



R E G U L A T I O N S

FOR ADMISSION TO THE FELLOWSHIP OF

THE COLLEGE OF NEUROSURGEONS OF SOUTH AFRICA

FC Neurosurg(SA)

The examination comprises Primary, Intermediate and Final: the Final must be passed within six years of passing the Intermediate

- | | | |
|---------------------|---|--|
| PRIMARY | - | i) Basic Sciences
ii) Neuro-anatomy |
| INTERMEDIATE | - | i) The principles of surgery in general
ii) The principles of neurosurgery |
| FINAL | - | The theory and practise of neurosurgery, including operative surgery and the applied basic sciences namely anatomy, physiology and pathology |

PRIMARY (Adapted from the College of Surgeons (SA))

1.0 ADMISSION TO THE PRIMARY EXAMINATION

- 1.1 A candidate for the Primary examination must hold a post-internship qualification to practise medicine which has been registered or is registrable with the Health Professions Council of South Africa
- 1.2 The General Surgical Primary examination is used for candidates wishing to proceed to other surgical specialities. The rules of the other surgical speciality vary and it is incumbent on prospective candidates to check the appropriate college's regulations before applying for admission to the general surgical primary examination.
- 1.3 The candidate should have successfully completed the Basic Surgical Skills course prior to applying for the Primary Examination

INTERMEDIATE (Adapted from the College of Surgeons (SA))**2.0 ADMISSION TO THE INTERMEDIATE EXAMINATION**

A candidate may be admitted to the Intermediate examination having

- 2.1 passed the Primary including Neuro-Anatomy
- 2.2 completed not less than 12 months of approved training as a registered medical practitioner, in surgery. Training during community service cannot be submitted.

Of the 12 months training called for, not less than 6 months must be spent in neurosurgery, not less than 3 months must be spent in ICU and not less than 3 months in trauma/emergency surgery.

2.3 NOTE:

2.3.1 The Primary and Intermediate examinations may be attempted concurrently with the proviso that if the Primary is failed and the Intermediate passed, no credit will be given for passing the Intermediate which will have to be retaken

2.3.2 The CMSA Senate, through its Examinations and Credentials Committee, will review all applications for admission to the examination and may also review the professional and ethical standing of candidates

3.0 SYLLABUS FOR THE PRIMARY EXAMINATION**3.1 Primary - Basic Sciences**

Core knowledge of anatomy, physiology and the principles of pathology and microbiology. This knowledge of the basic sciences is common to all surgical disciplines

- 3.2 **Primary – Neuroanatomy** [SEE APPENDIX A]
[SEE APPENDIX B FOR GUIDELINES]

4.0 SYLLABUS FOR THE INTERMEDIATE EXAMINATION**4.1 Paper I - The principles of surgery in general**

The principles of surgical care which are common to all surgical disciplines

[SEE APPENDIX C FOR GUIDELINES]

4.2 Paper II - The principles of neurosurgery

[SEE APPENDIX D FOR GUIDELINES]

5.0 CONDUCT OF THE PRIMARY AND INTERMEDIATE EXAMINATIONS**5.1 Primary**

- (i) two 3-hour papers of MCQs and/or short written questions on basic sciences
- (ii) one 3-hour paper of MCQs on basic neuro-anatomy

5.2 Intermediate**5.2.1 The written examination**

one 3-hour paper (FCS(SA) Intermediate Paper I) consisting of single best answer questions (SBA) on the principles of surgery in general and one 3-hour paper consisting of single best answer questions (SBA) on the principles of neurosurgery
candidates must achieve a minimum of 50% in the principles of neurosurgery paper and a minimum of 50% in the principles of surgery paper.

5.2.2 The performance examination (general surgery)

The performance examination will consist of one paper case and an OSCE.
The paper case will be centred around the Principles of Surgery in General.
There will be 10 OSCE questions based on Principles of Surgery in General.

The performance examination (neurosurgery)

The performance examination will be an OSCE consisting of 4 stations based on the Principles of Neurosurgery and interpretation of clinical findings.

5.2.3 The overall mark (Principles of surgery in general)

A candidate's final mark will be calculated as follows per paper:

Paper 1:

MCQ paper 1	33.3% final mark
Paper case mark	33.3% final mark
OSCE mark	33.3% final mark

The overall mark (Principles of neurosurgery)

A candidate's final mark will be calculated as follows:

Paper 2:

MCQ paper 2	50% final mark
OSCE mark	50% final mark

- 5.2.4 A candidate who passes both components in terms of rule 5.2.3 will have passed the intermediate examination.
- 5.2.5 A candidate who passes one component in terms of 5.2.3., must attempt the failed component at the next two consecutive examinations of the CMSA.
- 5.2.6 Both components (Principles of surgery in general and Principles of neurosurgery) must be completed within **THREE** consecutive college examinations.
- 5.2.7 A candidate who fails the remaining component at the next two consecutive examinations will be deemed to have failed the FC Neurosurg(SA) Intermediate examination. Such a candidate will need to repeat **BOTH** components at a later examination.

FINAL**6.0 ADMISSION TO THE FINAL EXAMINATION**

(to be read in conjunction with the Instructions)

- 6.1 A candidate may be admitted to the Final examination having
- 6.1.1 passed the Primary and Intermediate of the examination; or having completed the Fellowship of one of the Colleges with which there is an agreement of reciprocity; or having completed all the examination components of the MMed in neurosurgery of a South African university, except the research report if required
- 6.1.2 been qualified to practise for a period of not less than 5 years, the year of internship **NOT** to form part of this period
- 6.1.3 served a period of not less than 48 months in an approved training in neurosurgery and holds a Health Professions of SA registrar training number (this period may form part of the five years called for in 6.1.2 above: this is additional to the training called for in paragraph 2.2)
- 6.2 Candidates must produce certification of training for both Intermediate and Final examinations
- 6.3 The candidate's Head of Department should ensure that the candidate has completed the necessary training
- 6.4 The ATLS certificate is a compulsory requirement for entry to the Final examination
- 6.5 Certification from the Head of Department that the candidate has completed the neurosurgical Portfolio to his/her satisfaction (all candidates applying for the FC Neurosurg(SA) Final examination from January 2010 must comply with this rule)
- 6.6 Training is valid for a period of four (4) years from the date of completion in a numbered speciality training post. In exceptional circumstances candidates who do not successfully complete the examination within this period may motivate, with support from their HOD, to the College of Neurosurgeons for a once off extension.

7.0 SYLLABUS FOR THE FINAL EXAMINATION

The theory and practise of neurosurgery including operative surgery and the applied basic sciences, viz anatomy, physiology and pathology

8.0 CONDUCT OF THE FINAL EXAMINATION

8.1 Two (2) 3-hour SBA/MCQ papers

8.2 An OSCE consisting of 8 stations

9.0 WEIGHTING OF THE EXAMINATION FOR FC NEUROSURG(SA) FINAL

9.1 Written Examinations (out of 100%)

Two (2) SBA/MCQ papers each contributing 50% the overall combined mark.

An OSCE consisting of 8 stations (out of 100%)

All OSCE stations contributing 50% to the overall combined mark

9.2 Criteria for entry to the oral and clinical examination:

9.2.1 Candidates must achieve a pass in the combined SBA/MCQ papers for entry to the clinical/oral examination. The pass mark for the examination (combined mark for both papers) will be determined using the Yes/No Angoff method of setting an examination standard (Ricker, 2006).¹

9.3 Oral & Clinical Examinations

9.3.1 Candidates must achieve a combined minimum of 50% overall in the OSCE

10.0 ADMISSION AS A FELLOW

10.1 Only candidates who have completed training in a CMSA recognised registrar post may be awarded a fellowship if successful in the examination.

10.2 **Candidates who have written the examination as a prerequisite from the HPCSA for inclusion on the specialist register are not eligible to be awarded a Fellowship but will be sent a letter confirming their success in the examinations**

All other candidates will be asked to sign a declaration as below:

I, the undersigned, do solemnly and sincerely declare

that while a member of the CMSA I will at all times do all within my power to promote the objects of the CMSA and uphold the dignity of the CMSA and its members

that I will observe the provisions of the Memorandum and Articles of Association, By-laws, Regulations and Code of Ethics of the CMSA as in force from time to time

that I will obey every lawful summons issued by order of the Senate of the said CMSA, having no reasonable excuse to the contrary

and I make this solemn declaration faithfully promising to adhere to its terms

Signed at thisday of

..... 20

Signature

Witness

(who must be a Founder, Associate Founder, Fellow, Member, Diplomate or Commissioner of Oaths)

10.3 A two-thirds majority of members of the CMSA Senate present at the relevant meeting shall be necessary for the award to any candidate of a Fellowship

10.4 A Fellow shall be entitled to the appropriate form of certificate under the seal of the CMSA

10.5 In the event of a candidate not being awarded the Fellowship (after having passed the examination) the examination fee shall be refunded in full excluding HPCSA candidates who are not entitled to a Fellowship.

10.6 The first annual subscription is due one year after registration (statements are rendered annually)

APPENDIX A

EMBRYOLOGY

Neural:

1. **General development of the CNS and Cellular differentiation.**
2. **Development of the brain**
 - *Myelencephalon* - medulla oblongata
 - *Metencephalon* - cerebellum and pons
 - *Mesencephalon* - midbrain
 - *Diencephalon* - V3, pineal, thalamus, hypothalamus and pituitary
 - *Telecephalon* - cerebral hemispheres, cortex and commissure
3. **Development of the Spinal cord**
 - Neural tube (normal)
 - Neural crest (normal)

Sclerotomal:

1. **Skull** - ossification and closure of sutures
2. **Vertebrae** - ossification centres

GROSS ANATOMY OF THE SPINE:

1. **Anatomy** - vertebrae, disc, joint, ligament
2. **Relationships** - between neural and vertebral elements
3. **Meninges**
4. **Cross sectional anatomy**
5. **Nerve roots, ganglion, peripheral nerve**
6. **Perivertebral** - musculature and fasciae
7. **Relationships** - (anterior, lateral and posterior) of CCJ, C1/C2, cervical, cervico-thoracic junction, thoracic, thoraco-lumbar junction, lumbar, sacral
8. **Blood supply** - arterial, venous
 - territories of supply

GROSS ANATOMY OF THE BRAIN:

1. **Coverings**
2. **Divisions** - lobes, named fissures, sulci and gyrii
3. **White matter** - tracts and connections: commissures, association fibres, projection fibres
4. **Deep nuclei**
5. **Ventricular system, cisterns, sub-arachnoid space**
6. **Choroid plexus**
7. **Limbic system**

8. **Specific regions** - pituitary, pineal gland, cavernous sinus, orbit
9. **Brain stem**
 - divisions
 - superficial anatomy and relationships
 - cross sectional anatomy
 - cranial nerve relationships
10. **Cerebellum**
 - surface anatomy
 - gross cross sectional anatomy
 - peduncles and connections
11. **Cranial nerves** - nuclei, intracranial course, extra cranial course and supply

VASCULAR ANATOMY:

1. **Venous**
 - sinuses, internal deep drainage, superficial drainage
 - internal deep drainage
 - superficial drainage
2. **Arterial**
 - CAROTID
 - extra cranial
 - branches
 - cervical, petrous, cavernous sinus, clinoid, Circle of Willis
 - named and angiographic, areas of supply
 - EXTERNAL CAROTID
 - INTERNAL CAROTID
 - BRANCHES
3. **Vertebral**
 - extra-cranial in cervical spine
 - C1/C2 relationships
 - intracranial
 - branches and areas of supply

CSF CIRCULATION:

CORRELATIVE ANATOMY OF THE BRAIN:

1. **Lobes** - gyrii
2. **Deep nuclei**
3. **Cranial nerves**
4. **Cerebellum**

CORRELATIVE ANATOMY OF THE SPINAL CORD:

1. **Cross sectional**
2. **Segmental**

AUTONOMIC NERVOUS SYSTEM:

1. **Sympathetic**
 - *PARA VERTEBRAL GANGLIA* (sympathetic chains)
 - *PRE VERTEBRAL GANGLIA* (perivascular eg aorta)
2. **Para sympathetic**
 - *CRANIAL NERVE ASSOCIATION GANGLIA*
 - *III, VII, IX, X* (ciliary, pterygopalatine, submandibular, otic ganglia, visceral supply)
 - *NERVES T1 – L2/3*

3. **Anatomical location**
 - cervical ganglia and chain
 - cell body location in spinal canal
 - pre ganglionic axons
 - post ganglionic axons

ANATOMY OF THE NECK:

1. **Anterior triangle of the neck**
2. **Posterior triangle of the neck**
3. **Cervical plexus**

RELEVANT NEUROSURGICAL ANATOMY OF THE THORACIC WALL:

1. **Intercostal space anatomy**
2. **Intercostal nerve anatomy**

RELEVANT NEUROSURGICAL ANATOMY OF THE ABDOMINAL WALL:

1. **Abdominal wall muscle layers** (excluding inguinal area)
2. **Anterior relationships of lumbo sacral spine**

RELEVANT NEUROSURGICAL ANATOMY OF THE PERIPHERAL NERVES:

1. **Ulnar** nerve at elbow
2. **Median** nerve at wrist
3. **Sciatic nerve** at sciatic notch and piriformis
4. **Brachial plexus** and anatomical relations of the first rib
5. **Lumbo sacral plexus**
6. **Muscle innervation** by median, ulnar, radial nerves, musculocutaneous, posterior tibial, common peroneal and femoral nerves
7. **Myotomes and Dermatomes**

SPECIAL AREAS:

1. **Skull bones and foramina**
2. **Air sinuses**
3. Peripheral course of **VII** distal to the **Parotid gland**
4. **VII** course within the **Mastoid**
5. **Falx and Tentorium Cerebelli**
 - Relationship at **Tentorial hiatus**
 - Folding and formation of **Cavernous sinus**
6. **Cerebello pontine angle**

APPENDIX B

1.0 AIMS, OBJECTIVES AND SYLLABUS FOR THE PRIMARY EXAMINATION IN GENERAL SURGERY

- 1.1 The aim of the examination is to ensure that successful candidates are competent to embark on a career in General Surgery or one of its subspecialties. The examination will help refresh existing knowledge and impart new knowledge and competencies to ensure better care of surgical principles in a holistic manner. The competencies required are in the cognitive, psychomotor and affective (interpersonal/attitudinal) domains
- 1.2 Competence is defined as knowledge, skills and attitudes in:
- medical expertise
 - technical expertise
 - judgement – clinical decision making
 - communication
 - collaboration and teamwork
 - management and leadership
 - health advocacy
 - scholarship and teaching
 - professionalism.
- 1.3 Areas of competence that will be assessed in the FCS(SA) Primary examination will include:
- Clinically relevant anatomy and applied embryology
 - Appreciation of three dimensional and cross sectional relevant anatomy
 - Clinically relevant human physiology
 - Pathophysiology in surgical patients
 - General pathology principles and mechanisms of disease
 - The genetic basis of disease
 - Oncological principles in surgery
 - Immunology
 - Principles of microbiology relevant to general surgical practice
 - Asepsis and antisepsis
 - Pharmacological principles relevant to surgery
 - Pharmacology of drugs commonly used in surgery
 - Blood constituents, clotting mechanisms and blood product transfusion principles
 - Fluid requirements and fluid management in the surgical patient
 - Acid–base problems in the surgical patient
 - Applied medical statistics
 - Critical appraisal of the literature
 - Evidence based literature
 - Searching the literature
 - Informed consent
 - HPCSA regulations pertaining to surgical practice
 - Basic clinical skills
 - Basic procedural skills
 - Counseling of patients and relatives
 - Safety in the operating room
 - Principles of audit
 - Principles of patient documentation
 - Principles of continuity of care
 - The content of the Basic Surgical Skills course manual
 - Learning in medicine is a continual process. Although general and specific objectives have been set, any aspect of medicine that is deemed to be surgically relevant may be included in the assessment

- As a guide, the Specialty of Surgery (General Surgery) covers the following areas:
 - Alimentary tract
 - The abdomen and its contents
 - Breast, skin and soft tissue
 - Endocrine system
 - Head and neck surgery
 - Vascular surgery
 - Paediatric surgery
 - Trauma surgery/burns
 - Surgical critical care
 - Surgical oncology

2.0 SPECIFIC/LEARNING OBJECTIVES

2.1 Clinically relevant anatomy and applied embryology:

- 2.1.1 Detailed knowledge of anatomy is required. Clinically relevant anatomy should be concentrated on. The anatomy of the whole body should be known in some detail. It is expected however that the candidate should concentrate on the anatomy, surface anatomy, applied anatomy and embryology of :
- Those structures commonly affected by disease encountered by the general surgeon
 - Those anatomical structures and their anatomical relationships which are important in general surgical operations
- 2.1.2 Anatomical variations are common and often pose challenges to the practising surgeons. The anatomical variations that impact on presentation of disease and /or surgical exposure should be known in detail, as should the embryological basis of the variation
- 2.1.3 The embryological origin of organs should be known. Emphasis will be placed on common anatomical variations/abnormalities that have an embryological origin
- 2.1.4 The following areas of applied gross anatomy should be concentrated on:
- Brain and skull with emphasis on areas affected by trauma and space occupying lesions
 - The cranial nerves
 - The face
 - Bony structures of the sinuses, orbit, jaw
 - The tongue and pharynx
 - Salivary glands
 - The neck
 - The chest
 - The mediastinum
 - The thoracic inlet and outlet, the brachial plexus
 - The axilla
 - The muscles of the neck and back
 - The peripheral vascular system
 - The lymphatic system
 - The heart
 - The diaphragm
 - The abdominal wall
 - The abdominal contents
 - The retroperitoneum
 - The pelvis (its contents and foramina, the pelvic floor)
 - The pelvic bones
 - The anus and continence mechanisms
 - The peripheral nervous system
 - The autonomic nervous system
 - The spine
 - The spinal cord and its neuroanatomy

- The cubital fossa
- The popliteal fossa
- The gluteal area
- The perineum
- Female genitalia (internal and external)
- Male genitalia
- The extremities. Emphasis to be placed on vital structures (nerves, blood vessels), major muscle groups, compartments, vital structures in the joints, relationship of vital structures to bones
- The hand, with emphasis on vital structures, function and areas prone to infection

2.2 **Appreciation of three dimensional and cross sectional relevant anatomy:**

2.2.1 Current imaging with CT and MRI is cross sectional, but more and more axial and saggital scanning is being performed. In addition, three dimensional reconstruction is common. The candidate would be expected to be able to identify normal anatomical structures in such images

2.3 **Clinically relevant human physiology:**

2.3.1 Candidates should have detailed knowledge of:

- Homeostasis, thermodynamics, positive and negative feedback
- Fluid and electrolyte and acid-base physiology and pathophysiology
- Body water compartments
- Composition, osmotic activity and oncotic pressure of body fluids
- Water and electrolyte exchange
- Mechanisms of osmoregulation and volume regulation
- Buffer systems and mechanisms of acid-base haemostasis
- The haemopoietic system
- Lung function and respiratory exchange and oxygen transport. Control of respiration and breathing. Ventilatory response to exercise. Measuring lung function. Ventilation perfusion ratios, control of pulmonary circulation
- Oxygen transport:
- Renal function: control systems with respect to microanatomy, autoregulation, regulation of GFR, renal tubular function(in health and disease), the effect of diuretics, the effect of obstruction at various points, bladder function and control (in health and disease)
- Adrenal function
- Function of the GIT in digestion, motility and transit, absorption
- The secretions of the GIT
- Hepatic function
- Nutrition:

The interrelationship between fat, carbohydrate and protein metabolism and changes with under and over nutrition. The role of trace elements and vitamins in nutrition. The nutritional impact of surgery and injury

- Cardiac function, electrophysiology and circulation
- Physiology of the peripheral vascular system and microvasculature
- Physiology of the splanchnic, hepatic circulation
- Placental and fetal circulation
- Control of blood pressure
- The endothelium
- The extracellular space and lymph systems
- The cardiovascular response to exercise and stress
- The role of Nitric Oxide
- Neurophysiology:

Cell membrane excitability, intercellular signaling, somatic and autonomic nervous systems, cerebral function, the functional role of the basal ganglia, limbic system, hypothalamus brainstem and reticular activating system, reflex controls, spinal neurophysiology, the cortex (and its role in speech, sensory perception and motor control), the cerebellum (and its role in fine motor coordination), the cranial nerves

- The CSF and blood-brain barrier
- Endocrine function (pituitary, thyroid, parathyroid, adrenal medulla and cortex, pancreas, kidney, sex hormones)
- The regulation of body function in response to exercise, trauma, starvation, sepsis and stress of surgery
- Paracrine and autocrine function
- The different physiology of the neonate, child, the pregnant woman and the elderly must be understood

2.4 PATHOPHYSIOLOGY IN SURGICAL PATIENTS

2.4.1 It is expected that the candidate will have a clear understanding of normal human physiology and recognise how this may be altered by pathological processes, surgery or anaesthesia. Correlation between physiological changes and physical signs or symptoms elicited in patients should be clearly understood. For example, there should be a clear understanding of the physiological changes that:

- ensue in a patient following prolonged vomiting or diarrhoea,
- occur in renal function after surgery
- prevail in a patient with a perforated duodenal ulcer
- occur during and after major surgery
- occur with deep obstructive jaundice
- affect fluid balance in the surgical patient

2.4.2 The pathophysiological effects of insult to the neonate, child, the pregnant woman and the aged must be understood

2.4.3 Interpretation of laboratory results in a clinical scenario eg

- Fluid, electrolyte and acid base disturbances and their identification
- Acid base abnormalities
- Haemostasis

2.5 GENERAL PATHOLOGY PRINCIPLES AND MECHANISMS OF DISEASE

2.5.1 Candidates should demonstrate an understanding of the general pathological mechanisms (degenerative, reactive and neoplastic) underlying common disease. This will include knowledge of aetiology, pathogenesis, epidemiology, investigation and natural history. Areas to be concentrated on are:

- General pathological phenomena including cell injury, adaptation and death, inflammation, apoptosis, cell death, degenerations including atherosclerosis, pigmentation and calculus formation, alterations of growth, differentiation and function of cells and of age
- The effects of aging on the body
- Tissue response to injury including the adaptive reactions of the body to injury. This includes an understanding of important morphological manifestations, pathophysiology of important disease states (eg major organ failure either single or combined, shock, sepsis, disseminated intravascular coagulation), biochemical mechanisms and manifestations where these factors are important in the understanding of pathogenesis, natural history
- The processes of wound healing and tissue inflammation (acute and chronic)
- The principles of cellular events and resulting in local and systemic inflammatory responses. This includes knowledge of the common cytokines and other mediators of inflammation
- Common and important issues in systemic pathology are examinable in so far as:
 - (i) a given lesion exemplifies a basic pathological process, eg anaphylaxis as an example of hypersensitivity reactions, myocardial infarction in atherosclerosis, colorectal carcinoma as an example of neoplasia, or
 - (ii) disorders of a given system are likely to be encountered in surgical practice, eg post-operative pneumonia
- Knowledge of laboratory medicine

- 2.6 **THE GENETIC BASIS OF DISEASE** (Genetics and Molecular Biology)
- 2.6.1 Structure of DNA and RNA, the cell cycle, the generation of genetic abnormalities
- 2.6.2 Mendelian genetics
- 2.6.3 Cytogenetics including basics of laboratory techniques for detection of cytogenetic abnormalities
- 2.6.4 Specific conditions are examinable in so far as they illustrate important principles or are common or important disorders
- 2.7 **ONCOLOGICAL PRINCIPLES IN SURGERY**
- 2.7.1 An understanding of Cancer biology is essential. The following specific aspects pertaining to oncology should be known in detail:
- Cells and tissues of origin
 - Reproductive, growth (proliferative) patterns and host interaction
 - Mechanisms of invasion and metastasis
 - Molecular biological, genetic and inherited characteristics
 - Geographic racial and cultural (population) factors
 - Mechanisms and types of chemical, physical and microbial carcinogenesis
 - Distinctive pathological (macroscopic, histological and immunochemical) features which aid diagnosis
 - The application of the above to common cancers in children and adults
 - Principles of oncological surgery
 - Basic mechanisms of action of current common chemotherapeutic agents
- 2.8 **Immunology:**
- 2.8.1 Basic Immunology including:
- non-specific defence mechanisms, the complement system, the major histocompatibility complex
 - the cells of the immune system, their functions, their interactions, cell subsets, cell surface markers and receptors structure, function, genetics of secretory products of cells involved in the immune response including immunoglobulins, interleukins, various other factors activation and control of the normal immune response
 - Immunity infection including bacteria, viruses, fungi and protozoa
 - Abnormal Immunological Responses including hypersensitivity, autoimmune disorders and immunodeficiency disorders
 - Diagnostic Immunology including the basic principles (not detailed) of commonly used immunological tests, their applications and their limitations
 - Immunology pertaining to blood product transfusion
- 2.9 **Transplantation:**
- Define and differentiate autografts, allografts and xenografts
 - Understand the role of major histocompatibility complex in clinical transplantation
- 2.10 **PRINCIPLES OF MICROBIOLOGY RELEVANT TO GENERAL SURGICAL PRACTICE**
- An understanding and knowledge of infectious agents (viruses, bacteria, fungi, protozoa and sub-viral particles eg prions) in surgical disease processes and of the developing microbial resistance to current antimicrobials is essential
- Pathogenesis of infection
 - Host defence mechanisms and microbial virulence:
 - The normal microbial flora of the body and its role in health and disease
 - Surgically relevant bacterial, viral, fungal and parasitic infections;
 - infection following surgery, eg wound infection, septicaemia
 - infections with surgical implications, eg peritonitis, anaerobic soft tissue infections, AIDS
 - The principles of antimicrobial agents and their scientific use in the therapy and prevention (prophylaxis) of infection
 - Sterilisation and disinfection
 - Laboratory medicine aspects of infectious diseases, eg principles behind blood culture techniques, interpretation of gram stains, antimicrobial susceptibility techniques

2.11 PRINCIPLES OF PHARMACOLOGY AND THERAPEUTICS IN GENERAL SURGERY

- Pharmacological principles relevant to surgery and Pharmacology of drugs commonly used in surgery
- The following *principles* are to be covered in detail:
- Pharmacodynamics and pharmacokinetics of major drug groups
- The pharmacodynamics includes the mechanism of action of a drug, particularly where it may be important in understanding its use and/or its side-effects, whereas the pharmacokinetics include factors such as bioavailability (particularly to emphasise difference in routes of administration), plasma protein binding, clearance (metabolism if relevant) etc. The clinical application of pharmacodynamics and pharmacokinetics in route of administration, dosage and dosing schedules, the effect of disease states on drugs, the effect of the drug on the patient, and potential clinically relevant drug interactions
- The changes in the neonate, child and elderly that effect pharmacodynamics and pharmacokinetics
- The above principles pertaining to the following drug groups should be emphasised:
 - Pain killers
 - Diuretics
 - Inotropes, vasoconstrictors, vasodilators, anti-arrhythmics
 - Immune modulators including steroids and anti-inflammatories
 - Antimicrobials
 - Drugs affecting the GIT eg those affecting gastric acid secretion, gut motility, stool transit time
 - Drugs affecting haemostasis eg Heparin, Warfarin, Fractionated Heparin, Thrombolytics
 - Anaesthetic drugs (Inhalational, oral, and intravenous)
 - Local anaesthetics
 - Drugs affecting glucose metabolism eg insulin, oral hypoglycaemics
 - Cytotoxics, Anti-oestrogens eg Tamoxifen
 - Thyroxin and anti-thyroid drugs

2.12 HAEMATOLOGY AND TRANSFUSION

- The following aspects should be known in detail:
 - The origin and differentiation of haematopoietic cells
 - Anaemias of acute and chronic blood loss. Basic investigations to differentiate various causes of anaemia eg types and mechanisms of haemolysis, anaemias caused by substrate deficiency
 - Mechanisms of haemostasis. Tests of haemostasis and their clinical application
 - Abnormal haemostasis
 - Bleeding disorders, congenital and acquired
 - Disseminated intravascular haemostasis
 - Origin, differentiation and proliferations of white cells particularly lymphomas
 - Blood products, components and substitutes

2.13 ASEPSIS AND ANTISEPSIS

- Blood constituents, clotting mechanisms and blood product transfusion principles
- Fluid requirements and fluid management in the surgical patient

2.14 CRITICAL APPRAISAL OF THE LITERATURE, EVIDENCE BASED MEDICINE AND SEARCHING THE LITERATURE

- With the explosion of available medical literature, the candidate should understand the key concepts of Evidence Based Medicine (EBM), levels of evidence and how to effectively and efficiently search the literature

2.15 LEGAL AND ETHICAL ISSUES

- Candidates should know the ethical and legal principles relating to:
 - Informed consent
 - Confidentiality and access to health records
 - Filling out a death certificate
 - Medico-legal post mortems
 - Obtaining permission for autopsy
 - Withholding resuscitative measures
 - Organ donation
 - Brain death
- HPCSA regulations pertaining to surgical practice including issues of professional misconduct

2.16 **APPLIED MEDICAL STATISTICS, BIOSTATISTICS, EPIDEMIOLOGY**

- The candidate should:
 - Understand the principles of biostatistics and research design and commonly used statistical tests and terminology as necessary to critically appraise the clinical and experimental surgical literature
 - Understand the principles of biostatistics and epidemiology applicable to the use of diagnostic tests, screening and disease prevention programmes, patterns of disease (eg trauma, cancer), risk assessment, scoring systems (eg physiologic and anatomic scoring of trauma, neurologic function etc), prediction of outcome etc
 - Identify the meaning and appropriate usage of commonly used terms, including sensitivity, specificity, positive predictive value, negative predictive value, false positive, false negative, confidence limits, standard deviation, retrospective, prospective, intention to treat, power, randomised trial, control, blind, double blind, relative risk reduction, number needed to treat, meta analysis, systematic review
 - Identify types 1 and 2 statistical errors and the factors influencing them
 - Identify the requirements for the appropriate usage of common statistical comparison, including t test, chi-square, ANOVA, correlation, regression, non parametric testing”

2.17 **THE BASIC SURGICAL SKILLS COURSE**

- It is expected that all candidates have successfully completed the Basic Surgical Skills course that is run under the Aegis of the Colleges of Medicine of South Africa under license from the Royal College of Surgeons of England
- The following are examinable:
 - Asepsis and antisepsis
 - Safety in theatre
 - The principles of anastomosis
 - Suture materials and needles
 - The principles of debridement
 - Diathermy principles and safety
 - Basic principles of laparoscopy

2.18 **Suggested texts for new FCS(SA) Primary:**

- Rafferty AT, Delbridge MS. *Basic Science for the MRCS*. Churchill Livingstone, Elsevier Science, 2006. ISBN-13 978-0-443-10109-0
- Rafferty AT. *Applied Basic Science for Basic Surgical Training*. Churchill Livingstone, 2000. ISBN 0 443 06143 2
- Winscow TDV, Campbell MJ. *Statistics at Square One 10th Edition*. BMJ Books, 2002. ISBN 10 : 0 72791552 5
- Basic Surgical Skills Manual; Third edition
 - The above texts are highly recommended and cover almost the entire syllabus of the FCS Primary. It is expected, however, that the following texts be used as references for a deeper understanding of the basic sciences
- **Anatomy:**
 - Snell, Richard S. *Clinical Anatomy*. 7th Edition. Lippincott Williams and Wilkins, Philadelphia, 2004
 - McMinn R.M.H., *Last's Anatomy, Regional and Applied*, 9th Ed., 1998 (Reprinted 2003) Churchill Livingstone
 - Abrahams PH, Marks SC, Hutchings RT. *Mc Minns Color Atlas of Human Anatomy*. CV Mosby 2003 ISBN 0723432120
- **Physiology:**
 - Ganong W.F *Review of Medical Physiology*, 21th Ed., 2005, Lange Mc Graw-Hill
 - or
 - Guyton, AC, Hall JE. *Text Book of Medical Physiology*, 11th Ed. Elsevier. 2000

- **Pathology:**

- McPhee SJ, Lingappa, VR, Ganong WF. *Pathophysiology of Disease. An introduction to clinical medicine.* Fourth Edition Lange Medical Books/ McGraw–Hill 2003
- Really Essential Medical Immunology: ***Ivan Roitt & Arthur Rabson***
- Cotran, Ramzi S. Joint authors/editors: Robbins, Stanley L. Kumar. V, Tucker. C *Robbins pathologic basis of disease.* 3rd ed. Philadelphia: London: Saunders, c1999

2.19 **The examination:**

This will consist of two three hour multiple choice papers. The types of questions will include multiple true false, choose the best option and extended matching questions

APPENDIX C

GUIDELINES FOR CANDIDATES ENTERING THE FC NEUROSURG(SA) INTERMEDIATE

The examination in the principles of surgery in general is designed to test the candidate's understanding of aspects of patient care basic to the perioperative period, viz principles of pre-operative assessment, supportive measures, and complications for both adults and children. The syllabus includes:

1.0 PRE-OPERATIVE CARE

- 1.1 Surgical nutrition: Parental and oral
- 1.2 Fluid and electrolyte therapy
- 1.3 Blood transfusions and its hazards
- 1.4 Infection and antimicrobial agents
- 1.5 Diagnostic aids - imaging and clinical chemistry

2.0 INTRA-OPERATIVE CARE

- 2.1 Aseptic and antiseptic techniques
- 2.2 Hazards and precautions in operating theatres
 - Electrical safety and hazards
 - Radiation effects and hazards
- 2.3 Wound healing and care of the wound
- 2.4 Perioperative management of diabetes mellitus
- 2.5 Perioperative management of the patient on steroid therapy

3.0 NORMAL POSTOPERATIVE CARE AND COMPLICATIONS

- 3.1 Convalescence: The metabolic response to trauma
- 3.2 Hypovolaemic shock
- 3.3 Cardiac arrest
- 3.4 Acid-base metabolism
- 3.5 Gram negative - bacterial endotoxic shock
- 3.6 Respiratory support and mechanical ventilation
- 3.7 Pulmonary aspiration
- 3.8 Adult respiratory distress syndrome
- 3.9 Deep vein thrombosis and pulmonary embolism
- 3.10 Fat embolism
- 3.11 Haemostatic disorders
- 3.12 Postoperative acute renal failure
- 3.13 Postoperative jaundice
- 3.14 The recognition of cardiac arrhythmias and cardiac failure and its management
- 3.15 Multiple organ failure
- 3.16 Postoperative care of infants and children

Suggested reading for the Intermediate : SEE APPENDIX E

APPENDIX D

GUIDELINES FOR CANDIDATES PREPARING TO ENTER THE FC NEUROSURG(SA) INTERMEDIATE

The examination in the principles of neurosurgery is designed to test the candidate's understanding of the principles relevant to the basic skills fundamental to all neurosurgery. The syllabus includes:

1.0 LEGAL ASPECTS OF PRACTICE

Have a knowledge of those sections of the following acts which apply to neurosurgical practice:

- Health Professions Council amendment act: Act 29 of 2007
- Inquest Act: Act 58 of 1959, and its amendments
- Births and deaths registration acts: Act 51 of 1992
- Children's act: Act 38 of 2005

2.0 MEDICAL ETHICS

- General principal of medical ethics
- Surgical consent
- Organ donation
- Providing second opinions

3.0 PHARMACOLOGY

- To understand the pharmacology of commonly used medication in neurosurgery
- The use of prophylactic antibiotics in neurosurgery
- DVT prophylaxis in neurosurgery

4.0 NEUROPHYSIOLOGY

- The blood brain barrier
- Cerebral oedema
- Cerebral perfusion
- Raised intracranial pressure

5.0 NEUROCRITICAL CARE

- Fluids and electrolytes
- Brain death
- Care of the neonate
- Neurogenic pulmonary oedema
- The treatment of raised intracranial pressure
- Maintenance of cerebral perfusion pressure
- Treatment of spinal shock
- Nutrition in the neurosurgical patient

6.0 NEUROLOGICAL INVESTIGATIONS

Understand the principles, indications and complications of

6.1 Neurophysiological tests

- Nerve conduction studies
 - EMG's
 - Electroencephalograms (EEG)

6.2 Neuroradiology

- X-rays
- Radiation safety
- Computer tomography scans
- Magnetic resonance imaging
- Cerebral angiography
- Myelography
- Radionuclide scanning

6.3 Ophthalmological assessment

6.4 Laboratory investigations, including endocrine assessment relevant to neurosurgery

6.5 Audiometry

7.0 PRINCIPLES OF MANAGEMENT (NOT SPECIFICS)

- Spinal injuries
- Brain trauma
- Subarachnoid haemorrhage
- CNS infections
- Hydrocephalus
- Brain tumours

8.0 BASIC OPERATIVE PROCEDURES

- Surface anatomy of relevance to neurosurgery
- Safety in the operating room
- Complications of patient positioning
- Preparation of the patient for craniotomy
- Preparation of the patient for spinal surgery
- Common post-operative complications and their management

9.0 PRINCIPLES OF RADIATION THERAPY

- Conventional external beam radiation
- Stereotactic radiotherapy and radiosurgery
- Interstitial brachytherapy

A P P E N D I X E**SUGGESTED READING FOR THE FC NEUROSURG(SA) INTERMEDIATE**

In preparation for the Intermediate, the postgraduate student's reading should not be limited to the suggested texts. Much of the information necessary for the examination will be acquired during training on the wards, intensive care units, and trauma units

The following texts contain the basic material and approach necessary for both the Intermediate examinations:

1. Mieny CJ, Mennen U. *Principles of Surgical Patient Care, Volumes 1 and 2*. Pretoria; Academia (a division of Van Schaik), 1990
2. Oh TE. *Intensive Care Manual*. 3rd ed. Sydney: Butterworths, 1996
3. Trunkey, Lewis. *Current Therapy of Trauma*. 2nd ed. BC Dekker, 1999
4. Schwartz SI, Shires GT. *Principles of Surgery*. 7th ed. New York; London: McGraw-Hill, Health Professions Division, 1997

OR

- Christopher. F. *The Biological Basis of Modern Surgical Practice: Sabiston's Textbook of Surgery*:. 16th ed. Philadelphia; London: WB Saunders, 2000
5. Lindsay KW, Bone I, Fuller GT. *Neurology and Neurosurgery Illustrated*. 8th ed. Edingurgh; Churchill Livingstone, 2011
6. Greenberg MS. *Handbook of Neurosurgery*. 7th ed. New York; Thieme, 2010

APPENDIX F

1.0 Neurosurgery Syllabus

The syllabus below is a guide to the topics that need to be covered for the FC Neurosurg(SA) examination.

1.1 Anatomy and topographical relationships

- Scalp, skull, dura and leptomeninges, foramina
- Cavernous sinus, orbit and nasal cavities
- Cerebrum
- Cortical areas
- Commissures
- Cerebellum, pons and brainstem
- Pineal gland
- Cranial nerves
- Vertebral column
- Spinal cord and ascending and descending pathways
- Cauda equine, innervations of the bladder
- Brachial and lumbosacral plexus
- Peripheral nerves
- Autonomic ganglia, plexus and nerves
- Ventricular system, subarachnoid space and cisterns
- Cerebrovascular system
- Choroid plexus
- Spinal vascular system
- Somatic sensorimotor system
- Thalamic nuclei
- Limbic system
- Visual pathway
- Auditory pathway
- Hypothalamopituitary axis
- Brain stem reticular formation

1.2 Embryology

- Cranial skeleton
- Differences between foetal, infant, child and adult brain
- Development of ventricular system
- Development of brachial arches and vascular system
- Development of pituitary gland
- The notochord
- Spinal cord development

1.3 Physiology

- Energy metabolism in the brain\
- Cerebral blood flow regulation and pathophysiology of vasospasm
- Brain ischaemia and hypoxia
- Production and absorption of CSF and hydrocephalus
- Intracranial pressure
- Blood brain barrier and cerebral oedema
- Hyper and hyponatraemia
- Hypothalamic pituitary axis
- Neuropharmacology of commonly used agents in neurosurgery

1.4 Paediatric and congenital

- Developmental malformations of the CNS and its coverings
- Spina bifida
- Encephalocele
- Craniosynostosis
- Paediatric head injury
- Subdural effusions of infancy
- Intracranial tumours in children
- Spinal tumours in children
- Phakomatoses
- Craniovertebral abnormalities
- Vascular lesions in the paediatric age group

1.5 Hydrocephalus

- CSF physiology
- Pathophysiology, classification and investigation of hydrocephalus
- Treatment of hydrocephalus
- Benign intracranial hypertension

1.6 Cerebrovascular

- Pathophysiology and clinical diagnosis of cerebral ischaemia
- Occlusive carotid and vertebral disease/carotid endarterectomy/brain revascularisation
- Spontaneous intracerebral/spinal haemorrhage
- SAH
- Pathology, classification, natural history and management of cerebral aneurysms
- Pathology, classification, natural history and management of AVM
- Other cerebrovascular lesions: cavernomas, carotid cavernous fistulas and venous thrombosis
- Interventional radiology

1.7 Trauma

- Mechanisms and patterns/classification of traumatic brain and spinal cord injury
- Pathophysiology of CNS trauma
- Initial resuscitation and triage
- Clinical assessment
- Management including operation for surgical conditions
- Medical management
- Assessment of outcome, factors affecting prognosis

1.8 Perioperative and neurointensive care

- Ventilation
- Fluid balance, nutrition and feeding
- Blood coagulation
- DVT/pulmonary embolism
- Fever in neurosurgical patients
- Postoperative seizures
- Brainstem death
- The neurogenic bladder

1.9 Infections

- Infective complications of neurosurgical procedures – treatment and prophylaxis
- Intracranial and spinal abscess and empyema
- HIV and AIDS related infections
- Bacterial, fungal, viral and parasitic infections

1.10 Tumours

- Presenting features and management of tumours of the CNS
- Principles and techniques of tumour biopsy
- Operative management of intracranial and spinal tumours
- Radiotherapy, chemotherapy for tumours
- Specific management of tumours of the brain, skull base and orbit including glioma, meningioma, pituitary and parasellar tumours, cerebellar pontine angle tumours, metastases, ventricular tumours, pineal regional tumours, lymphoma, medulloblastoma, epidermoid/dermoid, haemangioblastoma and chordoma
- HIV related tumours
- Specific management of tumours involving the spinal column, intramedullary, intra and extradural tumours of the spinal canal and tumours of the nerve roots and peripheral nerves
- Prognosis of CNS tumours

1.11 Spinal disorders

- Spinal cord decompression
- Biomechanics of the spine and principles of spinal stabilization/fusion
- Degenerative spinal disease including cervical spondylotic myelopathy/radiculopathy, thoracic discs, lumbar disc disease, spinal stenosis and spondylolisthesis
- Syringomyelia and arachnoiditis
- Spasticity

1.12 Pain

- Pathophysiology of pain
- Craniofacial pain syndromes
- Trigeminal and glossopharyngeal neuralgia
- Analgesics and pain relief
- Nerve blocks, electrical stimulation and RF lesions for pain relief. Implants, cordotomy, DREZ lesions, dorsal rhizotomy

1.13 Peripheral nerves

- Entrapment neuropathies
- Causalgia

1.14 Functional and stereotactic surgery

- Stereotactic surgery
- Movement disorders and their surgical treatment
- Epilepsy and its medical and surgical management

2.0 LISTING OF DRUGS

Candidates should have a knowledge of the following drugs, with particular relevance to their role in Neurosurgery:

- Anticonvulsants
- Steroids
- Calcium channel blockers
- Drugs for spasticity
- Analgesics
- Antibiotics
- Sedative drugs
- Osmotic diuretics
- Barbiturates

A P P E N D I X G

SUGGESTED READING FOR THE FC NEUROSURG(SA) FINAL

- 1 Greenberg MS (Ed). *Handbook of Neurosurgery*. 8th ed. New York; Thieme. 2016
- 2 Winn HR (Ed). *Youmans and Winn Neurological Surgery*. 7th ed Amsterdam; Elsevier, 2016

JOHANNESBURG
September 2022