*

*Preoperative assessment and management: Ability to assess the patient adequately prior to operation and manage any preoperative problems appropriately.*

*Intraoperative care: Ability to conduct safe surgery in the operating theatre environment.*

*Postoperative care: Ability to care for the patient in the postoperative period.*

*Blood Products: Appropriate use of blood products.*

*Antibiotics: Appropriate use of antibiotics.*

#### Knowledge

Preoperative assessment and management:

- 4 Cardiorespiratory physiology
- 3 Diabetes mellitus
- 3 Renal failure
- 4 Pathophysiology of blood loss
- 4 Pathophysiology of sepsis
- 4 Risk factors for surgery and scoring systems
- 3 Principles of day surgery

Intraoperative care:

- 4 Safety in theatre
- 4 Sharps safety
- 4 Diathermy, laser use
- 4 Infection risks
- 3 Radiation use and risks
- 4 Tourniquets
- 3 Principles of local, regional and general anaesthesia

Postoperative care:

- 4 Cardiorespiratory physiology
- 3 Diabetes mellitus
- 3 Renal failure
- 4 Pathophysiology of blood loss
- 4 Pathophysiology of sepsis

- 4 Complications specific to particular operation
- 2 Critical care

Blood Products:

- 4 Components of blood
- 4 Alternatives to use of blood products

Antibiotics:

- 4 Common pathogens in surgical patients
- 4 Antibiotic sensitivities
- 4 Antibiotic side-effects
- 4 Principles of prophylaxis and treatment

**Clinical Skills**

Preoperative assessment and management:

- 4 History and examination
- 4 Interpretation of preop investigations
- 3 Management of comorbidity
- 4 Resuscitation

Intraoperative care:

- 4 Safe conduct of intraoperative care

Postoperative care:

- 4 Assessment of patient's condition
- 4 Postoperative analgesia
- 4 Fluid and electrolyte management
- 4 Monitoring of postoperative patient
- 4 Detection of impending organ failure
- 4 Initial management of organ failure
- 4 Use of MDT meetings

Blood Products:

- 4 Appropriate use of blood products
- 4 Management of the complications of blood product transfusion

Antibiotics:

- 4 Appropriate prescription of antibiotics

**Technical Skills**

No content

**Professional Skills**

Preoperative assessment and management:

- 0 Communication with patient and relatives
- 0 Liason with physicians and ITU staff

Intraoperative care:

- 0 Communication with other staff members

Postoperative care:

- 0 Communication with patient and relatives
- 0 Liason with physicians and ITU staff

Blood Products:

- 0 Communication with patient and relatives

### **Assessment of multiple injured patients including children**

#### **Objective**

*Safely assess the multiply injured patient.*

#### **Knowledge**

- 3 Anatomy
- 3 Pathogenesis of shock
- 1 Differences In Children

#### **Clinical Skills**

- 4 History and examination
- 3 Investigation
- 4 Resuscitation and early management according to ATLS and APLS guidelines
- 3 Referral to appropriate surgical subspecialties

#### **Technical Skills**

- 3 Central venous line insertion
- 3 Chest drain insertion
- 2 Diagnostic peritoneal lavage

#### **Professional Skills**

**No content**

### **Bleeding diathesis**

#### **Objective**

*Understand, Recognise and Manage bleeding diathesis in the surgical patient.*

*Diagnosis: Diagnose possible bleeding diathesis in the surgical patient.*

*Treatment: Manage bleeding diathesis in the surgical patient.*

#### **Knowledge**

Diagnosis:

3 Mechanism of haemostasis  
3 Pathology of impaired haemostasis e.g. haemophilia, liver disease, massive haemorrhage

Treatment:

3 Understands use of blood products

### **Clinical Skills**

Diagnosis:

4 Recognition of conditions likely to lead to the diathesis

3 Recognition of abnormal bleeding during surgery

Treatment:

3 Avoidance by correct surgical techniques

3 Corrective measures, e.g. warming, packing

### **Technical Skills**

No content

### **Professional Skills**

Diagnosis:

0 Communication with laboratory staff

Treatment:

0 Communication with anaesthetist, theatre team and laboratory staff

## **Venous thrombosis + embolism**

### **Objective**

*Understanding of practice in the prevention and management of Venous thrombosis and Embolism.*

*Coagulation: Understanding of the physiology and pathophysiology of coagulation.*

*Diagnosis: Able to arrange basic investigation of patients with suspected venous thrombosis and embolism.*

*Treatment: Ability to initiate treatment of venous thrombosis and embolism.*

*Prophylaxis: Use of common methods of prophylaxis against venous thrombosis and embolism.*

### **Knowledge**

Coagulation:

- 2 Clotting mechanism (Virchow Triad)
- 2 Effect of surgery and trauma on coagulation
- 2 Tests for thrombophilia and other disorders of coagulation

Diagnosis:

- 2 Methods of investigation for suspected thromboembolic disease

Treatment:

- 4 Anticoagulation, heparin and warfarin
- 2 Role of V/Q scanning, CT angiography and thrombolysis
- 2 Place of pulmonary embolectomy

Prophylaxis:

- 3 Knowledge of methods of prevention, mechanical and pharmacological

### **Clinical Skills**

Coagulation:

- 4 Recognition of patients at risk

Diagnosis:

- 3 Awareness of symptoms and signs associated with pulmonary embolism and DVT
- 2 Role of duplex scanning, venography and d-dimer measurement

Treatment:

- 3 Initiate and monitor treatment

Prophylaxis:

- 4 Awareness at all times of the importance of prophylaxis

### **Technical Skills**

No content

### **Professional Skills**

Coagulation:

- 0 Protocol management

Diagnosis:

- 0 Ability to organise and time appropriate investigation

Treatment:

0 Prioritisation of investigation and treatment  
0 Patient counselling

Prophylaxis:

0 Able to implement in the team setting the culture of prophylaxis

## **Nutrition**

### **Objective**

*Recognise the need for artificial nutritional support and arrange enteral nutrition.*

### **Knowledge**

3 Effects of malnutrition, both excess and depletion  
3 Methods of screening and assessment

### **Clinical Skills**

3 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Dietary supplements  
2 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Enteral nutrition  
1 Arrange access to suitable artificial nutritional support, preferably via a nutrition team: Parenteral nutrition

### **Technical Skills**

No content

### **Professional Skills**

No content

## **Academic activity**

### **Objective**

*An introduction to research methodology and to teaching others.*

*Research: Ability to perform a simple research study and present the results.*

*Teaching: Ability to teach small groups such as medical students.*

### **Knowledge**

Research:

2 Research methodology

Teaching:

2 Teaching methods

### **Clinical Skills**

Research:

2 Ability to analyse published evidence

Teaching:

3 Ability to teach small groups

**Technical Skills**

No content

**Professional Skills**

No content

**Management of the dying patient**

**Objective**

*Ability to manage the dying patient appropriately.*

*Palliative Care: Good management of the dying patient in consultation with the palliative care team.*

*Principles of organ donation: Knowledge of the principles of organ donation.*

**Knowledge**

Palliative Care:

3 Care of the terminally ill

4 Analgesia

3 Antiemetics

3 Laxatives

Principles of organ donation:

3 Circumstances in which consideration of organ donation is appropriate

3 Principles of brain death

3 Understanding the role of the coroner and the certification of death

**Clinical Skills**

Palliative Care:

3 Symptom control in the terminally ill patient

**Technical Skills**

No content

**Professional Skills**

Palliative Care:

0 Communication with the patient and relatives

0 Liaison with the palliative care team

Principles of organ donation:

0 Communication with relatives

0 Liaison with the transplant team

## **Endocrine and metabolic disorders**

### **Objective**

*To identify, investigate and manage surgical patients with common metabolic disorders*

- *To identify, investigate and manage surgical patients with Thyrotoxicosis*
- *To identify, investigate and manage surgical patients with Hypothyroidism*
- *To identify, investigate and manage surgical patients with Hypercalcaemia*
- *Knowledge of the significance of corticosteroid therapy in patient care*
- *To identify, investigate and manage surgical patients with diabetes mellitus*
- *To identify, investigate and manage surgical patients with Hyponatraemia*

### **Knowledge**

Thyrotoxicosis

4 Pathophysiology of thyroid hormone excess and associated risks from surgery

Hypothyroidism

4 Pathophysiology of thyroid hormone deficiency and associated risks from surgery

Hypercalcaemia

3 Causes and effects of hypercalcaemia

Cortico-steroid therapy

4 Complications

4 Steroid insufficiency

Diabetes Mellitus

4 Complications

Hyponatraemia

4 Pathophysiology of fluid and electrolyte balance

4 Causes of hyponatraemia

### **Clinical Skills**

Thyrotoxicosis

4 History and examination

3 Investigation of thyrotoxicosis

Hypothyroidism

4 History and examination

4 Investigation

Hypercalcaemia

3 Investigation of hypercalcaemia  
3 Treatment of hypercalcaemia

Cortico-steroid therapy

4 Peri-operative management of patients on steroid therapy

Diabetes Mellitus

4 Peri-operative management of diabetic patients

Hyponatraemia

4 Treatment

### **Technical Skills**

No content

### **Professional Skills**

Liaise with endocrinologists

Liaise with diabetic team

## **Child Protection**

### **Objective**

No content

### **Knowledge**

4 Working knowledge of Trust and ACPC Child Protection Procedures

4 Basic understanding of child protection law

4 Understanding of Children's rights

4 Working knowledge of types and categories of child maltreatment, presentations, signs and other features (primarily physical, emotional, sexual, neglect, professional)

4 Understanding of one personal role, responsibilities and appropriate referral patterns in child protection

4 Understanding of the challenges of working in partnership with children and families

### **Clinical Skills**

Ability to:

4 recognise the possibility of abuse or maltreatment

4 recognise limitations of own knowledge and experience and seek appropriate expert advice

4 urgently consult immediate senior in surgery to enable referral to paediatricians

4 keep appropriate written documentation relating to child protection matters

4 Communicate effectively with those involved with child protection, including children and their families

### **Technical Skills**

No content

### **Professional Skills**

No content

## Basic Clinical Neurosurgery ST2 & ST3

### Cranial Trauma

#### General management of the head injured patient

##### Objective

*To achieve competence in the general management of head-injured patients*

##### Knowledge

4 Pathophysiology of head injury and of multiple trauma including an understanding of:

- Cerebral perfusion and oxygenation
- Raised intracranial pressure
- Impaired intracranial compliance
- Intracranial herniation

4 Medical management of acutely raised intracranial pressure

4 Indications for operation intervention including the use of pressure monitoring

4 Principles, diagnosis and confirmation of brain death

4 Principles of intensive care of head injured patients

4 Principles of spinal stabilisation and radiological assessment in head injured patients

3 Natural history of recovery from head injury including neurological, cognitive and behavioural disability and post- traumatic epilepsy

2 Role of neurological rehabilitation

##### Clinical Skills

4 Clinical assessment of the multiply-injured patient.

4 Neurological assessment of the head-injured patient including:

- Assessment and categorisation of impaired consciousness
- Recognition and interpretation of focal neurological deficits

4 Prioritisation of clinical risk

3 Interpretation of CT scans and plain radiology

##### Technical Skills

No procedures specified

##### Professional Skills

Generic skills - in particular:

Accurate documentation

Ability to communicate effectively and concisely with medical and nursing staff

#### Insertion of ICP monitor

##### Objective

*To achieve competence in the insertion of subdural and intraparenchymal ICP monitors*

##### Knowledge

4 Indications for ICP monitoring

- 4 Applied anatomy of the skull vault
- 4 Calibration, zeroing and interpretation of ICP traces
- 4 Potential complications of the procedure

**Clinical Skills**

Non specified

**Technical Skills**

- 4 Insertion of frontal subdural and intraparenchymal ICP monitors using a standard frontal burr hole and/or twist drill craniostomy.

**Professional Skills**

Generic

**Burr hole evacuation of chronic subdural haematoma**

**Objective**

*To achieve competence in burr hole evacuation of chronic subdural haematomas*

**Knowledge**

- 4 Pathophysiology of chronic subdural haematomas
- 4 Applied anatomy of the skull vault and subdural space
- 4 Indications for surgery
- 4 Surgical options
- 4 Complications of surgery
- 4 Management of anti-platelet and anti-coagulant medication

**Clinical Skills**

- 4 Neurological assessment of patients with a CSDH
- 3 Interpretation of CT scans
- 4 Obtaining informed consent
- 4 Post-operative assessment and management

**Technical Skills**

- 3 Performance of single and multiple frontal and parietal burrhole evacuation of CSDHs

**Professional Skills**

Generic

**Management of soft tissue trauma**

**Objective**

*To achieve competence in the management of cranial soft tissue trauma*

**Knowledge**

- 4 Anatomy and blood supply of the scalp
- 4 Indications for primary and secondary closure of wounds
- 4 Indications for antibiotic prophylaxis

**Clinical Skills**

- 4 Assessment of tissue perfusion and viability

**Technical Skills**

- 4 Wound exploration under local and general anaesthesia
- 3 Wound debridement
- 4 Arrest of scalp haemorrhage

4 Layered closure of the scalp without tension

3 Suturing technique

4 Wound drainage and head bandaging

**Professional Skills**

Generic

## Spontaneous Intracranial Haemorrhage

### General management of subarachnoid haemorrhage

#### Objective

*To achieve competence in the general management of subarachnoid haemorrhage (SAH)*

#### Knowledge

- 4 Aetiology of SAH
- 4 Pathophysiology of SAH
- 4 WFNS grading of SAH
- 4 Principles of resuscitation and timing of interventions.
- 4 Indications for CT scanning, diagnostic lumbar puncture, CT angiography and digital subtraction angiography.
- 4 Principles of management of post-haemorrhagic hydrocephalus
- 4 Indications for endovascular and surgical intervention

#### Clinical Skills

- 3 Interpretation of CT scans including assessment of intracranial blood load, haematomas and hydrocephalus
- 3 Basic interpretation of cerebral angiography

#### Technical Skills

- 4 Lumbar puncture

#### Professional Skills

Generic

### Diagnostic lumbar puncture

#### Objective

*To understand the indications for diagnostic lumbar puncture  
To undertake an atraumatic lumbar puncture*

#### Knowledge

- 4 Indications for diagnostic lumbar puncture
- 4 Interpretation of basic microscopy and biochemistry
- 3 Principles of spectrophotometry

#### Clinical Skills

None specified

#### Technical Skills

- 4 Lumbar puncture

#### Professional Skills

Generic

### Management of delayed secondary ischaemia

#### Objective

*To recognise and manage delayed cerebral ischaemia following subarachnoid haemorrhage*

#### Knowledge

- 4 Pathophysiology of delayed cerebral ischaemia including the impact of secondary insults
- 4 Principles governing the augmentation of cerebral blood flow

**Clinical Skills**

- 4 Assessment of a deteriorating patient
- 4 Recognition and management of secondary insults
- 4 Interpretation of CT scans
- 3 Management of hypervolaemic hypertension

**Technical Skills**

- 3 Insertion of central venous catheter
- 3 Insertion of lumbar drain
- 3 Insertion of external ventricular drain

**Professional Skills**

Generic

**Management of post-haemorrhagic hydrocephalus****Objective**

*To achieve competence in the management of post-haemorrhagic hydrocephalus*

**Knowledge**

- 4 Pathophysiology of hydrocephalus
- 4 Indications for external ventricular drainage and lumbar subarachnoid drainage
- 4 Applied anatomy of the skull vault, subdural space and ventricular system
- 4 Complications of surgery

**Clinical Skills**

- 4 Assessment of the unconscious and deteriorating SAH patient
- 3 Interpretation of CT scans

**Technical Skills**

- 4 Insertion of lumbar drain
- 3 Insertion of external ventricular drain

**Professional Skills**

Generic

## Hydrocephalus

### Adult hydrocephalus

#### Objective

*The management of hydrocephalus complicating intracranial haemorrhage, head injury and intracranial space occupying lesions; insertion and taping of CSF reservoirs; insertion and maintenance of lumbar and ventricular drains*

#### Knowledge

The pathophysiology of CSF circulation

Applied surgical anatomy of the ventricular system

Indications for external ventricular drainage, ventriculoperitoneal shunting, lumbar CSF drainage and shunting, ventriculo-cisternostomy

Complications of surgery

#### Clinical Skills

None

#### Technical Skills

3 Insertion of ventricular drain/access device

2 Insertion of VP shunt

1 Revision of VP shunt

#### Professional Skills

None

## Intracranial tumours

### Assessment and perioperative management of patients with space-occupying intracranial tumours

#### Objective

*To achieve competence in the assessment and peri-operative management of patients with intracranial tumours*

#### Knowledge

3 The neuropathology of primary and secondary intracranial tumours including:

- classification
- epidemiology
- natural history

4 Clinical presentations of intracranial tumours

4 Indications for neuroimaging

4 Management of raised intracranial pressure

3 Principles of operative management

4 Detection and management of post-operative complications

#### Clinical Skills

4 Neurological history taking and examination

4 Basic interpretation of CT and MRI scans

#### Technical Skills

None specified

#### Professional Skills

Generic skills - in particular:

Case presentations to neuro-oncology MDTs

Communication with patients and careers

### Image-guided biopsy of intracranial tumour

#### Objective

*To undertake image-guided biopsy of an intracranial tumour under supervision*

#### Knowledge

4 Indications for biopsy of intracranial tumours

4 Risks of biopsy

4 Principles of image-guided surgery

#### Clinical Skills

3 Interpretation of CT and MRI scans and selection of biopsy targets

#### Technical Skills

3 Image-guided frameless and/or frame-based stereotactic biopsy including:

- Setting up a computer workstation and importing and interrogating image data
- Positioning the patient and applying a cranial fixator
- Obtaining and confirming accurate patient registration
- Positioning and performing a suitable burr hole
- Passage of biopsy probe and biopsy
- Preparation of smear histology (when available)

**Professional Skills**

Generic skills

Obtaining informed consent

## Acute Spinal Disorders

### Acute Spinal Disorders

#### Objective

*The assessment and peri-operative management of patients presenting with spinal cord, cauda equina and spinal root compression; the management of spinal shock; the ward management of patients with spinal instability; the detection and initial management of postoperative complications including compressing haematomas, CSF fistula and spinal sepsis*

#### Knowledge

None

#### Clinical Skills

None

#### Technical Skills

None

#### Professional Skills

None

## 3. Intermediate Stage

### Four point scales

What the 4 point scale means for Knowledge

1. Knows of
2. Knows basic concepts
3. Knows generally
4. Knows both specifically and broadly

What the 4 point scale means for **Clinical Skills** and **Technical Skills and Procedures**

1. Has observed
2. Can do with assistance
3. Can do whole but may need assistance
4. Competent to do whole without assistance, including managing complications

## 3.1 Overview

### Intermediate Training Stage ST4 – ST5

During the intermediate stage trainees will consolidate the theoretical knowledge and clinical skills gained during the initial training stage. They will develop their surgical judgement, decision making and operative competencies in the following conditions:

- **Cranial trauma:** including the general management of the head injured patient; surgical management of cranial trauma; neuro-intensive care of the head-injured patient; the role of post-traumatic neurological rehabilitation
- **Intracranial haemorrhage:** including the operative management of space-occupying spontaneous intracerebral haematomas; surgical aspects of the multi-disciplinary management of aneurysmal subarachnoid haemorrhage SAH
- **Hydrocephalus:** including the assessment and operative management of adult patients with communicating and non communicating hydrocephalus; the assessment of children with hydrocephalus; emergency external ventricular drainage in children with acute hydrocephalus
- **Neuro-oncology:** including the multi-disciplinary management of patients with intracranial neoplasia; image-guided surgery applied to the management of patients with intracranial tumours; the operative management of supra-tentorial intrinsic tumours; the operative management of convexity meningiomas
- **CNS sepsis:** including the general management of CNS infections e.g. ventriculitis, cerebral abscess, subdural empyema and spinal epidural abscess; the operative management of cerebral abscess by burr hole aspiration
- **Spinal trauma:** all aspects of the non-operative management of spinal injury patients
- **Spinal oncology:** including the general management of patients with malignant spinal cord compression and basic surgical management of patients with malignant spinal cord compression
- **Degenerative spinal disorders:** including the surgical management of lumbar compressive radiculopathies by lumbar microdiscectomy and associated microsurgical decompressions; the surgical management of compressive cervical myeloradiculopathies

By the end of the intermediate stage trainees will have acquired the necessary clinical and operative skills with sufficient experience to manage without direct supervision a range of adult emergency conditions together with selected, life saving emergency intervention in children. They will be competent to undertake all the common surgical

approaches and to perform selected microsurgical procedures included in the Operative Competency Schedule.

## 3.2 Conditions

### Cranial Surgery

#### Cranial Trauma

##### **General management of the head injured patient**

###### **Objective**

*To achieve competence in all aspects of the general management of head-injured patients*

###### **Knowledge**

- 4 Pathophysiology of head injury and of multiple trauma
- 4 Prevention of secondary insults
- 4 Indications for operative intervention
- 4 Medical management of acutely raised intracranial pressure

###### **Clinical Skills**

- 4 Clinical assessment of the head-injured and multiply-injured patient
- 4 Prioritisation of clinical risk
- 4 Interpretation of CT scans and plain radiology
- 4 Interpretation of multi-modality cerebral monitoring
- 4 Ability to assess and advise on the transfer of head-injured patient using image-transfer and telemedicine

###### **Technical Skills**

None specified

###### **Professional Skills**

- Generic skills
- Communication with referring specialists
- Decision making under pressure

##### **Surgical management of cranial trauma**

###### **Objective**

*To achieve competence in the operative management of head-injured patients*

###### **Knowledge**

- 4 Pathophysiology of raised intracranial pressure and space occupying haematomas
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Indications for surgery and appropriate surgical approaches

###### **Clinical Skills**

- 4 Assessment of the head-injured patient
- 4 Interpretation of trauma CT scans

###### **Technical Skills**

- 3 Craniotomy for supratentorial traumatic haematoma, in particular:
- 3 Planning and siting of craniotomies for evacuation of extradural and subdural haematomas
- 3 Handling the "tight" brain

- 3 Achieving haemostasis in the coagulopathic patient
- 3 Achieving haemostasis from the skull base and venous sinuses
- 3 Elevation of compound depressed skull fracture with dural repair
- 3 Delayed cranioplasty of skull vault

**Professional Skills**

Generic skills - in particular:

Multidisciplinary working with medical and paramedical colleagues

Communication with relatives and carers

Working effectively and quickly under pressure

**Neuro-intensive care of the head-injured patient**

**Objective**

*To achieve competence in the neurointensive care of head-injured patients*

**Knowledge**

4 Pathophysiology of head injury

4 The management of raised intracranial pressure, impaired intracranial compliance, and cerebral ischaemia

4 Prevention and management of secondary insults

**Clinical Skills**

4 Assessment of the unconscious patient

4 Use and interpretation of multimodality monitoring

4 Interpretation of CT scans

4 Ability to advise on management of secondary complications and further surgical intervention

**Technical Skills**

None specified

**Professional Skills**

Generic skills - in particular:

Ability to contribute to the multi-disciplinary intensive care of head-injured patients

**Neurological rehabilitation**

**Objective**

*To understand the role of post-traumatic neurological rehabilitation*

**Knowledge**

4 The natural history of recovery from head injury

4 Understanding of neurological, cognitive and behavioural disabilities following mild and severe head injury

4 Risks of post-traumatic epilepsy and its management

**Clinical Skills**

4 Ability to contribute to the multi-disciplinary assessment of head injured patients

4 Ability to advise family and carers regarding prognosis, professional and lay support

**Technical Skills**

None specified

**Professional Skills**

Generic skills

## Intracranial Haemorrhage

### Primary intracerebral haematomas

#### Objective

*To achieve competence in the operative management of space-occupying spontaneous intracerebral haematomas*

#### Knowledge

- 4 Aetiology of supra and infratentorial intracerebral haemorrhage
- 4 Pathophysiology of spontaneous intracerebral haemorrhage
- 4 Indications for surgical evacuation
- 4 Management strategies to reduce the risk of intra-operative re-bleeding in presence of suspected aneurysm or AVM including partial haematoma evacuation, pre or post-operative embolisation and definitive surgical treatment

#### Clinical Skills

- 4 Assessment of patients with intracerebral haematomas and raised intracranial pressure
- 4 Interpretation of CT and MRI scans and identification of probable aetiology
- 4 Indications for pre-operative CT angiography, MRA and digital subtraction angiography

#### Technical Skills

- 3 Craniotomy for supratentorial haematoma including:
- 3 Planning and siting of craniotomies
- 3 Use of ventricular drainage
- 3 Intracerebral haemostasis in the coagulopathic patient

#### Professional Skills

Generic skills

### Aneurysmal subarachnoid haemorrhage

#### Objective

*To achieve competence in the surgical aspects of the multi-disciplinary management of aneurysmal subarachnoid haemorrhage SAH*

#### Knowledge

- 4 Pathophysiology of SAH
- 4 Prevention and management of delayed cerebral ischaemia, cerebral vasospasm and hydrocephalus
- 4 Relative indications for endovascular and surgical interventions

#### Clinical Skills

- 4 Clinical assessment of patients with aneurysmal SAH
- 4 Non operative management of patients undergoing endovascular coiling
- 4 Management of delayed cerebral ischaemia

#### Technical Skills

- 4 External ventricular drainage
- 4 Lumbar subarachnoid drainage

4 Ventriculoperitoneal shunting

**Professional Skills**

Generic skills

## Hydrocephalus

### Adult hydrocephalus

#### Objective

*To achieve competence the assessment and operative management of adult patients with communicating and non communicating hydrocephalus.*

#### Knowledge

- 4 The pathophysiology of CSF circulation
- 4 Applied surgical anatomy of the ventricular system
- 4 Indications for external ventricular drainage, ventriculoperitoneal shunting, lumbar CSF drainage and shunting, ventriculo-cisternostomy
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with hydrocephalus, including interpretation of CT and MRI scans and identification of shunt malfunction

#### Technical Skills

- 4 Lumbar subarachnoid drainage
- 4 External ventricular drainage
- 3 Primary ventriculoperitoneal shunt
- 3 Revision of ventriculoperitoneal shunt
- 2 Lumbo-peritonooneal shunt

#### Professional Skills

Generic

### Paediatric hydrocephalus

#### Objective

*To achieve competence in the assessment of children with hydrocephalus. To undertake emergency external ventricular drainage in children with acute hydrocephalus*

#### Knowledge

- 4 The pathophysiology of CSF circulation
- 4 Applied surgical anatomy of the ventricular system
- 4 Indications for external ventricular drainage

#### Clinical Skills

- 4 Assessment of the ill child with hydrocephalus, impaired consciousness and sepsis
- 4 Differential diagnosis of shunt malfunction
- 4 Interpretation of CT scans in shunted children

#### Technical Skills

- 4 Taping and draining from an Ommaya reservoir
- 4 Taping a shunt
- 3 External ventricular drainage

#### Professional Skills

Generic

## Neuro-oncology

### General principles of neuro-oncology

#### Objective

*To achieve competence in the multi-disciplinary management of patients with intracranial neoplasia*

#### Knowledge

- 4 Classification, natural history and pathology of benign and malignant intracranial neoplasia
- 4 Pathophysiology of raised intracranial pressure associated with space occupying tumours
- 4 Diagnostic imaging of intracranial tumours including the interpretation of CT and MRI scans and the role of MRS
- 4 Principles of fractionated radiotherapy, stereotactic radiotherapy and radiosurgery
- 4 Role of adjuvant chemotherapy
- 4 Principles of clinical trials and their application to neuro-oncology
- 4 Principles of palliative care

#### Clinical Skills

- 4 Clinical assessment of patients with raised intracranial pressure and space occupying lesions
- 4 Ability to contribute to the multi-disciplinary management of patients with intracranial neoplasia
- 4 Empathetic communication with patients and families

#### Technical Skills

None specified

#### Professional Skills

Generic

### Principles of image-guided surgery

#### Objective

*To achieve competence in image-guided surgery applied to the management of patients with intracranial tumours*

#### Knowledge

- 4 An understanding of the principles and practice of frameless image-guided surgery and the principles of frame-based stereotactic surgery

#### Clinical Skills

- 4 Interpretation of CT and MRI scans

#### Technical Skills

- 3 Image-guided biopsy of supratentorial intrinsic tumour
- 3 Ability to import, check and interrogate image data sets on a standard work station
- 3 Setting up an image-guidance system and obtaining satisfactory intra-operative registration
- 3 Planning and siting burr holes and craniotomy flaps using image-guidance
- 3 Identification of an intra-cranial tumour and its margins using image-guidance

## **Professional Skills**

Generic

### **Supra-tentorial intrinsic tumours**

#### **Objective**

*To achieve competence in the operative management of supra-tentorial intrinsic tumours*

#### **Knowledge**

- 4 Indications for surgery
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### **Clinical Skills**

- 4 The assessment, counselling and pre-operative preparation of patients with supratentorial intrinsic tumours

#### **Technical Skills**

- 3 Craniotomy for superficial, lobar supratentorial intrinsic tumour

In particular:

- 3 safe patient positioning
- 3 planning and siting of craniotomy with and without image-guidance
- 3 intra-operative management of raised ICP
- 3 appropriate exposure of the tumour, using operating microscope as necessary
- 3 safe use of fixed retractors
- 3 precise use of suction, electo-coagulation and ultrasonic aspiration
- 3 intracranial haemostasis

#### **Professional Skills**

Generic

### **Convexity meningioma**

#### **Objective**

*To achieve competence in the operative management of a convexity meningiomas*

#### **Knowledge**

- 4 Indications for surgery
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### **Clinical Skills**

- 4 The assessment, counselling and pre-operative preparation of patients with convexity meningiomas

#### **Technical Skills**

Resection of a convexity meningioma, in particular:

- 3 safe patient positioning
- 3 planning and siting of craniotomy with and without image-guidance
- 3 intra-operative management of raised ICP
- 3 appropriate exposure of the tumour
- 3 precise use of suction, electo-coagulation and ultrasonic aspiration

3 use of internal tumour decompression  
3 dissection in the subarachnoid plane using the operating microscope  
as necessary  
3 intracranial haemostasis  
3 use of duraplasty and cranioplasty

**Professional Skills**

Generic

## CNS Sepsis

### General microbiological principles

#### Objective

*To achieve competence in the general management of CNS infections including ventriculitis, cerebral abscess, subdural empyema and spinal epidural abscess*

#### Knowledge

- 4 The pathophysiology of intracranial and spinal sepsis
- 4 Principles of anti-microbial chemotherapy
- 4 Indications for operative intervention

#### Clinical Skills

- 4 Clinical assessment of patients with CNS infections
- 4 Interpretation of CT and MRI scans

#### Technical Skills

None specified

#### Professional Skills

Generic

### Management of intracerebral abscess

#### Objective

*To achieve competence in the operative management of cerebral abscess using burr hole aspiration*

#### Knowledge

- 4 Indications for surgery
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with a cerebral abscess

#### Technical Skills

- 4 Burr hole aspiration of a cerebral abscess with and without image-guidance

#### Professional Skills

Generic

# Spinal Surgery

## Spinal Trauma

### Management of the spinal injury patient

#### Objective

*To achieve competence in all aspects of the non-operative management of spinal injury patients.*

#### Knowledge

- 4 Pathophysiology of spinal cord injury
- 4 Classification of spinal fracture dislocations
- 4 Biomechanics of spinal instability
- 4 Indications for halo traction and external stabilisation
- 4 Indications for and principles of open reduction and stabilisation

#### Clinical Skills

- 4 Clinical assessment of the spinal injury patient
- 4 Management of spinal shock
- 4 Interpretation of plain radiology, CT and MRI scans
- 4 Liaison with spinal injury units

#### Technical Skills

- 4 Use of external mobilisation including cervical collars and spinal boards
- 3 Application of halo traction
- 3 Application of a halo-body jacket

#### Professional Skills

Generic

## Spinal Oncology

### **Malignant spinal cord compression**

#### **Objective**

*To achieve competence in the general management of patients with malignant spinal cord compression.*

#### **Knowledge**

- 4 The pathophysiology of spinal cord compression
- 4 The classification, aetiology and natural history of vertebral metastases
- 4 Spinal instability associated with vertebral malignancy
- 4 Indications for surgical intervention
- 4 Role of primary radiotherapy and adjuvant radiotherapy or chemotherapy

#### **Clinical Skills**

- 4 Clinical assessment of patients with malignant spinal cord compression
- 4 Interpretation of plain radiology, CT and MRI scans
- 4 Liaison with medical oncologists and radiotherapist

#### **Technical Skills**

None specified

#### **Professional Skills**

Generic

### **Surgical management of thoraco-lumbar metastases**

#### **Objective**

*To achieve competence in the basic surgical management of patients with malignant spinal cord compression*

#### **Knowledge**

- 4 Indications for surgery
- 4 The principles of operative spinal decompression and stabilisation of patients with spinal cord metastases.
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### **Clinical Skills**

- 4 The assessment, counselling and pre-operative preparation of patients with malignant spinal cord compression

#### **Technical Skills**

- 3 Extradural spinal biopsy and decompression by laminectomy in selected patients without segmental instability

#### **Professional Skills**

Generic

## Degenerative Spinal Disorders

### Lumbar radiculopathies

#### Objective

*To achieve competence in the surgical management of lumbar compressive radiculopathies by lumbar microdiscectomies and associated microsurgical decompressions.*

#### Knowledge

- 4. Indications for operative management of lumbar radiculopathies
- 4. Applied surgical anatomy of the lumbar spine with particular reference to degenerative neural compression and morphological variations in vertebral anatomy
- 4. Selection of minimally-invasive approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with lumbar radiculopathies
- 4 Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms

#### Technical Skills

- 3 Primary lumbar microdiscectomy
- 3 Primary posterior decompression (laminotomy, hemilaminectomy etc): including
  - Identification of spinal level by pre and intra-operative fluoroscopy
  - Achieving safe access to the spinal canal by micro-surgical fenestration
  - Achieving full decompression of the spinal canal, lateral recess and foramen by appropriate bone and soft tissue resection
  - Protection and safe retraction of neural tissues

#### Professional Skills

Generic

### Compressive cervical myeloradiculopathies

#### Objective

*To achieve competence in the surgical management of compressive cervical myeloradiculopathies*

#### Knowledge

- 4. Indications for operative management of cervical myeloradiculopathies
- 4. Applied surgical anatomy of the cervical spinal column with particular reference to the relationships between the bony elements, spinal cord, nerve roots and vertebral arteries
- 4. Selection of surgical approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of

patients with cervical myeloradiculopathies

4 Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms

**Technical Skills**

3 Single level anterior cervical discectomy with and without fusion

In particular:

3 Standard anterolateral approach to the cervical spine

3 Use of fluoroscopy or plain radiographs to confirm spinal level

3 Radical and subtotal excision of the cervical disc, PLL, central and unco-vertebral osteophytes

3 Protection and full decompression of the spinal cord and spinal nerve roots

3 Interbody fusion using autologous bone with or without interbody cages

**Professional Skills**

Generic

## 4. Final Stage

### Four point scales

What the 4 point scale means for Knowledge

1. Knows of
2. Knows basic concepts
3. Knows generally
4. Knows both specifically and broadly

What the 4 point scale means for **Clinical Skills** and **Technical Skills and Procedures**

1. Has observed
2. Can do with assistance
3. Can do whole but may need assistance
4. Competent to do whole without assistance, including managing complications

## 4.1 Overview

### Final Stage ST6 – ST8

The final stage syllabus is not intended to be a comprehensive training guide. Due to the nature of neurosurgical practice there will be conditions and procedures that are not individually specified in the syllabus and that will form part of a trainee's experience. This clinical and operative experience will be taken into account when assessing the overall quality of advanced training.

However, by the time that trainees apply for special interest training or to take the FRCS (Neurosurgery) they must be competent in all aspects of the clinical management of patients presenting with the following essential conditions:

- Cranial trauma
- Spontaneous intracranial haemorrhage
- Hydrocephalus
- Intracranial tumours
- CNS infections
- Spinal trauma
- Benign intradural tumours
- Malignant spinal cord compression
- Degenerative spinal disorders
- Emergency paediatric care

They must be competent to undertake the full range of operative procedures specified in the final training stage of the essential operative competency schedule (Table 1) without supervision and have sufficient operative experience to be able to manage operative difficulties and complications (Competence level 4).

### Special Interest Training

To ensure the quality of emergency and continuing care of neurosurgical patients with appropriate liaison and cross referral all trainees are expected to have a basic understanding of the specialist areas of neurosurgical practice. During final stage training all trainees will undertake selected specialist operative procedures under direct supervision to consolidate their advanced operative skills.

Trainees in special interest training will develop a comprehensive and in-depth knowledge of their field. By the end of specialist interest training they will be competent to undertake selected operative procedures relating to the common presentations in their specialist field without direct supervision. They will be competent to undertake other procedures in their field under the mentorship of a senior

colleague. The specialist interest summaries indicate the breath and depth of training required in a specialist interest fellowship

### **Paediatric neurosurgery**

All trainees will undertake a six month placement in a paediatric neurosurgery service under the direct supervision of paediatric neurosurgeons with a full-time or major commitment to paediatric surgery. The service must provide a comprehensive range of paediatric neurosurgical care (with the exception of supra-regional services) and have a minimum annual operative workload of 250 cases.

On completion of general paediatric training trainees will be competent to assess and undertake the emergency neurosurgical management of the critically-ill child with raised intracranial pressure.

On completion of a special interest fellowship in paediatric neurosurgery trainees will be competent in all aspects of the non-operative neurosurgical management of children presenting with disorders of the nervous system. They will have detailed knowledge of the statutory framework governing the care of children, paediatric neurointensive care, the principles of paediatric neurorehabilitation and of the management of non-accidental injury. They will be competent to undertake all aspects of the emergency neurosurgical operative care of children and to undertake a range of elective procedures in the following fields with appropriate supervision:

- **Hydrocephalus:** including the insertion and revision of ventriculo-peritoneal, ventriculo-atrial and lumbo-peritoneal shunts; endoscopic third ventriculostomy; image-guided placement of ventricular catheters; management of neonatal post-haemorrhagic hydrocephalus
- **Paediatric neuro-oncology:** including stereotactic and image-guided biopsy of paediatric tumours; endoscopic biopsy of third ventricular tumours; resection of supratentorial and infratentorial intrinsic tumours; approaches to suprasellar, third ventricular and pineal tumours; management of spinal cord tumours
- **Paediatric head injury:** including decompressive craniectomy; cranioplasty; management of growing fractures; craniofacial reconstruction; management of CSF fistulae
- **Spinal dysraphism:** including the management of neonatal spina bifida, meningoceles and encephaloceles; spinal cord tethering syndromes
- **Congenital and acquired spinal deformity:** including the management of syndromic spinal deformity and post-operative spinal deformity
- **Craniofacial disorders:** including the management of simple craniosynostosis, syndromic craniosynostosis, post-traumatic deformity

## Neuro-oncology

All trainees will be competent to manage patients with high grade intrinsic tumours, metastases and convexity meningiomas. Trainees with a special interest in neuro-oncology will participate fully in the multidisciplinary management of neuro-oncology patients and will be familiar with current developments in molecular neuro-oncology, emerging surgical techniques and the ethical, regulatory and practical considerations governing clinical trials in neuro-oncology. They will develop additional expertise as follows:

- **Advanced surgical techniques:** including awake craniotomy; stereotactic craniotomy, intraoperative neurophysiological monitoring; advanced image guidance with integration of functional data; intraoperative imaging techniques; the use of intraoperative chemotherapy wafers; third ventriculostomy
- **Low-grade intrinsic tumours:** the management of low grade intrinsic tumours using advanced techniques; optimal resection of lobar low grade intrinsic tumours
- **Tumours of the ventricular system and pineal:** including surgical approaches to the third ventricle and pineal; transfrontal transventricular excision of intraventricular tumours and cysts; transcallosal transventricular excision of lesions of the third ventricle and foramen of Munro
- **Brainstem tumours:** including the management options for intrinsic brainstem tumours; stereotactic biopsy of accessible lesions
- **Radiosurgery and stereotactic radiotherapy:** including the principles of radiosurgery and stereotactic radiotherapy and the indications for their use as adjunctive and/or primary treatment modalities.

## Functional neurosurgery

Trainees with a special interest in functional neurosurgery will develop additional expertise as follows:

- **Surgical management of pain:** including the implantation of spinal cord stimulators; the insertion of intrathecal drug delivery systems; knowledge of ablative surgical treatment for pain including DREZ lesioning, cordotomy and myelotomy and of neuromodulatory techniques including peripheral nerve, motor cortex and deep brain stimulation.
- **Neurovascular compression syndromes:** including microvascular decompression of the trigeminal nerve; microvascular decompression of the facial nerve; percutaneous trigeminal rhizotomy
- **Spasticity:** including an in-depth understanding of medical and surgical treatments for spasticity; implantation of intrathecal

drug delivery systems; knowledge of other surgical treatments for spasticity including phenol blocks, neurectomies and rhizotomy.

- **Epilepsy:** including the multidisciplinary assessment and preparation of patients for epilepsy surgery; stereotactic placement of depth electrodes and placement of subdural electrode grids; temporal lobectomy; selective amygdalohippocampectomy; callosotomy; insertion of vagal nerve stimulators; hemispherectomy; multiple subpial transections
- **Movement disorders:** including the multidisciplinary assessment and selection of patients with movement disorders e.g. Parkinson's disease and dystonia; selection, targeting and placement of deep brain stimulation electrodes; management of neuro-stimulators; radiofrequency lesioning

### **Neurovascular surgery**

Special interest training will take place in units with extensive experience in the multi-disciplinary management of all common intracranial vascular disorders. These units should manage a minimum of 120 aneurysmal subarachnoid haemorrhages a year. Trainees with a special interest in neurovascular surgery will develop additional expertise in:

- **Intracranial aneurysms:** including surgical and endovascular strategies for the management of ruptured and unruptured intracranial aneurysms; surgical treatment of ruptured aneurysms of the anterior circulation; principles of microvascular reconstruction and bypass for complex aneurysms
- **Intracranial vascular malformations:** including surgical, endovascular and radiosurgical strategies for the management of arteriovenous malformations; surgical treatment of superficial cortical arteriovenous malformations, surgical and endovascular treatment of dural arteriovenous fistulae, image-guided resection of cavernomas
- **Other vascular disorders:** including the management of primary intracerebral haematomas; the management of venous occlusive disorders
- **Acute and chronic cerebral ischaemia:** including the medical, surgical and endovascular management of extracranial arterial occlusive disease

### **Skull-base surgery**

Special interest training in skull base surgery will take place in units with extensive multi-disciplinary experience in the management of all common skull-base disorders. Trainees with a special interest in skull-base surgery will develop additional expertise as follows:

- **Skull-base and craniofacial surgical access:** including standard variations of fronto-basal, fronto-orbital, trans-zygomatic, infratemporal, transtemporal, far-lateral, transphenoidal and transmaxillary approaches
- **Cranial base meningiomas:** including resection of anterior fossa (olfactory groove and suprasellar) meningiomas; tentorial and petrous temporal meningiomas; petroclival meningiomas
- **Pituitary and sellar tumours:** including microsurgical and endoscopic transphenoidal resection of pituitary tumours; pterional, subfrontal, interhemispheric and transventricular approaches to suprasellar tumours
- **Acoustic neuromas:** including retrosigmoid, translabyrinthine and middle fossa resection of acoustic neuromas
- **Other skull-base tumours:** including the management of other cranial nerve schwannomas, glomus tumours and malignant primary and secondary tumours of the skull-base
- **Management of cranio-facial trauma:** including multi-disciplinary management of fronto-orbital disruption
- **Repair of CSF fistulae:** including the management of post-operative CSF fistulae; indications for endoscopic repair of basal CSF fistula; techniques for open repair and skull-base reconstruction

## Spinal surgery

On completion of a special interest fellowship in spinal surgery trainees will be competent in all aspects of the emergency and urgent operative care of patients with spinal disorders. They will develop additional expertise as follows:

- **Spinal trauma:** including reduction and internal stabilisation of atlanto-axial, sub-axial and thoraco-lumbar fractures and dislocations
- **Metastatic disease of the spine:** including posterior decompression and stabilisation using pedicle screw, hook and sub-laminar wire constructs; corporectomy and instrumented reconstruction of the anterior column
- **Primary tumours of the spine:** including techniques for local ablation of benign lesions and en bloc resections of malignant tumours
- **Intradural tumours:** including the radical resection of intradural, extra-medullary tumours; biopsy and optimal resection of intramedullary tumours
- **Syringomyelia and hind brain anomalies:** including foramen magnum decompression, syringostomy, syringopleural shunting, detethering and duroplasty
- **Advanced surgery of the ageing and degenerative spine:** including the management of osteoporotic collapse, vertebroplasty, kyphoplasty; stabilisation of the osteoporotic

spine; operative management degenerative spondylolisthesis and scoliosis

- **The rheumatoid and ankylosed spine:** including the management of atlanto-axial subluxation; cranial settling and odontoid migration; sub-axial degeneration; cervico-dorsal kyphosis
- **Spinal deformity:** including the multidisciplinary management of patients with spinal dysraphism, diastematomyelia etc

**Table1. Schedule of Essential Operative Competencies**

This table summarises the level of operative competence which should be attained at each stage of training using the four point scale: 1 – has observed; 2 – can do with assistance; 3 – can do whole but may need assistance; 4 – competent to do whole without assistance and manage complications.

	Initial	Intermediate	Final
<b>• Surgical Approaches</b>			
• Burr hole	3	4	4
• Craniotomy – convexity	2	3	4
• Craniotomy – pterional	1	3	4
• Craniotomy – midline supratentorial	1	3	4
• Craniotomy – midline posterior fossa	2	3	4
• Transsphenoidal approach	1	2	4
• Lateral posterior fossa	1	2	4
• Lumbar fenestration	2	4	4
• Laminectomy	2	3	4
<b>• General Procedures</b>			
• Insertion of lumbar drain	3	4	4
• Tapping/draining of CSF reservoir	3	4	4
• Application of skull traction	2	4	4
• Image Guidance/Stereotaxy set up	2	4	4
<b>• Management of cranial trauma</b>			
• Insertion of Intracranial (ICP) monitor	3	4	4
• Burr hole evacuation of CSDH	3	4	4
• Elevation of depressed skull fracture	2	4	4
• Craniotomy for traumatic haematoma (ICH)	2	3	4
<b>• Management of spontaneous intracranial haemorrhage</b>			
• Craniotomy for spontaneous intracerebral haematoma (ICH)	1	3	4

supratentorial)			
• Craniotomy for spontaneous intracerebellar haematoma (ICH infratentorial)	1	3	4
• <b>Management of hydrocephalus</b>			
• Insertion of ventricular drain/access device	3	4	4
• Insertion of VP shunt	2	3	4
• Revision of VP shunt	1	2	4
• <b>Management of intracranial tumours</b>			
• Supratentorial tumour biopsy	2	3	4
• Craniotomy for supratentorial intrinsic tumour/metastasis	1	3	4
• Craniotomy for posterior fossa intrinsic tumour/metastasis	1	2	4
• Craniotomy for convexity meningioma	1	3	4
• <b>Management of intradural spinal tumours</b>			
• Excision of intradural extramedullary tumour	1	2	4
• <b>Management of degenerative spinal disorders</b>			
• Lumbar microdiscectomy	1	3	4
• Anterior cervical discectomy	1	3	4
• <b>Emergency paediatric care</b>			
• Insertion of EVD	1	2	4
• Evacuation of intracranial haematoma (ICH)	1	2	4

## 4.2 Conditions

### Cranial Surgery

#### Cranial Trauma

##### **Management of head injured patients**

##### **Objective**

*To achieve competence in all aspects of the advanced operative management of head-injured patients*

##### **Knowledge**

- 4 Pathophysiology of raised intracranial pressure and space occupying haematomas
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Indications for surgery and appropriate surgical approaches
- 4 Indications for open and endoscopic closure of traumatic CSF fistulae
- 4 Complications of surgery and their management

##### **Clinical Skills**

- 4 Competence in all aspects of peri-operative management of head-injured patients
- 4 Ability to diagnose and confirm brain death

##### **Technical Skills**

- 4 Craniotomy for supra and infratentorial extradural, subdural and intracerebral haematomas
- 4 Lobectomy for haemorrhagic contusion
- 4 Vault cranioplasty using in-situ or preformed prostheses
- 3 Decompressive bifrontal craniotomy with extensive durotomy
- 3 Subfrontal extradural or subdural repair of anterior fossa fractures
- 3 Combined craniofacial repair of fronto-orbito-maxillary injuries (fellowship)

##### **Professional Skills**

Generic skills

## Spontaneous Intracranial Haemorrhage

### **Aneurysmal Subarachnoid haemorrhage**

#### **Objective**

*To achieve competence in the surgical aspects of the multi-disciplinary management of aneurysmal subarachnoid haemorrhage SAH*

#### **Knowledge**

4 Pathophysiology of SAH

4 Prevention and management of delayed cerebral ischaemia, cerebral vasospasm and hydrocephalus

4 Relative indications for endovascular and surgical interventions

#### **Clinical Skills**

4 Clinical assessment of patients with aneurysmal SAH

4 Non operative management of patients undergoing endovascular coiling

4 Management of delayed cerebral ischaemia

#### **Technical Skills**

4 External ventricular drainage

4 Lumbar subarachnoid drainage

4 Ventriculoperitoneal shunting

#### **Professional Skills**

None

## Hydrocephalus

### Adult hydrocephalus

#### Objective

*To achieve competence in all aspects of the management of adult patients with hydrocephalus*

#### Knowledge

- 4 The pathophysiology of CSF circulation
- 4 Applied surgical anatomy of the ventricular system
- 4 Indications for external ventricular drainage, shunting, lumbar CSF drainage and shunting, ventriculo-cisternostomy
- 4 Surgical complications and their management

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with hydrocephalus
- 4 Interpretation of pressure studies and CSF infusion studies
- 4 Interpretation of CT and MRI scans and identification of shunt malfunction

#### Technical Skills

Competence in all aspects of primary and revisional shunt surgery including:

- 4 Use of 3-D image-guidance or ultrasound for difficult ventricular cannulation
- 4 Intra-operative testing of shunt function
- 4 Selection of appropriate shunts
- 4 Management of peri-operative ventricular haemorrhage
- 4 Lumbo-peritoneal shunt
- 2 Third ventriculo-cisternostomy

#### Professional Skills

Generic

## Intracranial tumours

### Anterior and middle fossa skull base tumours

#### Objective

*To achieve competence in the surgical management of patients with anterior and middle fossa tumours*

#### Knowledge

- 4 Indications for selected approaches in relation to pathology and surgical goals
- 4 Applied microsurgical anatomy of the anterior and middle cranial fossae
- 4 Principles of intra-operative management of patients undergoing resection of anterior and middle fossa tumours including olfactory groove, planum sphenoidale, parasellar and sphenoid wing and falcine meningiomas
- 4 Complications of surgery and their management

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with anterior and middle fossa tumours
- 4 Interpretation of CT and MRI scans

#### Technical Skills

Non-fellowship

- 4 Standard pterional and subfrontal approaches including:
  - Pterional resection and basal drilling
  - Subfrontal approach to the optic nerve, chiasm and internal carotid arteries
  - Sylvian fissure splitting and exposure of the MCA bifurcation
  - CSF drainage by chiasmatic cisternal suction, intra-operative ventricular puncture and lamina terminalis fenestration

- 4 Bi-Frontal/Frontal and parietal parafalcine approaches
- 4 Microsurgical resection of superficial skull base meningioma
- 2 Anterior interhemispheric, fronto-orbital, zygomatic and temporo-zygomatic approaches

Fellowship

- 3 Anterior interhemispheric, fronto-orbital, zygomatic and temporo-zygomatic approaches
- 2 Microsurgical resection of deep skull base meningioma

#### Professional Skills

Generic

### Transphenoidal surgery

#### Objective

*To achieve competence in transphenoidal approaches to the pituitary fossa and resection of pituitary adenomas*

#### Knowledge

- 4 Pathophysiology of the hypothalamic-pituitary axis
- 4 Indications for surgery

4 Selection of surgical approaches: sublabial, transnasal and endoscopic

4 Applied surgical anatomy of the skull base

4 Principles of peri-operative care

4 Complications of surgery and their management

#### **Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients with pituitary, sellar and parasellar tumours

4 Interpretation of CT and MRI scans

#### **Technical Skills**

Non-fellowship

3 Microsurgical transphenoidal approach

2 Transphenoidal resection of non-functioning macroadenoma

Fellowship

4 Transphenoidal resection of non-functioning macroadenoma

3 Transphenoidal selective microadenectomy

3 Endoscopic transphenoidal resection of non-functioning adenoma

#### **Professional Skills**

Generic

### **Midline tumours**

#### **Objective**

*To achieve competence in the management of patients with midline sellar, parasellar, pineal and third ventricular tumours*

#### **Knowledge**

4 Indications for surgery

4 Applied surgical anatomy of midline structures

4 Selection of surgical approaches including principles of endoscopic biopsy and/or resection

4 Principles of intra-operative management of patients undergoing resection of midline sellar, para-sellar, pineal and third ventricular tumours including colloid cysts

4 Complications of surgery and their management

#### **Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients with midline tumours

4 Interpretation of CT and MRI scans

#### **Technical Skills**

Non-fellowship

4 Transfrontal, transcortical approach to the lateral and third ventricle

2 Microsurgical resection of lateral intraventricular tumour

2 Transfrontal endoscopic biopsy

Fellowship

3 Microsurgical resection of lateral intraventricular tumour

3 Microsurgical resection of third ventricular tumour/colloid cyst

3 Transfrontal endoscopic biopsy and third ventriculostomy

3 Inter-hemispheric, transcallosal approach to third ventricle  
2 Approaches to pineal region

**Professional Skills**

Generic

**Malignant posterior fossa tumours**

**Objective**

*To achieve competence in the surgical management of superficial, hemispheric and midline intrinsic posterior fossa tumours and metastases*

**Knowledge**

- 4 Indications for surgery
- 4 Selection of surgical approaches
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Complications of surgery and their management

**Clinical Skills**

- 4 The assessment, counselling and pre-operative preparation of patients with posterior fossa malignant tumours
- 4 Interpretation of CT and MRI scans

**Technical Skills**

- 4 Competence in midline, paramedian and retrosigmoid posterior fossa craniotomies including:
  - safe patient positioning in the prone and semi-prone positions
  - exposure of the lateral and sigmoid sinuses
  - exposure and decompression of the foramen magnum
  - use of cisternal CSF drainage
  - safe use of fixed retractors
  - exposure and resection of superficial, lateral and mid-line intrinsic cerebellar tumours and metastases

**Professional Skills**

Generic

**Cerebellopontine angle tumours**

**Objective**

*To achieve competence in the management of patients with cerebellopontine angle tumours*

**Knowledge**

- 4 Relative indications for surgery, radiosurgery and conservative management
- 4 Principles of intra-operative management of patients undergoing resection of CP angle tumours including vestibular schwannomas and meningiomas
- 4 Principles and application of cranial nerve and brainstem monitoring
- 4 Applied microsurgical anatomy of the CP angle, brainstem and lower cranial nerves
- 4 Relative indications for retrosigmoid, middle fossa, and translabyrinthine approaches with respect to hearing preservation,

tumour size and position

**Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients with CP angle tumours

4 Interpretation of CT and MR scans

**Technical Skills**

Non-fellowship

4 Retrosigmoid approach

3 Subarachnoid dissection and exposure of the tumour and lower cranial nerves

2 Subtotal resection of acoustic neuroma by microsurgical dissection

Fellowship

2 Initial Microsurgical resection of tumour

**Professional Skills**

Generic

## CNS Sepsis

### **Intracerebral abscess and subdural empyema**

#### **Objective**

*To achieve competence in the management of patients with CNS infections including ventriculitis, cerebral abscess and subdural empyema*

#### **Knowledge**

- 4 The aetiology and pathophysiology of intracranial sepsis
- 4 Indications for burr hole drainage, ventricular drainage and craniotomy in the management of intracranial sepsis
- 4 Indications for combined otorhinological procedures
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Surgical complications

#### **Clinical Skills**

- 4 The assessment, counselling and pre-operative preparation of patients with intracranial sepsis
- 4 Interpretation of CT and MRI scans
- 3 Management of anti-microbial therapy

#### **Technical Skills**

- 4 Burr hole drainage of intracerebral abscess
- 4 Ventricular drainage
- 4 Craniotomy for subdural empyema, including frontal and parietal parafalcine approaches
- 4 Craniotomy and resection of frontal, temporal and cerebellar abscess
- 3 Anterior and middle fossa extradural and subdural duroplasty

#### **Professional Skills**

Generic

# Neurovascular Surgery

## Neurovascular surgery

### Intracranial aneurysms

#### Objective

*To achieve competence in the surgical aspects of the multi-disciplinary management of ruptured and unruptured intracranial aneurysms*

#### Knowledge

- 4 Aetiology, epidemiology and natural history of unruptured and ruptured intracranial aneurysms
- 4 Pathophysiology and general management of subarachnoid haemorrhage
- 4 Angiographic and microsurgical anatomy of the cerebral circulation
- 4 Indications for surgical management of intracranial aneurysms by clipping, trapping, microsurgical reconstruction and microvascular bypass
- 4 Complications of surgery and their management

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with ruptured and unruptured aneurysms
- 4 Interpretation of CT, MR and catheter angiography

#### Technical Skills

- 4 Standard pterional and subfrontal approaches
- 3 Anterior interhemispheric, fronto-orbital, fronto-zygomatic, temporo-zygomatic, subtemporal, retrosigmoid and far-lateral posterior fossa approaches (fellowship)
- 2 Anterior circulation aneurysm clipping
- 3 Saphenous vein and radial artery graft harvest (fellowship)
- 2 Microsurgical vascular anastomosis (fellowship)

#### Professional Skills

Generic

### Intracranial vascular malformations

#### Objective

*To achieve competence in the surgical aspects of the multi-disciplinary management of intracranial vascular malformations*

#### Knowledge

- 4 Pathogenesis, aetiology, epidemiology and natural history of intracranial vascular malformations including AVMs, A-V fistula, cavernomas and venous malformations
- 4 Pathophysiology and general management of intracranial haemorrhage
- 4 Angiographic and microsurgical anatomy of the cerebral circulation
- 4 Indications for embolisation and radiosurgery
- 4 Indications for surgical management of malformations

4 Complications of surgery and their management, including hyperperfusion syndromes

**Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients with vascular malformations

4 Interpretation of CT, MR and catheter angiography

**Technical Skills**

Non-fellowship

3 Image-guided craniotomy and exposure of supratentorial AVM

2 Microsurgical resection of superficial gyral or sulcal AVM

Fellowship

3 Microsurgical resection of superficial gyral or sulcal AVM

2 Microsurgical resection of paraventricular and posterior fossa AVM

2 Image-guided resection of infratentorial cavernoma

**Professional Skills**

Generic

**Occlusive cerebrovascular disease**

**Objective**

*To achieve competence in the management of occlusive cerebrovascular disease*

**Knowledge**

4 Pathophysiology of cerebral ischaemia

4 Pathogenesis of extracranial atherosclerosis

4 Epidemiology, investigation and medical management of stroke

4 Principles of diffusion and perfusion weighted MRI

4 Principles of PET and HMPAO scanning

4 Principles of Doppler/duplex ultrasound scanning of extra and intracranial vessel

4 Indications for and operative principles of carotid endarterectomy, carotid angioplasty and stenting

4 Indications for and operative principles of high and low flow cerebral re-vascularisation

4 Indications for and operative principles of re-vascularisation by encephalosynangiosis

4 Surgical complications and their management

**Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients undergoing surgery for occlusive cerebrovascular disease with ruptured and unruptured aneurysms

4 Interpretation of Doppler ultrasound studies

4 Interpretation of CT, MR and catheter angiography

**Technical Skills**

Fellowship

3 Carotid endarterectomy

2 Extracranial-intracranial bypass surgery

**Professional Skills**

Generic

# Functional Neurosurgery

## Functional neurosurgery

<b>Chronic pain</b>
<b>Objective</b> <i>To understand the management of patients with chronic pain syndromes (non-fellowship)</i> <i>To achieve competence in the surgical aspects of the multi-disciplinary management of patients with chronic pain syndromes (fellowship)</i>
<b>Knowledge</b> Non-fellowship 2 The aetiology and pathophysiology of chronic pain syndromes 2 Indications for medical, minimally-invasive and surgical management Fellowship 4 The aetiology and pathophysiology of chronic pain syndromes 4 Indications for medical, minimally-invasive and surgical management 4 Applied surgical anatomy 4 Complications of surgery and their management
<b>Clinical Skills</b> Fellowship 4 Surgical aspects of the multi-disciplinary assessment of chronic pain patients 4 Preoperative counselling and preparation
<b>Technical Skills</b> Fellowship 4 Dorsal column stimulator 2 DRE2 Lesion 2 Open Cordotomy 2 Deep Brain Stimulation
<b>Professional Skills</b> Generic

<b>Trigeminal neuralgia</b>
<b>Objective</b> <i>To achieve competence in the surgical aspects of the multi-disciplinary management of patients with trigeminal neuralgia and related cranio-facial pain syndromes</i>
<b>Knowledge</b> 4 Aetiology, epidemiology and natural history of trigeminal neuralgia 4 Differential diagnosis and management of related cranio-facial pain syndromes 4 Medical management of cranio-facial pain 4 Surface anatomy of the trigeminal nerve and microsurgical anatomy of the CP angle 4 Indications for surgical management of trigeminal neuralgia by

peripheral neurectomy, percutaneous rhizotomy, radiofrequency rhizotomy, microvascular decompression

4 Complications of surgery and their management

### **Clinical Skills**

4 The assessment, counselling and pre-operative preparation of patients with trigeminal neuralgia

4 Interpretation of posterior fossa CT and MR scans

### **Technical Skills**

Non-fellowship

3 Retrosigmoid microsurgical approach to the CP angle and trigeminal nerve

3 Trigeminal microvascular decompression

Fellowship

3 Percutaneous trigeminal rhizotomy

4 Trigeminal microvascular decompression

### **Professional Skills**

Generic

## **Epilepsy**

### **Objective**

*To understand the management of patients with idiopathic and lesional epilepsy (non-fellowship)*

*To achieve competence in the surgical aspects of the multi-disciplinary management of patients with epilepsy (fellowship)*

### **Knowledge**

Non-fellowship

2 The aetiology and pathophysiology of idiopathic and lesional epilepsy

2 Indications for medical and surgical management

Fellowship

4 The pathophysiology of idiopathic and lesional epilepsy

4 Indications for medical and surgical management

3 Principles of ictal, interictal, sphenoidal and intraoperative EEG

3 Principles of video-EEG monitoring

4 Applied surgical anatomy

4 Complications of surgery and their management

### **Clinical Skills**

Fellowship

4 Surgical aspects of the multi-disciplinary assessment of epilepsy patients

4 Interpretation of CT, MRI and SPECT scans

4 Preoperative counselling and preparation

### **Technical Skills**

Fellowship

2 Stereotactic placement of depth electrodes

3 Placement of subdural electro-grids

3 Image-guided resection of cortical lesions

3 Mesial temporal resection

- 3 Vagal nerve stimulation
- 1 Functional hemispherectomy
- 2 Corpus callosotomy

**Professional Skills**

Generic

**Movement disorders**

**Objective**

*To understand the management of patients with movement disorders (non-fellowship)*

*To achieve competence in the surgical aspects of the multi-disciplinary management of patients with movement disorders (fellowship)*

**Knowledge**

Non-fellowship

- 2 The aetiology and pathophysiology of movement disorders
- 2 Indications for medical, minimally-invasive and surgical management

Fellowship

- 4 The aetiology and pathophysiology of movement disorders
- 4 Indications for medical, minimally-invasive and surgical management
- 4 Applied surgical anatomy
- 4 Complications of surgery and their management

**Clinical Skills**

Fellowship

- 4 Surgical aspects of the multi-disciplinary assessment of patients with movement disorders
- 4 Interpretation of CT and MRI scans
- 4 Preoperative counselling and preparation

**Technical Skills**

Fellowship:

- 3 Deep brain stimulation
- 3 Microvasculae decompression for hemi-facial spasm

**Professional Skills**

Generic

**Spasticity**

**Objective**

*To understand the management of patients with chronic pain syndromes (non-fellowship)*

*To achieve competence in the surgical aspects of the multi-disciplinary management of patients with chronic pain syndromes (fellowship)*

**Knowledge**

Non-fellowship

- 2 The aetiology and pathophysiology of spasticity
- 2 Indications for medical and surgical management

Fellowship

- 4 The aetiology and pathophysiology of spasticity
- 4 Indications for medical, minimally-invasive and surgical management
- 4 Applied surgical anatomy

4 Complications of surgery and their management

**Clinical Skills**

Fellowship

4 Surgical aspects of the multi-disciplinary assessment of patients with spasticity

4 Preoperative counselling and preparation

**Technical Skills**

4 Intrathecal drug delivery

3 Deep brain stimulation

**Professional Skills**

Generic

# Spinal Surgery

## Spinal Trauma

### Cervical spine fracture-sublaxation

#### Objective

*To achieve competence in the general management of fracture-sublaxations of the cervical spine (non-fellowship)*

*To achieve competence in the operative management of fracture-sublaxations of the cervical spine (fellowship)*

#### Knowledge

Non-fellowship

- 4 Pathophysiology of spinal cord injury
- 4 Classification of cervical spinal fracture dislocations
- 4 Biomechanics of spinal instability
- 4 Indications for halo traction and external stabilisation
- 4 Indications for and principles of open reduction and stabilisation

Fellowship

- 4 Applied surgical anatomy of cervical fracture-sublaxations
- 4 Relative indications for operative reduction and stabilisation by anterior and posterior approaches

#### Clinical Skills

- 4 Clinical assessment of the spinal injury patient
- 4 Management of spinal shock
- 4 Interpretation of plain radiology, CT and MRI scans
- 4 Liaison with spinal injury units
- 4 Counselling and pre-operative preparation of spinal injury patients

#### Technical Skills

Non-fellowship

- 4 Application of Cranial-cervical traction

Fellowship

- 3 Instrumented stabilisation of subaxial fracture-dislocation by anterior cervical plate and/or lateral mass screws
- 2 Instrumented stabilisation of atlanto-axial fracture dislocation by anterior odonto-axial screws and/or posterior atlantoaxial screws/wiring
- 4 Application of halo-body jacket

#### Professional Skills

Generic

### Thoraco-lumbar fractures

#### Objective

*To achieve competence in the general management of thoracolumbar fractures (non-fellowship)*

*To achieve competence in the operative management of thoracolumbar*

*fractures (fellowship)*

**Knowledge**

Non-fellowship

- 4 Pathophysiology of spinal cord injury
- 4 Classification of thoracolumbar fracture dislocations
- 4 Biomechanics of spinal instability
- 4 Indications for open reduction and stabilisation

Fellowship

- 4 Applied surgical anatomy of thoracolumbar fractures
- 4 Relative indications for operative reduction and stabilisation by anterior and posterior approaches

**Clinical Skills**

- 4 Clinical assessment of the spinal injury patient
- 4 Management of spinal shock
- 4 Interpretation of plain radiology, CT and MRI scans
- 4 Liaison with spinal injury units
- 4 Counselling and pre-operative preparation of spinal injury patients

**Technical Skills**

Non-fellowship

- 2 Posterior reduction of thoracolumbar fractures by pedicle screw instrumentation and ligamentotaxis

Fellowship

- 3 Posterior reduction of thoracolumbar fractures by pedicle screw instrumentation and ligamentotaxis
- 2 Combined anterior and posterior reduction and instrumented stabilisation of thoracolumbar fractures

**Professional Skills**

Generic

## Benign Intradural Tumours

### Intradural extramedullary tumours

#### Objective

*To achieve competence in the management of patients with intradural extramedullary tumours including schwannomas, neurofibromas and meningiomas*

#### Knowledge

4 Classification, natural history and basic molecular biology of intradural spinal tumours

4 Pathophysiology of spinal cord compression

4 Indications for surgery

4 Selection of surgical approaches

4 Applied surgical anatomy

4 Principles of peri-operative care

4 Complications of surgery and their management

#### Clinical Skills

4 Assessment, counselling and pre-operative preparation of patients with intradural spinal tumours

4 Interpretation of spinal MRI scans

#### Technical Skills

4 Microsurgical excision of posterior and postero-lateral intradural extramedullary tumours

2 Microsurgical excision of anterior intradural extramedullary tumours

#### Professional Skills

Generic

### Intramedullary spinal cord tumours

#### Objective

*To achieve competence in the management of patients with intramedullary spinal cord tumours*

#### Knowledge

4 Classification, natural history and pathology of intramedullary spinal cord tumours

4 Indications for biopsy, subtotal and radical excision

4 Role of adjuvant treatment

4 Applied surgical anatomy of spine and spinal cord

4 Selection of surgical approaches

4 Principles of intra-operative management of patients undergoing resection of intramedullary tumours

4 Complications of surgery and their management

#### Clinical Skills

4 Assessment, counselling and pre-operative preparation of patients with intramedullary spinal cord tumours

4 Interpretation of spinal MRI scans

#### Technical Skills

3 Microsurgical biopsy of intramedullary spinal cord tumour

2 Subtotal microsurgical resection of intramedullary tumour

4 Duroplasty

**Professional Skills**

Generic

## Malignant Spinal Cord Compression

### **Malignant spinal cord compression**

#### **Objective**

*To achieve competence in the management of patients with malignant secondary spinal cord compression*

#### **Knowledge**

- 4 The pathophysiology of spinal cord compression
- 4 The classification, aetiology and natural history of vertebral metastases
- 4 Spinal instability associated with vertebral malignancy
- 4 Indications for percutaneous and open spinal biopsy
- 4 Role of primary radiotherapy and adjuvant radiotherapy or chemotherapy
- 4 Indications for spinal decompression with and without instrumented spinal stabilisation

#### **Clinical Skills**

- 4 Clinical assessment of patients with malignant spinal cord compression
- 4 Interpretation of plain radiology, CT and MRI scans
- 4 Liaison with medical oncologists and radiotherapist
- 4 Counselling and pre-operative preparation of patients with malignant spinal cord compression

#### **Technical Skills**

Non fellowship

- 4 Decompressive thoracic and lumbar laminectomy with extradural tumour resection
- 2 Lumbosacral pedicle screw stabilisation
- 3 Anterior cervical corpectomy with anterior column re-construction and anterior cervical plating

Fellowship

- 3 Lumbosacral pedicle screw stabilisation
- 3 Thoracic pedicle screw stabilisation
- 3 Cervical lateral mass stabilisation
- 2 Posterior corpectomy with anterior column replacement and posterior stabilisation
- 2 Combined anterior and posterior total vertebrectomy with stabilisation

#### **Professional Skills**

Generic

## Degenerative Spinal Disorders

### Lumbar radiculopathies

#### Objective

*To achieve competence in the surgical management of lumbar compressive radiculopathies by lumbar microdiscectomies and associated microsurgical decompressions.*

#### Knowledge

- 4. Indications for operative management of lumbar radiculopathies
- 4. Applied surgical anatomy of the lumbar spine with particular reference to degenerative neural compression and morphological variations in vertebral anatomy
- 4. Selection of minimally-invasive approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with lumbar radiculopathies
- 4 Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms

#### Technical Skills

- 4 Lumbar microdiscectomy
- 4 Microsurgical lateral recess decompression
- 4 Posterior decompression (laminotomy, hemilaminectomy etc)
- 4 Revisional lumbar microsurgical discectomy with and without decompression
- 4 Microsurgical lumbar discectomy for central disc protrusion with cauda equina compression

#### Professional Skills

Generic

### Cervical myeloradiculopathy

#### Objective

*To achieve competence in the management of cervical radiculopathy*

#### Knowledge

- 4. Indications for operative management of cervical radiculopathies
- 4. Applied surgical anatomy of the cervical spinal column, spinal cord, nerve roots and vertebral arteries
- 4. Selection of surgical approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with cervical myeloradiculopathies
- 4 Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms

#### Technical Skills

Non-fellowship

4 Single and multi-level anterior cervical discectomy with and without fusion

4 Anterior cervical plating

4 Posterior cervical microforaminotomy and microdiscectomy

4 Posterior cervical decompression (laminotomy, hemilaminectomy etc.)

Fellowship

3 Single and multi-level corpectomy with anterior cervical plating

3 Anterior cervical discectomy and cervical arthroplasty

3 Cervical laminectomy with lateral mass and/or pedicle screw stabilisation

3 Cervical laminoplasty

### **Professional Skills**

Generic

## Craniocervical junction disorders

### Rheumatoid disease

#### Objective

*To understand the management of rheumatoid patients with atlanto-axial subluxation, cranial settling and related disorders (non-fellowship)*

*To achieve competence in the management of rheumatoid atlanto-axial subluxation, cranial settling and related disorders (fellowship)*

#### Knowledge

- 4 The pathology and natural history of rheumatoid spondylopathy
- 4 Indications for operative management of atlanto-axial subluxation, cranial settling and related disorders
- 4 Applied surgical anatomy of the craniocervical junction
- 4 Selection of surgical approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with cervical myeloradiculopathies
- 4 Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms and 3D spinal reconstructions

#### Technical Skills

Fellowship

- 3 Atlanto-axial wiring for reducible atlanto-axial subluxation
- 3 Atlantoaxial stabilisation using transarticular screws or pedicle and lateral mass screws and rods
- 3 Instrumented atlanto-occipital fusion
- 3 Transoral odontoidectomy

#### Professional Skills

Generic

### Hindbrain herniation

#### Objective

*To achieve competence in the management of craniocervical stenosis and hindbrain herniation*

#### Knowledge

- 4 The pathogenesis and natural history of hindbrain herniation, craniocervical stenosis, syringomyelia and syringobulbia
- 4 Indications for foramen magnum decompression
- 4 Applied surgical anatomy of the craniocervical junction
- 4 Selection of surgical approaches
- 4 Principles of peri-operative care
- 4 Complications of surgery

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with hind brain anomalies
- 4 Interpretation of plain radiographs, CT scan, MRI scans and CT

myelograms and 3D spinal reconstructions

**Technical Skills**

3 Foramen magnum decompression

**Professional Skills**

Generic

## Spinal Infection

### Spinal epidural abscess

#### Objective

*To achieve competence in the operative management of spinal epidural abscess*

#### Knowledge

- 4 The aetiology and pathophysiology of spinal sepsis
- 4 Indications for drainage of spinal epidural abscess by laminectomy and multiple laminotomies
- 4 Applied surgical anatomy
- 4 Principles of peri-operative care
- 4 Surgical complications and their management
- 4 Principles of peri-operative care

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with spinal sepsis
- 4 Interpretation of spinal CT and MRI scans
- 3 Management of anti-microbial therapy

#### Technical Skills

- 4 Drainage of spinal epidural abscess by laminectomy and/or multiple laminotomies

#### Professional Skills

Generic

### Vertebral osteomyelitis and discitis

#### Objective

*To achieve competence in the operative management of vertebral osteomyelitis and discitis*

#### Knowledge

- 4 The aetiology and pathophysiology of vertebral osteomyelitis and discitis, including pyogenic, tuberculous and atypical infections
- 4 Indications for percutaneous and open biopsy
- 4 Indications for spinal stabilisation
- 4 Principles of peri-operative care
- 4 Surgical complications and their management

#### Clinical Skills

- 4 The assessment, counselling and pre-operative preparation of patients with spinal sepsis
- 4 Interpretation of spinal CT and MRI scans
- 3 Management of anti-microbial therapy

#### Technical Skills

- 2 Transpedicular and open vertebral and disc biopsy

#### Professional Skills

Generic

## Peripheral Nerve Surgery

### Carpal tunnel compression

**Objective**

*To achieve competence in carpal tunnel decompression*

**Knowledge**

4 Presentation, differential diagnosis and management of carpal tunnel syndrome

4 Interpretation of nerve conduction studies

4 Indications for surgery

4 Applied surgical anatomy

**Clinical Skills**

4 Assessment and counselling of patients with carpal tunnel syndrome

**Technical Skills**

4 Carpal tunnel decompression

**Professional Skills**

Generic

### Ulnar neuropathy

**Objective**

*To achieve competence in the management of ulnar neuropathy*

**Knowledge**

4 Presentation, differential diagnosis and management of ulnar neuropathies

4 Interpretation of nerve conduction studies

4 Indications for surgery

4 Applied surgical anatomy

**Clinical Skills**

4 Assessment and counselling of patients with an ulnar neuropathy

**Technical Skills**

4 Cubital ulnar nerve decompression with and without transposition

**Professional Skills**

Generic

### Peripheral nerve sheath tumours

**Objective**

*To achieve competence in the resection of major and minor peripheral nerve tumours*

**Knowledge**

4 Pathology of peripheral nerve sheath tumours

4 Indications for complete and subtotal resection of tumours

4 Applied surgical anatomy of the major peripheral nerves

**Clinical Skills**

4 Assessment and counselling of patients with peripheral nerve sheath tumours

**Technical Skills**

3 Microsurgical excision of peripheral nerve sheath tumour

**Professional Skills**

Generic

## Emergency Paediatric Care

### Paediatric head injury

#### Objective

*Decompressive craniectomy; cranioplasty; management of growing fractures; craniofacial reconstruction; management of CSF fistulae*

#### Knowledge

No content

#### Clinical Skills

No content

#### Technical Skills

4 Insertion of EVD

4 Evacuation of intracranial haematoma (ICH)

#### Professional Skills

No content

### Paediatric hydrocephalus

#### Objective

*To achieve competence in the management of paediatric hydrocephalus*

#### Knowledge

4 The pathophysiology of CSF circulation

4 Applied surgical anatomy of the ventricular system

4 Indications for external ventricular drainage, lumbar CSF drainage and shunting, ventriculo-cisternostomy

4 Indications for VP and VA shunting and

4 Principles of shunt function and selection

4 Surgical complications and their management

#### Clinical Skills

4 Assessment of the ill child with hydrocephalus, impaired consciousness and sepsis

4 Differential diagnosis of shunt malfunction

4 Interpretation of CT scans in shunted children

#### Technical Skills

Non fellowship

4 Insertion, tapping and draining from an CSF reservoir

4 External ventricular drainage including externalisation of VP shunts

Fellowship

Competence in all aspects of primary and revisional shunt surgery in children including:

4 Use of 3-D image-guidance or ultrasound for difficult ventricular cannulation

4 Intra-operative testing of shunt function

4 Selection of appropriate shunts

4 Management of peri-operative ventricular haemorrhage

3 Third ventriculo-cisternostomy

**Professional Skills**

Generic

# 5. Professional and Generic Skills

## 5.1. Initial

**Professional Competencies to be acquired during the initial stage of surgical training.**

<b>Medical Expert (Good Clinical Care; Maintaining Good Medical Practice)</b>
---

The specialty specific knowledge, clinical skills and technical skills and procedures relating to symptoms and conditions that a trainee will encounter during this stage of training are listed separately. The competencies listed below are generic competencies, which underpin the specialty specific competencies.

### *Skills*

- Elicits a history that is relevant, concise, accurate and appropriate to the patient's problem

### *Behaviour*

- Demonstrates effective consultation skills in presenting well documented assessments and recommendations in written and/or verbal form in response to a request from another healthcare provider
- Demonstrates the attitudes and the skills necessary to retrieve and implement the information necessary to provide healthcare services to patients in meeting the needs and expectations of the community
- Demonstrates insight into his/her limitations by self assessment

<b>Communicator (Good Clinical Care; Maintaining Good Medical Practice)</b>
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### **1. Effective doctor/patient communication**

#### *Objective*

To establish a doctor/patient relationship characterised by understanding, trust, respect, empathy and confidentiality

### *Skills*

- Able to gather information regarding the patient's beliefs, concerns and expectations about the condition and consider the influence of factors such as the patient's age, gender, ethnic, cultural and socio-economic background and spiritual values on that illness
- Able to elicit information regarding the beliefs, concerns and expectations of patients with regard to their presenting conditions.
- Able to evaluate factors such as the patient's age, gender, ethnic, cultural, socio-economic and spiritual values and the impact that these may have on the management of that patient and condition.
- Able to deliver information to the patient and family humanely and in a way that is understandable, encourages discussion and promotes the patient's participation in decision making to the level appropriate for the situation.
- Able to work with patients who present significant communication challenges such as anger or confusion, or an ethno-cultural background different from the doctor's own.

## **2. Communication with Colleagues**

### *Objective*

To appreciate the importance of co-operation with other healthcare professionals involved in patient care and to ensure that the roles of these professionals are clear, consistent, understood by all involved, and that, appropriate and timely information is delivered to patients and their families.

### *Skills*

- Able to communicate effectively with colleagues within and outside of the team
- Able to evaluate the roles and responsibilities of individuals within the clinical team and to ensure that these are understood by all concerned in the context of individual and general patient care.

## **Collaborator (Good Clinical Care; Working with Colleagues)**

### *Objective*

To achieve competence in the formulation and implementation of appropriate care plans in the clinical situation, in collaboration with members of an interdisciplinary team, incorporating assessment, investigation, treatment and continuing care.

### *Skills*

- To achieve a goal related to patient care, a research problem, an educational activity or an administrative responsibility by using the expertise and being aware of the limitations of all members of an interdisciplinary team

Manager (Working with Colleagues; Probity)

### *Objective*

be able to work effectively as a member of a team or a partnership and to accomplish tasks whether one is a team leader or a team member

Health Advocate (Good Clinical Care; Probity)

### *Objective*

To demonstrate an understanding of determinants of health and public policy in relation to individual patients by identifying the patient's status with respect to one or more determinants of health (i.e. unemployment)

### *Skills*

- Adapts the assessment and management accordingly (i.e. the medical history to the patients social circumstances); and
- Assesses the patient's ability to access various services in the health and social system and offer appropriate assistance.

Scholar (Maintaining Good Medical Practice; Teaching and Training, Appraising and Assessing; Probity)

## **1. Clinical**

### *Objective*

To demonstrate a rigorous approach to clinical problem solving

### *Skills*

- Can pose a clinical question
- Recognises and identifies gaps in knowledge and expertise around a clinical question
- Formulates a plan to fill the gap by:
  - conducting an appropriate literature search based upon a clinical question
  - assimilating and critically appraise the literature

- developing a system to store and retrieve relevant literature
- consulting others (physicians and other healthcare professionals) in a collegiate manner
- Proposes a solution to the clinical question
- Implements the solution in practice. Evaluate the outcome and reassess the solution (re-enter the loop at c-i or c-ii)
- Identifies practice areas for research

## 2. **Education and Teaching**

### *Objective*

Can demonstrate an understanding of, and the ability to apply, the principles of adult education, with respect to oneself and others

### *Skills*

- Uses his/her understanding of preferred learning methods in dealing with students, trainees and colleagues

Professional (Relationships with Patients; Probity)

## 1. **Discipline-Based Objectives**

### *Objective*

Displays attitudes commonly accepted as essential to Professionalism

### *Skills*

- Use appropriate strategies to maintain and advance professional competence
- Continually evaluates one's abilities, knowledge and skills and know one's limitations of professional competence

## 2. **Personal Professional Boundary Objectives**

### *Objective*

To balance personal and professional roles and responsibilities and to demonstrate ways of attempting to resolve conflicts and role strain

### *Skills*

- Adopts specific strategies to heighten personal and professional awareness and explore and resolve interpersonal difficulties in professional relationships

### 3. Ethics and Professional Bodies

#### *Objective*

To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations

#### *Knowledge*

- Knows and understand the professional, legal and ethical codes of the General Medical Council and any other codes to which the physician is bound

#### *Skills*

- Recognises, analyses and attempts to resolve in clinical practice ethical issues such as truth telling, consent, advanced directives, confidentiality, end-of-life care, conflict of interest, resource allocation, research ethics etc
- Understands and is able to apply relevant legislation that relates to the health care system in order to guide one's clinical practice
- Recognises, analyses and knows how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations

## 5.2. Intermediate

**Professional Competencies to be acquired during the intermediate stage of surgical training. (New competencies are in bold)**

### **Medical Expert (Good Clinical Care; Maintaining Good Medical Practice)**

The specialty specific knowledge, clinical skills and technical skills and procedures relating to symptoms and conditions that a trainee will encounter during this stage of training are listed separately. The competencies listed below are generic competencies, which underpin the specialty specific competencies.

#### *Skills*

- Elicits a history that is relevant, concise, accurate and appropriate to the patient's problem

#### *Behaviour*

- Demonstrates effective consultation skills in presenting well documented assessments and recommendations in written and/or verbal form in response to a request from another healthcare provider
- Demonstrates the attitudes and the skills necessary to retrieve and implement the information necessary to provide healthcare services to patients in meeting the needs and expectations of the community
- Demonstrates insight into his/her limitations by self assessment

### **Communicator (Good Clinical Care; Maintaining Good Medical Practice)**

#### **1. Effective doctor/patient communication**

##### *Objective*

To establish a doctor/patient relationship characterised by understanding, trust, respect, empathy and confidentiality

##### *Skills*

- Able to gather information regarding the patient's beliefs, concerns and expectations about the condition and consider the influence of factors such as the patient's age,

- gender, ethnic, cultural and socio-economic background and spiritual values on that illness
- Able to elicit information regarding the beliefs, concerns and expectations of patients with regard to their presenting conditions.
- Able to evaluate factors such as the patient's age, gender, ethnic, cultural, socio-economic and spiritual values and the impact that these may have on the management of that patient and condition.
- Able to deliver information to the patient and family humanely and in a way that is understandable, encourages discussion and promotes the patient's participation in decision making to the level appropriate for the situation.
- Able to work with patients who present significant communication challenges such as anger or confusion, or an ethno-cultural background different from the doctor's own.

## 2. **Communication with Colleagues**

### *Objective*

To appreciate the importance of co-operation with other healthcare professionals involved in patient care and to ensure that the roles of these professionals are clear, consistent, understood by all involved, and that, appropriate and timely information is delivered to patients and their families.

### *Skills*

- Able to communicate effectively with colleagues within and outside of the team
- Able to evaluate the roles and responsibilities of individuals within the clinical team and to ensure that these are understood by all concerned in the context of individual and general patient care.

## **Collaborator (Good Clinical Care; Working with Colleagues)**

### *Objective*

To achieve competence in the formulation and implementation of appropriate care plans in the clinical situation, in collaboration with members of an interdisciplinary team, following assessment, investigation, treatment and continuing care.

### *Skills*

- To achieve a goal related to patient care, a research problem, an educational activity or an administrative responsibility by using

the expertise and being aware of the limitations of all members of an interdisciplinary team

### **Manager (Working with Colleagues; Probity)**

#### *Objective*

To be able to work effectively as a member of a team or a partnership and to accomplish tasks whether one is a team leader or a team member.

### **Health Advocate (Good Clinical Care; Probity)**

#### *Objective*

To demonstrate an understanding of determinants of health and public policy in relation to individual patients by identifying the patient's status with respect to one or more determinants of health (i.e. unemployment)

#### **Knowledge**

- **Demonstrates an understanding of determinants of health and public policy in relation to:**
  - **Practice populations by work with specialty society and other organizations in identifying current "at risk" groups within a given specialty practice and applying the available knowledge about prevention to "at risk" groups within the practice; and contributing "group data" for better understanding of health problems within the population**
  - **General Population by describing in broad terms the key issues currently under debate regarding changes in the National Health System, indicating how these might affect societal health care outcomes and advocating to decrease the burden of illness (at a community or societal level) of a condition or problem relevant to his/her specialty society, community based advocacy group, or other public education bodies, or private organizations**
- **Demonstrates an understanding of the determinants of health by identifying the most important determinants of health (i.e. poverty, unemployment, early childhood education, social support systems), being familiar with underlying research evidence, and applying this understanding to common problems and conditions in the trainees specialty**
- **Demonstrates an understanding of public health policy by describing how public policy is developed; identifying**

**current policies that affect health, either positively or negatively (i.e. communicable diseases, tobacco, substance abuse); and citing examples of how policy was changed as a result of actions by physicians**

### *Skills*

- Adapts the assessment and management accordingly (i.e. the medical history to the patients social circumstances); and
- Assesses the patient's ability to access various services in the health and social system and offer appropriate assistance.

<b>Scholar (Maintaining Good Medical Practice; Teaching and Training, Appraising and Assessing; Probity)</b>
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## **1. Clinical**

### *Objective*

To demonstrate a rigorous approach to clinical problem solving

### *Skills*

- Can pose a clinical question
- Recognises and identifies gaps in knowledge and expertise around a clinical question
- Formulates a plan to fill the gap by:
  - conducting an appropriate literature search based upon a clinical question
  - assimilating and critically appraise the literature
  - developing a system to store and retrieve relevant literature
  - consulting others (physicians and other healthcare professionals) in a collegiate manner
- Proposes a solution to the clinical question
- Implements the solution in practice. Evaluate the outcome and reassess the solution (re-enter the loop at c-i or c-ii)
- Identifies practice areas for research

## **2. Education and Teaching**

### *Objective*

Can demonstrate an understanding of, and the ability to apply, the principles of adult education, with respect to oneself and others.

**To be able to develop and deliver a teaching module or unit and supporting lecture notes for an undergraduate or peer teaching session.**

### *Skills*

- Uses his/her understanding of preferred learning methods in dealing with students, trainees and colleagues
- **Plans educational activities which clearly set out aims and intended learning outcomes**
- **Prepares appropriate teaching materials which meet learners' needs**

### *Behaviours*

- **Shows a commitment to teaching and learning**
3. **Research**

### *Objective*

**To demonstrate a rigorous approach to research through: a successful application to the ethics committee; or a successfully completing a formal audit application; or presenting to a local mortality and morbidity meeting; or presenting to a national meeting.**

### *Skills*

- **To be able to pose a research question (clinical, basic or population health)**
- **Develops a proposal to solve the research question:**
  - **Conduct an appropriate literature search on the research question**
  - **Identify, consult and collaborate with appropriate content experts to conduct the research**
  - **Propose the methodological approach to solve the question**
- **Carries out the research outlined in the proposal**
- **Defends and disseminate the results of the research**
- **Identifies areas for further research that flow from the results**

## **Professional (Relationships with Patients; Probity)**

### **1. Discipline-Based Objectives**

#### *Objective*

Displays attitudes commonly accepted as essential to professionalism

#### *Skills*

- Use appropriate strategies to maintain and advance professional competence
- Continually evaluates one's abilities, knowledge and skills and know one's limitations of professional competence

## **2. Personal Professional Boundary Objectives**

### *Objective*

To balance personal and professional roles and responsibilities and to demonstrate ways of attempting to resolve conflicts and role strain

### *Skills*

- Adopts specific strategies to heighten personal and professional awareness and explore and resolve interpersonal difficulties in professional relationships

## **3. Ethics and Professional Bodies**

### *Objective*

To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations

### *Knowledge*

- Knows and understand the professional, legal and ethical codes of the General Medical Council and any other codes to which the physician is bound

### *Skills*

- Recognises, analyses and attempts to resolve in clinical practice ethical issues such as truth telling, consent, advanced directives, confidentiality, end-of-life care, conflict of interest, resource allocation, research ethics etc
- Understands and is able to apply relevant legislation that relates to the health care system in order to guide one's clinical practice
- Recognises, analyses and knows how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations

## 5.3. Final

**Professional Competencies to be acquired during the final stage of surgical training. (New competencies are in bold)**

### **Medical Expert (Good Clinical Care; Maintaining Good Medical Practice)**

The specialty specific knowledge, clinical skills and technical skills and procedures relating to symptoms and conditions that a trainee will encounter during this stage of training are listed separately. The competencies listed below are generic competencies, which underpin the specialty specific competencies.

#### *Skills*

- Elicits a history that is relevant, concise, accurate and appropriate to the patient's problem

#### *Behaviour*

- Demonstrates effective consultation skills in presenting well documented assessments and recommendations in written and/or verbal form in response to a request from another healthcare provider
- Demonstrates the attitudes and the skills necessary to retrieve and implement the information necessary to provide healthcare services to patients in meeting the needs and expectations of the community
- Demonstrates insight into his/her limitations by self assessment
- **Demonstrates medical expertise in situations other than those involving direct patient care**

### **Communicator (Good Clinical Care; Maintaining Good Medical Practice)**

#### **1. Effective doctor/patient communication**

##### *Objective*

To establish a doctor/patient relationship characterised by understanding, trust, respect, empathy and confidentiality

##### *Skills*

- Able to gather information regarding the patient's beliefs, concerns and expectations about the condition and consider the influence of factors such as the patient's age,

- gender, ethnic, cultural and socio-economic background and spiritual values on that illness
- Able to elicit information regarding the beliefs, concerns and expectations of patients with regard to their presenting conditions.
- Able to evaluate factors such as the patient's age, gender, ethnic, cultural, socio-economic and spiritual values and the impact that these may have on the management of that patient and condition.
- Able to deliver information to the patient and family humanely and in a way that is understandable, encourages discussion and promotes the patient's participation in decision making to the level appropriate for the situation.
- Able to work with patients who present significant communication challenges such as anger or confusion, or an ethno-cultural background different from the doctor's own.

## 2. **Communication with Colleagues**

### *Objective*

To appreciate the importance of co-operation with other healthcare professionals involved in patient care and to ensure that the roles of these professionals are clear, consistent, understood by all involved, and that, appropriate and timely information is delivered to patients and their families.

### *Skills*

- Communicates effectively with colleagues within and outside of the team
- Evaluates the roles and responsibilities of individuals within the clinical team and to ensure that these are understood by all concerned in the context of individual and general patient care.

## **Collaborator (Good Clinical Care; Working with Colleagues)**

### *Objective*

To achieve competence in the formulation and implementation of appropriate care plans in the clinical situation, in collaboration with members of an interdisciplinary team, following assessment, investigation, treatment and continuing care.

**To understand how healthcare governance influences patient care, research and educational activities at a local, regional and national level**

### *Skills*

- To achieve a goal related to patient care, a research problem, an educational activity or an administrative responsibility by using the expertise and being aware of the limitations of all members of an interdisciplinary team
- **Ability to accept, consider and respect the opinion of others team members, while contributing specialty-specific expertise him/herself in an interdisciplinary team meeting**
- **Ability to communicate with members of an interdisciplinary team in the resolution of conflicts, provide feedback, and where appropriate, assume a leadership role**

### **Manager (Working with Colleagues; Probity)**

#### *Objectives*

To be able to work effectively as a member of a team or a partnership and to accomplish tasks whether one is a team leader or a team member.

**To make clinical decisions and judgments based upon sound evidence for the benefit of individuals and the population served.**

#### *Skills*

- **Is able to function effectively in a healthcare organization from individual clinical practice to organisations at the local, regional and national level**
- **Through understanding the structure, financing, and operation of the NHS and its facilities, is able to function effectively within it playing an active role in its change**
- **Ability to access and apply a broad base of information to the care of patients in community care, hospital and other healthcare settings**
- **Uses population based approaches to healthcare services and recognises their implication for medical practice**
- **Uses planning, budgeting, evaluation to maximise the outcomes of a patient care**

### **Health Advocate (Good Clinical Care; Probity)**

#### *Objective*

To demonstrate an understanding of determinants of health and public policy in relation to individual patients by identifying the patient's

status with respect to one or more determinants of health (i.e. unemployment)

### *Skills*

- Adapts the assessment and management accordingly (i.e. the medical history to the patients social circumstances); and
- Assesses the patient's ability to access various services in the health and social system and offer appropriate assistance.

## **Scholar (Maintaining Good Medical Practice; Teaching and Training, Appraising and Assessing; Probity)**

### **1. Clinical**

#### *Objective*

To demonstrate a rigorous approach to clinical problem solving

#### *Skills*

- Can pose a clinical question
- Recognises and identifies gaps in knowledge and expertise around a clinical question
- Formulates a plan to fill the gap by:
  - conducting an appropriate literature search based upon a clinical question
  - assimilating and critically appraise the literature
  - developing a system to store and retrieve relevant literature
  - consulting others (physicians and other healthcare professionals) in a collegiate manner
- Proposes a solution to the clinical question
- Implements the solution in practice. Evaluate the outcome and reassess the solution (re-enter the loop at c-i or c-ii)
- Identifies practice areas for research

### **2. Education and Teaching**

#### *Objective*

Can demonstrate an understanding of, and the ability to apply, the principles of adult education, with respect to oneself and others.

To develop and deliver a teaching module or unit and supporting lecture notes for an undergraduate or peer teaching session.

**To supervise and mentor learners (trainees) in a work setting.**

## To teach trainees in a work setting

### *Skills*

- Uses his/her understanding of preferred learning methods in dealing with students, trainees and colleagues
- Plans educational activities which clearly set out aims and intended learning outcomes
- Prepares appropriate teaching materials which meet learners' needs
- **Provides effective feedback to learners**
- **Optimises opportunistic teaching and learning in**
  - **Operating theatre**
  - **Bedside**
  - **Outpatients**
- **Can highlight ways in which their clinical teaching might be improved**
- **Able to evaluate the use of reflective practice, learning agreements, portfolios and journals**
- **Uses different methods of assessment appropriate to what is being assessed e.g. knowledge, skills, judgment and professionalism**
- **Can differentiate between appraisal and assessment**

### *Behaviours*

- Shows a commitment to teaching and learning
- **Shows a willingness to supervise the work of less experienced colleagues**
- **Shows sensitivity to the needs of learner and responds appropriately.**

## 3. Research

### *Objective*

**To demonstrate a rigorous approach to research through: the publication of a paper in a peer review journal; or participation in a systematic review with defined outcomes; publishing guidance at trust, regional, specialty or national level.**

### *Skills*

- To be able to pose a research question (clinical, basic or population health)
- Develops a proposal to solve the research question:
  - Conduct an appropriate literature search on the research question
  - Identify, consult and collaborate with appropriate

<p>content experts to conduct the research</p> <ul style="list-style-type: none"> <li>▪ Propose the methodological approach to solve the question</li> <li>○ Carries out the research outlined in the proposal</li> <li>○ Defends and disseminate the results of the research</li> <li>○ Identifies areas for further research that flow from the results</li> </ul>
<p><b>Professional (Relationships with Patients; Probity)</b></p>

## 1. Discipline-Based Objectives

### *Objective*

Displays attitudes commonly accepted as essential to professionalism

### *Skills*

- Use appropriate strategies to maintain and advance professional competence
- Continually evaluates one's abilities, knowledge and skills and know one's limitations of professional competence

## 2. Personal Professional Boundary Objectives

### *Objective*

To balance personal and professional roles and responsibilities and to demonstrate ways of attempting to resolve conflicts and role strain

### *Skills*

- Adopts specific strategies to heighten personal and professional awareness and explore and resolve interpersonal difficulties in professional relationships

## 3. Ethics and Professional Bodies

### *Objective*

To recognise, analyse and know how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations

### *Knowledge*

- Knows and understand the professional, legal and ethical codes of the General Medical Council and any other codes to which the physician is bound

## *Skills*

- Recognises, analyses and attempts to resolve in clinical practice ethical issues such as truth telling, consent, advanced directives, confidentiality, end-of-life care, conflict of interest, resource allocation, research ethics etc
- Understands and is able to apply relevant legislation that relates to the health care system in order to guide one's clinical practice
- Recognises, analyses and knows how to deal with unprofessional behaviours in clinical practice, taking into account local and national regulations