Rawalpindi Medical University

Curriculum

Masters in Neurosurgery (M.S)

PREFACE

The horizons of *Medical Education* are widening & there has been a steady rise of global interest in *Post Graduate Medical Education*, an increased awareness of the necessity for experience in education skills for all healthcare professionals and the need for some formal recognition of postgraduate training in Neurosurgery.

We are seeing a rise in the uptake of places on postgraduate courses in medical education, more frequent issues of medical education journals and the further development of e-journals and other new online resources. There is therefore a need to provide active support in *Post Graduate Medical Education* for a larger, national group of colleagues in all specialties and at all stages of their personal professional development. If we were to formulate a statement of intent to explain the purpose of this curriculum we might simply say that our aim is to help clinical colleagues to teach and to help students to learn in a better and advanced way. This book is a state of the art book with representation of all activities of the MSNeurosurgery program at RMU.Curriculum is incorporated in the book for convenience of supervisors and residents. MS curriculum is based on six Core Competencies of ACGME ***(Accreditation Council for Graduate Medical Education)*** including ***Patient Care, Medical Knowledge, System Based Practice, Practice Based Learning, Professionalism, Interpersonal and Communication Skills***. The mission of Rawalpindi Medical University is to improve the health of the communities and we serve through education, biomedical research and health care. As an integral part of this mission, importance of research culture and establishment of a comprehensive research structure and research curriculum for the residents has been formulated and provided in this book.

Prof. Muhammad Umar
(Sitara-e-Imtiaz)
(MBBS, MCPS, FCPS, FACG,
FRCP (Lon), FRCP (Glasg), AGAF)
Vice Chancellor
Rawalpindi Medical University
& Allied Hospitals

CONTRIBUTIONS

SR.NO	NAME & DESIGNATION		CONTRIBUTIONS IN FORMULATIONOF LOG BOOK OF MS NEUROSURGERY
1.		**PROF.DR.NADEEM AKHTAR** MBBS, FCPS (Neurosurgery) Head of Neurosurgery Department, Rawalpindi Medical University & Allied Hospitals	Over all synthesis, structuring & over all write up of MS Neurosurgery Curriculum. Also Proof reading & synthesis of final print version of Log Books of MS Neurosurgery and Rotations Log Book.
2.		**DR. YASIR SHAHZAD** MBBS,MCPS,FCPS,ASCD (Spine), CHPE (Medical Education) Assistant Professor NEUROSURGERY DEPARTMENT, Rawalpindi Medical University	Log Book of MS Neurosurgery and also Log Book for MS Neurosurgery rotations under guidance of Prof. Nadeem Akhtar, Rawalpindi Medical University, Rawalpindi
3.		**DR. SOBAN SARWAR GONDAL** MBBS,FCPS,CHPE (Medical Education) Senior Registrar NEUROSURGERY DEPARTMENT Rawalpindi Medical University	Log Book of MS Neurosurgery and also Log Book for MS Neurosurgery rotations under guidance of Prof. Nadeem Akhtar, Rawalpindi Medical University, Rawalpindi

4.		**DR. SYED HAMMAD ALI NAQVI** MBBS POST GRADUATE RESIDENT (FCPS) Department of NEUROSURGERY, Rawalpindi Medical University	Assistance of Faculty in formulating the log books & computer work under their direct guidance & supervision
5.		**DR ABDUL RAFFAY** MBBS POST GRADUATE RESIDENT (Rotational) Department of NEUROSURGERY, Rawalpindi Medical University	Assistance of Faculty in formulating the log books & computer work under their direct guidance & supervision
6		**MR. ZUBAIR AHMED** MSc. Electronics Computer operator NeurosurgeryDeptt Rawalpindi Medical University.	Assistance of Faculty in designing log books & computer work under their direct guidance & supervision

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SECTION – I

MISSION STATEMENT

The mission of MS Neurosurgery Residency Program of Rawalpindi Medical University is:

1. To provide exemplary neurosurgical care, treating all patients who come before us with uncompromising dedication and skill.
2. To set and pursue the highest goals for ourselves as we learn the science, craft, and art of surgery.
3. To passionately teach our junior colleagues and students as we have been taught by those who preceded us.
4. To treat our colleagues and hospital staff with kindness, respect, generosity of spirit, and patience.
5. To foster the excellence and well-being of our residency program by generously offering our time, talent, and energy on its behalf.
6. To support and contribute to the research mission of our neurosurgical center, nation, and the world by pursuing new knowledge, whether at the bench or bedside.
7. To promote the translation of the latest scientific knowledge to the bedside to improve our understanding of disease pathogenesis and ensure that all patients receive the most scientifically appropriate and up to date care.
8. To promote responsible stewardship of neurosurgical resources by wisely selecting diagnostic tests and treatments, recognizing that our individual decisions impact not just our own patients, but patients everywhere.
9. To promote social justice by advocating for equitable health care, without regard to race, gender, sexual orientation, social status, or ability to pay.
10. To extend our talents outside the walls of our hospitals and clinics, to promote the health and well-being of communities, locally, nationally, and internationally.

11. To serve as proud ambassadors for the mission of the Rawalpindi Medical University MSNeurosurgery Residency Program for the remainder of our professional lives.

STATUTES

1. ***Nomenclature:***

Nomenclature of the Proposed Course The name of degree programme shall be **MSNeurosurgery**. This name is well recognized and established for thelast many decades worldwide.

2. ***Course Title:***

   MSNeurosurgery

3. ***Training Centers:***

   Departments of Neurosurgery at Rawalpindi Medical University (RMU).

4. ***Duration of Course:***The duration of MS Neurosurgery course shall be five (5) years. First 02 years in Part I and next three years in Part II with structured training in a recognized department under the guidance of an approved supervisor.

5. ***Course structure:*** The course is structured in 02 parts.

➢ Part 1

S. No	Discipline	Duration
1.	Neurosurgery	06 months **(Initial)**
2.	General Surgery	01 year
3.	Trauma and Orthopedics	02 months **(Mandatory)**
4.	(i) Plastics Surgery (ii) Paediatric Surgery (iii) Urology (iv) Thoracic Surgery	02 months each (any two of the disciplines given)

Note: Mandatory workshops must be attended during the first 02 years of programme

At the end of 02 years, the candidate will take up Intermediate Examination.

➢ Part 2

It comprises of 3rd, 4th and 5thyear of the programme. There are 02 components of the training: -

1. **Training inNeurosurgery.**

The candidate shall undergo training to achieve educational objectives of M.S Neurosurgery (knowledge and skills) along with rotations in the relevant fields.The training shall be competency based. There shall be generic and specialty specific competencies and shall be assessed by continuous Internal Assessment.
Candidate will attend 02 mandatory rotations as listed below

S. No	Discipline	Duration
1.	Neurology	01month
2.	Neuro-radiology	01 month

2. Synopsis, Research and Thesis writing.

By the end of 3rdyear candidate should have selected, submitted and got his synopsis approved from RMU.Research Component and thesis writing shall be completed over the last 02 years duration of the course. Candidates will spend total time ranging from 06 months to 01 year for research during the training.

Admission Criteria

Applications for admission to MS Training Programs will be invited through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination.

Eligibility: The applicant on the last date of submission of applications for admission must possess the:

i. Basic Medical Qualification of MBBS or equivalent medical qualification recognized by Pakistan Medical Commission.

ii. Certificate ofone year's House Job experience in institutions recognized by Pakistan Medical Commission Is essential at the time of interview. The applicant is required to submit Hope Certificate from the concerned Medical Superintendent that the House Job shall be completed before the Interview.

iii. Valid certificate of permanent or provisional registration with Pakistan Medical Commission.

Registration and Enrollment

- As per policy of Pakistan Medicalcomission the number of PG Trainees/ Students per supervisor shall be maximum O5 per annum for all PG programmes including minor programmes (if any).
- Beds to trainee ratio at the approved teaching site shall be at least 5 beds per trainee.
- The University will approve supervisors for MS courses.
- Candidates selected for the courses: After their enrollment at the relevant institutions shall be registered with RMU as per prescribed Registration Regulations.

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of five years MSprogramme in Neurosurgery is to train residents to acquire the competency of a specialist in the field of Neurosurgery so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

GENERAL OBJECTIVES

1. To provide a broad experience in Neurosurgery, including its interrelationship with other disciplines.

2. To enhance neurosurgical knowledge, surgical and clinicalskills, and competence in bedside diagnostic and therapeutic procedures.

3. To achieve the professional requirements to prepare for Higher Physician Training in one or more specialty in Neurosurgery.

4. To cultivate the correct professional attitude and enhance communication skill towards patients, their families and other healthcare professionals.

5. To enhance sensitivity and responsiveness to community needs and the economics of health care delivery.

6. To enhance critical thinking, self-learning, and interest in research and development of patient service.

7. To cultivate the practice of evidence-based medicine and critical appraisal surgical skills.

8. To inculcate a commitment to continuous neurosurgical education and professional development.

9. To provide a broad training and in-depth experience at a level for trainees to acquire competence and professionalism of a specialist in Neurosurgery especially in the diagnosis, investigation and treatment of neurosurgical problems towards the delivery of holistic patient care.

10. To acquire competence in managing acute neurosurgical emergencies and identifying neurosurgical problems in patients referred by primary care and other doctors, and in selecting patients for timely referral to appropriate tertiary care or the expertise of another specialty.

11. To develop competence in the inpatient and outpatient management of neurosurgical problems and in selecting patients for referral to tertiary care facilities and treatment modalities requiring high technology and/or the expertise of another specialty.

12. To manage patients in general neurosurgical units in regional/District hospitals; to be a leader in the health care delivery team and to work closely with networking units which provide convalescence, rehabilitation and long term care.

13. To encourage the development of skills in communication and collaboration with the community towards health care delivery.

14. To foster the development of skills in the critical appraisal of new methods of investigation and/or treatment.

15. To reinforce self-learning and commitment to continued updating in all aspects of Neurosurgery.

16. To encourage contributions aiming at advancement of knowledge and innovation in neurosurgery through basic and/or clinical research and teaching of junior trainees and other health related professionals.

17. To acquire professional competence in training future trainees in Neurosurgery at Rawalpindi Medical University.

SPECIFIC OBJECTIVES

(A)Neurosurgical Knowledge

1. The development of a basic understanding of core Neurosurgery concepts.

2. Etiology, clinical manifestation, disease course and prognosis, investigation and management of common neurosurgical diseases.

3. Scientific basis and recent advances in pathophysiology, diagnosis and management of neurosurgical diseases.

4. Spectrum of surgical and clinical manifestations and interaction of multiple neurosurgical diseases in the same patient.

5. Psychological and social aspects of neurosurgical illnesses.

6. Effective use and interpretation of investigation and special diagnostic procedures.

7. Critical analysis of the efficacy, cost-effectiveness and cost-utility of treatment modalities.

8. Patient safety and risk management

9. Neurosurgical audit and quality assurance

10. Ethical principles and medico legal issues related to neurosurgical illnesses.

11. Updated knowledge on evidenced-based medicine and its implications for diagnosis and treatment of neurosurgical patients.

12. Familiarity with different care approaches and types of health care facilities towards the patients care with neurosurgical illnesses, including convalescence, rehabilitation, palliation, long term care, and medical ethics.

13. Knowledge on patient safety and clinical risk management.

14. Awareness and concern for the cost-effectiveness and risk-benefits of various advanced treatment modalities.

15. Familiarity with the concepts of administration and management and overall forward planning for a general neurosurgical unit.

(B)Skills

1. Ability to take a detailed history, gathers relevant data from patients, and assimilates the information to develop diagnostic and management plan.

2. Students are expected to effectively record an initial history and physical examination and follow-up notes as well a deliver comprehensive oral presentations to their team members based on these written documents.

3. Competence in eliciting abnormal physical signs and interpreting their significance.

4. Ability to relate clinical abnormalities with pathophysiologic states and diagnosis of diseases.

5. Ability to select appropriate investigation and diagnostic procedures for confirmation of diagnosis and patient management.

6. Residents should be able to interpret basic as well as advanced laboratory data as related to the disorder/disease.

7. Basic understanding of routine laboratory and ancillary tests including complete blood count, chemistry panels, EEG, chest x-rays, CT brain, and body fluid cell counts. In addition, students will properly understand the necessity of incorporating sensitivity, specificity, pre-test probability and Bayes laws/theorem in the ordering of individual tests in the context of evaluating patients' signs and symptoms.

8. The formulation of a differential diagnosis with up-to—date scientific evidence and clinical judgment using history and physical examination data and the development of a prioritized problem list to select tests and make effective therapeutic decisions.
9. Assessing the risks, benefits, and costs of varying, effective treatment options; involving the patient in decisionmaking via open discussion; selecting drugs from within classes; and the design of basic treatment programs and using critical pathways when appropriate.

10. Residents must be able to perform competently all neurosurgical procedures essential for the practice of Neurosurgery. This includes technical proficiency in taking informed consent, performing by using appropriate indications, contraindications, interpretations of findings and evaluating the results and handing the complications of the related procedures mentioned in the syllabus.

11. Residents should be instructed in additional surgical skills that will be determined by the training environment, residents practice expectations, the availability of skilled teaching faculty, and privilege delineation.

12. Skills in performing important bedside diagnostic and therapeutic procedures and understanding of their indications. Trainees should acquire competence through supervised performance of the required number of each of the following procedures during the 3-year training period and should record them in the Trainee's Log Book.

At least 10 times during the three-year training period:

- Cardiopulmonary resuscitation
- Central venous cannulation
- Lumbar Puncture

- Epidural Steroid injection
- Sacroiliac Block
- Endotracheal intubation
- Emergency External ventricular drain Placement
- Chest drain insertion
- Arterial Blood gases sampling
- Percutaneous Tracheostomy

13. Ability to present clinical problems and literature review in grand rounds and seminars.

14. Good communication skills and interpersonal relationship with patients, families, medical colleagues, nursing and allied health professionals.

15. Ability to mobilize appropriate resources for management of patients at different stages of neurosurgical illnesses, including critical care, consultation of neurosurgical specialties and other disciplines, ambulatory and rehabilitative services, and community resources.

16. Competence in the diagnosis and management of emergency neurosurgical problems, in particular head injury including EDH, SDH, SAH and various fractures of the skull and spine.

17. Competence in the diagnosis and management of acute and chronic neurosurgical problems as secondary care in a regional/district hospital.

18. Diagnostic skills to effectively manage complex cases with unusual presentations.

19. Ability to implement strategies for preventive care and early detection of diseases in collaboration with primary and community care doctors.

20. Ability to understand neurosurgical statistics and critically appraise published work and clinical research on disease presentations and treatment outcomes. Experience in basic and/or clinical research within the training programme should lead to publications and/or presentation in seminars or conferences.

21. Practice evidence—based learning with reference to research and scientific knowledge pertaining to their discipline through comprehensive training in Research Methodology

22. Ability to recognize and appreciate the importance of cost-effectiveness of treatment modalities.

23. The identification of key information resources and the utilization of the medical literature to expand one's knowledge base and to search for answer to neurosurgical problems. They will keep abreast of the current literature and be able to integrate it to clinical practice.

(C) Attitudes

1. The well-being and restoration of health of patients must be of paramount consideration.

2. Empathy and good rapport with patient and relatives are essential attributes.

3. An aspiration to be the team-leader in total patient care involving nursing and allied medical professionals should be developed.

4. The cost-effectiveness of various investigations and treatments in patient care should be recognized.

5. The privacy and confidentiality of patients and the sanctity of life must be respected.

6. The development of a functional understanding of informed consent, advanced directives, and the surgeon-patient relationship.

7. Ability to appreciate the importance of the effect of disease on the psychological and socio-economic aspects of individual patients and to understand patients' psycho-social needs and rights, as well as the medical ethics involved in patient management.

8. Willingness to keep up with advances in Neurosurgery and other Specialties.

9. Willingness to refer patients to the appropriate specialty in a timely manner.

10. Aspiration to be the team leader in total patient care involving nursing and allied medical professionals.

11. The promotion of health via adult immunizations, periodic health screening, and risk factor assessment and modification.

12. Recognition that teaching and research are important activities for the advancement of the profession.

Other required core competencies:

1. PATIENT CARE

- Residents are expected to provide patient care that is compassionate, appropriate and effective for the promotion of health, prevention of illness, treatment of disease and at the end of life.

- Gather accurate, essential information from all sources, including medicalarticles, physical examinations, Medical records and diagnostic/therapeutic procedures.

- Make informed recommendations about preventive, diagnostic and therapeutic options and interventions based on clinical judgment, scientific evidence, and patient preference.

- Develop, negotiate and implement effective patient management plans and integration of patient care.
- Perform competently the diagnostic and therapeutic procedures considered essential to the practice of Neurosurgery.

2. INTERPERSONAL AND COMMUNICATION SKILLS

- Residents are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of health care teams.
- Provide effective and professional consultation to other physicians and health care professionals and sustain therapeutic and ethically sound professional relationships with patients, their families, and colleagues.
- Use effective listening, nonverbal, questioning, and narrative skills to communicate with patients and families.
- Interact with consultants in a respectful, appropriate manner.
- Maintain comprehensive, timely, and legible medical records.

3. PROFESSIONALISM

- Residents are expected to demonstrate behaviors that reflect a commitment to continuous professional developmental, ethical practice, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society.
- Demonstrate respect, compassion, integrity, and altruism in relationships with patients, families, and colleagues.
- Demonstrate sensitivity and responsiveness to the gender, age, culture, religion, sexual preference, socioeconomic status, beliefs, behavior and disabilities of patients and professional colleagues.

- Adhere to principles of confidentiality, scientific/academic integrity, and informed consent.
- Recognize and identify deficiencies in peer performance.
- Understand and demonstrate the skill and art of end of life care.

4. PRACTICE-BASED LEARNING AND IMPROVEMENT

- Residents are expected to be able to use scientific evidence and methods to investigate, evaluate, and improve patient care practices.
- Identify areas for improvement and implement strategies to enhance knowledge, skills, attitudes and processes of care.
- Analyze and evaluate practice experiences and implement strategies to continually improve the quality of patient practice.
- Develop and maintain a willingness to learn from errors and use errors to improve the system or processes of care.
- Use information of technology or other available methodologies to access and manage information, support patient care decisions and enhance both patient and physician education.

5. SYSTEMS-BASED PRACTICE

- Residents are expected to demonstrate both an understanding of the contexts and systems in which health care is provided, and the ability to apply this knowledge to improve and optimize health care.
- Understands accesses and utilizes the resources, providers and systems necessary to provide optimal care.
- Understand the limitations and opportunities inherent in various practice types and delivery systems, and develop strategies to optimize care for the individual patient.
- Apply evidence-based, cost-conscious strategies to prevention, diagnosis, and disease management.
- Collaborate with other members of the health care team to assist patients in dealing effectively with complex systems and to improve systematic processes of care.

SECTION II

SYLLABUS OUTLINE:

Basic Sciences:

Student is expected to acquire comprehensive knowledge of Anatomy, Physiology, Pathology and Pharmacology relevant to surgical practice appropriate for Neurosurgery

1. **Anatomy**
    - Detailed Anatomy of the organ systems of body, their blood supply, nerve supply, lymphatic drainage and important gross relations to other organs as appropriate for neurosurgical procedures
    - Developmental Anatomy and associated common congenital abnormalities
    - Features of Surface, Imaging and Applied Anatomy within skull, brain, spinal cord, peripheral nervous system and head and neck
    - Relate knowledge to assessment of clinical situation or progress of disease condition

Embryogenesis of the brain and spinal cord

- Embryogenesis of supporting structures - skull and vertebral column
- Common anatomical variations and developmental abnormalities
- Embryogenesis of the skeleton and muscle development

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

- Scalp
- Skull
- Meninges
- Orbit
- Cranial fossae
- Cranial foramina

- Cranial nerves

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

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

- Vertebral column
- Spinal cord: ascending and descending tracts
- Spinal nerve roots
- Cauda equina

Structure, innervation and Distribution of autonomic and peripheral nervous system:

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

Applied Anatomy

- Stereotaxis
- Embryology and mal-development
- Differences between foetal, infant, child and adult brain
- Development of facial and cranial skeleton
- Branchial arches and the vascular system
- Development of the ventricular system
- Development of the cerebral hemispheres
- Development of brain stem and cranial nerves
- The notochord
- The sub-ependymal plate (sub-ventricular zone)
- Development of the pituitary gland
- The external granular layer of the cerebellum
- Spinal cord development
- Applied embryology of the CNS and its coverings

2. **Physiology**

▪ Functional Neurophysiology: Cellular organization, structure function correlations and physiological alterations in the central and peripheral nervous systems of body

Functional Neurophysiology:

- Structure and function of neurons and glial cells
- Synaptic function, action potentials and axonal conduction
- Higher cerebral functions
- Sleep and coma
- Memory and disorders of the limbic system
- Control of motor function: ascending and descending pathways, basal ganglia and cerebellar function
- The special senses
- Hypothalamic-pituitary function
- Cerebral blood flow and metabolism
- Cerebral auto-regulation and vasospasm
- Blood brain barrier and cerebral edema
- Intracranial pressure dynamics
- Cerebral ischaemia and neuroprotection
- CSF hydrodynamics - production and absorption

Autonomic Nervous System:

- Differing effects of sympathetic and parasympathetic innervation
- Effects on differing physiological processes

Clinical Neurophysiology:

- Principles of electroencephalography

- Principles of somatosensory, motor and brainstem evoked potential monitoring
- Peripheral neuropathies and entrapment neuropathies including:

▪Structure and function of peripheral nerves

▪Use of nerve conduction studies

- Disorders of the neuromuscular junction including:

▪Structure and function of smooth and striated muscle

▪Use of electro-myographic studies

Clinical Skills

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

- Membrane biochemistry and signal transduction
- Enzymes and biologic catalysis
- Tissue metabolism
- Carbohydrate metabolism
- Lipid metabolism
- Nitrogen metabolism

Neurochemistry (Including Neuroendocrinology)

- Fundamentals of Chemistry
- Introduction to acid-base chemistry and equilibrium
- Fundamentals of Neurochemistry
- CNS metabolism
- Principle of neuronal communication
- Mechanism controlling transmitter release
- Transduction mechanisms in the post-synaptic cells
- Characteristics of synaptic potential
- Process of synaptic summation (spatial and temporal)

- Neurotransmitters & Synaptic Transmission
- Neurotransmitters and receptors
- Important neurotransmitters and chemical messengers

Chemical Classification

- Nitric Oxide
- Eicosanoids
- Acetylcholine
- Amino acid transmitters
- Serotonin
- Catecholamines
- Peptides

Functional Classification

- Metabolism
- Important second messenger pathways
- Pathophysiologic mechanism of conditions interfering chemical transmission
- Neurochemistry of common neurological diseases (Alzheimer's disease, alcoholism, anxiety, sleep disorders etc.)
- Neuroendocrinology and Neuro-hormones
- Molecular bases of neuroendocrine regulation
- Neuroendocrinology of hypothalamus, pituitary gland, hypothalamic-pituitary-gonadal axis, sleep and arousal etc.)
- Homeostasis and biological rhythms
- Gene expression and the synthesis of proteins
- Bioenergetics; fuel oxidation and the generation of ATP
- Biotechnology and concepts of molecular biology with special emphasis on use of recombinant DNA techniques in medicine and the molecular biology of cancer.

3. **Pharmacology**

- The Evolution of Neurosurgical Drugs
- British Pharmacopia
- Introduction to Pharmacology
- Receptors
- Mechanisms of Drug Action
- Pharmacokinetics
- Pharmacokinetic Process
- Absorption
- Distribution
- Metabolism
- Desired Plasma Concentration
- Volume of Distribution
- Elimination
- Elimination rate constant and half life
- Creatinine Clearance
- Drug Effect
- Beneficial Responses
- Harmful Responses
- Allergic Responses
- Drug Dependence, Addiction, Abuse and Tolerance
- Drug Interactions
- Dialysis
- Drug use in pregnancy and in children

4. **Pathology**

Pathological alterations at cellular and structural level in infection, inflammation, ischaemia, neoplasia and trauma affecting the nervous system.
Cell Injury and adaptation

- Reversible and Irreversible Injury
- Fatty change, Pathologic calcification
- Necrosis and Gangrene
- Cellular adaptation
- Atrophy, Hypertrophy,
- Hyperplasia, Metaplasia, Aplasia

Inflammation

- Acute inflammation
- Cellular components and chemical mediators of acute inflammation
- Exudates and transudate
- Sequelae of acute inflammation
- Chronic inflammation
- Etiological factors and pathogenesis
- Distinction between acute and chronic (duration) inflammation
- Histologic hallmarks
- Types and causes of chronic inflammation, non-granulomatous & granulomatous,

Haemodynamic disorders

- Etiology, pathogenesis, classification and morphological and clinical manifestations of Edema, Haemorrhage, Thrombosis, Embolism, Infarction &Hyperaemia
- Shock; classification etiology, and pathogenesis, manifestations.
- Compensatory mechanisms involved in shock
- Pathogenesis and possible consequences of thrombosis
- Difference between arterial and venous emboli

Neoplasia

- Dysplasia and Neoplasia
- Benign and malignant neoplasms
- Etiological factors for neoplasia
- Different modes of metastasis
- Tumor staging system and tumor grade

Immunity and Hypersensitivity

- Immunity
- Immune response
- Diagnostic procedures in a clinical Immunology laboratory
- Protective immunity to microbial diseases
- Tumour immunology
- Immunological tolerance, autoimmunity and autoimmune diseases.
- Transplantation immunology
- Hypersensitivity
- Immunodeficiency disorders
- Immunoprophylaxis& Immunotherapy

Related Microbiology

- Role of microbes in various central and peripheral nervous system diseases
- Infection source
- Nosocomial infections
- Bacterial growth and death
- Pathogenic bacteria
- Vegetative organisms
- Spores
- Important viruses
- Important parasites
- Surgically important microorganisms
- Sources of infection
- Asepsis and antisepsis
- Sterilization and disinfection
- Infection prevention
- Immunization
- Personnel protection from communicable diseases

- Use of investigation and procedures in laboratory

Special Pathology

- Cerebral hypoxia and ischaemia
- Cytopathology of neurons and glial in response to ischaemia, hypoxia and trauma
- Diffuse axonal injury
- Congenital malformations of the nervous system
- Cerebral and spinal vascular disorders and lesions of extracranial vessels
- Brain and spinal cord trauma
- Acute and chronic inflammatory processes in the CNS
- Meningitis, encephalitis, brain abscess and other disorders of bacterial, viral, fungal or parasitic origin
- Principles and practice of antibiotic therapy
- Slow viruses and the brain
- Bacterial, fungal and parasitic meningitis, encephalitis and abscess formation
- Viral encephalitis
- Slow viruses, CJD and vCJD
- HIV associated infections, tumours and leucoencehalopathies
- The dementias
- Causes of epilepsy
- Demyelinating diseases
- Diseases of the scalp, skull and meninges
- Diseases and degenerative disorders of the spine
- Inborn errors of metabolism
- Diseases of muscle
- Brain shifts, herniation and raised intracranial pressure
- Classification, epidemiology and pathology of CNS tumours
- Techniques of biopsy and tissue preparation, staining and immunohistochemical
- Orbital tumours
- Tumour biology, cell kinetics, tumour markers, immunocytochemistry

MS Neurosurgery

Fundamental Principles of Surgery

- History of surgery
- Preparing a patient for surgery
- Principles of operative surgery: asepsis, sterilization and antiseptics
- Surgical infections and antibiotics
- Basic principles of anaesthesia and pain management
- Acute life support and critical care:
- Pathophysiology and management of shock
- Fluids and electrolyte balance/ acid base metabolism
- Haemostasis, blood transfusion
- Trauma: assessment of poly-trauma, triage, basic and advanced trauma
- Accident and emergency surgery
- Wound healing and wound management
- Nutrition and metabolism
- Principles of burn management
- Principles of surgical oncology
- Principles of laparoscopy and endoscopy
- Organ transplantation
- Informed consent and medicolegal issues
- Molecular biology and genetics
- Operative procedures for common surgical manifestations e.g cysts, sinuses, fistula, abscess, nodules, basic plastic and reconstructive surgery
- Principles of basic diagnostic and interventional radiography
- Principles and interpretation of conventional and advanced radiographic procedures

Common Surgical Skills

Incision of skin and subcutaneous tissue:

- Langer's lines
- Healing mechanism
- Choice of instrument
- Safe practice

Closure of skin and subcutaneous tissue:

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

Knot tying:

- Choice of material
- Single handed
- Double handed
- Superficial
- Deep

Tissue retraction:

- Choice of instruments
- Placement of wound retractors
- Tissue forceps

Use of drains:

- Indications
- Types
- Insertion
- Fixation
- Management/removal

Incision of skin and subcutaneous tissue:
▪Ability to use scalpel, diathermy and scissors

Closure of skin and subcutaneous tissue:
▪Accurate and tension free apposition of wound edges

Haemostasis:
▪Control of bleeding vessel (superficial)
▪Diathermy
▪Suture ligation
▪Tie ligation
▪Clip application
▪Plan investigations
▪Clinical decision making
▪Case work up and evaluation; risk management

Pre-operative assessment and management:
▪Cardiorespiratory physiology
▪Diabetes mellitus
▪Renal failure
▪Pathophysiology of blood loss

▪Pathophysiology of sepsis
▪Risk factors for surgery
▪Principles of day surgery
▪Management of comorbidity

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

Post-operative care:
- Monitoring of postoperative patient
- Postoperative analgesia
- Fluid and electrolyte management
- Detection of impending organ failure
- Initial management of organ failure
- Complications specific to particular operation
- Critical care

Blood products:
- Components of blood
- Alternatives to use of blood products
- Management of the complications of blood product transfusionincluding children

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

Safely assess the multiply injured patient:

▪History and examination
▪Investigation
▪Resuscitation and early management
▪Referral to appropriate surgical subspecialties

Technical Skills
▪Central venous line insertion
▪Chest drain insertion
▪Diagnostic peritoneal lavage
▪Bleeding diathesis & corrective measures, e.g. warming, packing
▪Clotting mechanism; Effect of surgery and trauma on coagulation
▪Tests for thrombophilia and other disorders of coagulation
▪Methods of investigation for suspected thromboembolic disease
▪Anticoagulation, heparin and warfarin
▪Role of V/Q scanning, CT angiography and thrombolysis
▪Place of pulmonary embolectomy
▪Awareness of symptoms and signs associated with pulmonary embolism and DVT
▪Role of duplex scanning, venography and d-dimer measurement
▪Initiate and monitor treatment

Diagnosis and Management of Common Paediatric Surgical Conditions:
▪ Child with abdominal pain
▪ Vomiting child
▪ Trauma
▪ Groin conditions
▪Hernia
▪Hydrocoele
▪Penile inflammatory conditions
▪Undescended testis
▪Acute scrotum

- Abdominal wall pathologies
- Urological conditions
- Constipation
- Head / neck swellings
- Intussusception
- Abscess
- In growing toenail

In terms of general experience it is expected that trainees would have gained exposure to the following procedures and to be able to perform those marked (*) under direct supervision.

- **Elective Procedures**
  - Inguinal hernia (not neo-natal)
  - Orchidopexy
  - Circumcision*
  - Lymph node biopsy*
  - Abdominal wall hernias
  - Insertion of CV lines
  - Management of in growing toenails*
  - EUA rectum*
  - Manual evacuation*
  - Open rectal biopsy
  - Excision of skin lesions*
- Emergency Procedures
  - Appendicectomy
  - Incision and drainage of abscess*
  - Pyloromyotomy
  - Operation for testicular torsion*
  - Insertion of pleural drain*
  - Insertion of suprapubic catheter*
  - Reduction of intussusception

MS Neurosurgery

Common Neurosurgical Disorders (Clinical Component)

Congenital and Paediatric Neurosurgery

- Neurological evaluation of the neonate and infant
- Developmental malformations of the CNS and its coverings
- Spina bifida and its variants; aetiology
- Encephalocoele
- Craniosynostosis; principles of craniofacial reconstruction
- Paediatric head injury
- Prevention and treatment of secondary insults relating to transfer and emergency surgery in head-injured children
- Subdural effusions of infancy
- Intracranial and spinal tumours in children
- Phakomatoses (neurofibromatoses; tuberous sclerosis)
- Craniovertebral anomalies
- Vascular lesions in the paediatric age-group
- Epidemiology, natural history, pathophysiology and clinical features of subarachnoid haemorrhage, haemorrhagic stroke and ischaemia stroke in children secondary to intracranial aneurysms, arteriovenous malformations and fistulae, cavernomas, arterial dissection, moya-moya disease and venous sinus thrombosis

- Surgical and endovascular strategies for the management of acute intracranial vascular disorders in children
- Ethical considerations
- Hydrocephalus and CSF disturbances
- CSF physiology
- Pathophysiology, investigation and classification of hydrocephalus and its complications
- Benign intracranial hypertension
- Neurosurgical and surgical methods of treatment of hydrocephalus and long term complications

Cerebrovascular Neurosurgery
- Pathophysiology and clinical diagnosis of cerebral ischaemia
- Extracranial carotid/vertebral disease; carotid endarterectomy; brain revascularisation
- Neurosurgical prevention of occlusive cerebrovascular disease
- Spontaneous intracranial/spinal haemorrhage especially SAH and intracerebral haemorrhage

Pathology, classification and natural history of cerebral aneurysms and AVM's
- Surgery of and perioperative management of aneurysms, AVM's, cavernomas and haematomas
- Miscellaneous cerebrovascular lesions e.g.Caroticocavernous fistulae, venous thrombosis.
- Role of interventional radiology

Trauma - Head and Spine
(For neurointensive care and rehabilitation - see relevant sections)
- Mechanisms and patterns of traumatic brain and spinal cord damage
- Pathophysiology of CNS trauma
- Cerebral perfusion and oxygenation
- Raised intracranial pressure
- Impaired intracranial compliance
- Intracranial herniation
- Epidemiology and prevention of head and spinal injury
- Pathophysiology of spinal cord injury

- Classification of cervical spinal fracture dislocations
- Biomechanics of spinal instability
- Indications for halo traction and external stabilization
- Indications for and principles of open reduction and stabilization
- Transport, retrieval and pre-hospital care
- Initial resuscitation and triage
- Clinical Assessment
- Natural history of recovery from head injury including neurological,
- cognitive and behavioural disability and post- traumatic epilepsy
- Management including operation for 'surgical' complications (eg. acute and chronic haematoma, open injury, CSF fistula, traumatic vascular injuries, spinal instability, late hydrocephalus).
- 'Neurosurgical' management of persisting unconsciousness
- Assessment of outcome, factors affecting prognosis and late sequelae
- Perioperative and neuro-intensive care
- Respiratory functions and ventilation
- Management of disorders of fluid balance; nutrition and feeding
- Blood coagulation and transfusion
- DVT and pulmonary embolism
- Fever in neurosurgical patients
- Confusion, restlessness and agitation in neurosurgery
- Informed consent and medicolegal aspects
- Postoperative seizures
- Diagnosis of brainstem death
- Monitoring techniques in Neuro-intensive care and Theatre
- Principles of prophylactic drug treatment
- Other post-operative complications
- The neurogenic bladder

Infections

- The pathophysiology of intracranial and spinal sepsis

- Infective complications of neurosurgical procedures – treatment and prophylaxis
- Intracranial and spinal abscess/ empyema-clinical features, investigation and management
- The aetiology and pathophysiology of spinal sepsis
- Indications for drainage of spinal epidural abscess by laminectomy and multiple laminotomies
- Bacterial, viral, fungal and parasitic infections of the CNS and spine
- Opportunistic infections, HIV and AIDS

- The aetiology and pathophysiology of vertebral osteomyelitis and discitis, including pyogenic, tuberculous and atypical infections

Indications for percutaneous and open biopsy
- Principles of anti-microbial chemotherapy
- Indications for operative intervention
- Principles of peri-operative care
- Surgical complications and their management

Neuro-oncology
- Presenting features and investigations of tumours involving the central nervous and peripheral nervous system
- Classification, natural history and pathology of benign and malignant intracranial neoplasia
- Pathophysiology of raised intracranial pressure associated with space occupying tumours
- Diagnostic imaging of intracranial tumours including the interpretation of CT and MRI scans and the role of MRS
- Principles and techniques of tumour biopsy
- Stereotaxy, robotics/ endoscopic techniques in CNS tumour management
- Operative management of intracranial and spinal tumours.
- Principles of fractionated radiotherapy, stereotactic radiotherapy and radiosurgery
- Role of adjuvant chemotherapy
- Principles of clinical trials and their application to neuro-oncology
- Specific management of tumours of the brain, skull base and orbit including glioma, meningioma, pituitary

and parasellartumours, cerebellar pontine angle tumours, metastases, tumours of the ventricular system
and pineal region, lymphoma, medulloblastoma, epidermoid, dermoid, haemangioblastoma and chordoma

- Specific management of primary and secondary tumours involving the spinal column, intramedullary, intra
and extra duraltumours of the spinal canal and tumours of the nerve roots and peripheral nerves
- Prognosis of CNS and peripheral nerve tumours
- Principles of palliative care

Spinal disorders (for congenital, trauma, tumour and vascular disorders, see relevant sections)

- Differential diagnosis of spinal cord compression and root dysfunction – investigation and management

Biomechanics of the spine and principles of spinal stabilization/fusion; approaches to the spine

- Conservative management of spinal disorders
- Degenerative and inflammatory spinal disease - e.g. rheumatoid arthritis, cervical spondylotic myelopathy/radiculopathy, thoracic discs, lumbar disc disease, spinal stenosis and spondylolisthesis
- Syringomyelia; arachnoiditis
- Management of spasticity

Pain

- Pathophysiology of pain; differential diagnosis
- General and psychological factors in pain management
- Analgesics and pain relief
- Craniofacial pain syndromes
- Trigeminal and glossopharyngeal neuralgia - history, drug treatment, percutaneous and posterior fossa
approaches
- Nerve blocks, electrical stimulation and RF lesions for pain relief; implants; cordotomy
- DREZ lesions; Dorsal rhizotomy

Peripheral nerves

- The diagnosis and treatment of common peripheral nerve problems
- including entrapment neuropathies, thoracic outlet and brachial plexus, causalgia and sympathetic dystrophy
- Theory and practice of nerve repair and cranial nerve reconstruction

Functional and Stereotactic Neurosurgery

- Principles and techniques of stereotactic and computer-assisted image-guided surgery
- Stereotactic radiosurgery
- Movement disorders and their surgical treatment
- Investigation, neurosurgical and surgical management of epilepsy and other functional disorders
- Classification, causes and presentations of dysphasias, speech dyspraxia and dyslexia
- Classification, causes and presentations of dysarthria
- Role of speech and language therapists in assessment and treatment
- Neurological causes of dysphagia

Indications for laryngoscopy, videofluoroscopy, nasogastric and percutaneous gastric feeding

- Aaetiology, differential diagnosis, investigation and initial management of patients presenting with sphincteric disorders
- Interpretation of urodynamic studies
- Aetiology, differential diagnosis, investigation and initial management of patients presenting with movement disorders
- Parkinson's disease
- Iatrogenic movement disorders
- Dystonic syndromes
- Choreiform syndromes
- Disorders of memory and cognition associated with head injury, subarachnoid haemorrhage, hydrocephalus,

structural lesions of the frontal and temporal lobes and disorders of the limbic system

Neuro-ophthalmology / Neuro-otology

- Visual acuity and visual fields; fundal *examination*
- Patterns of visual loss in relation to common bulbar, retrobulbar, sellar, parasellar and optic pathway disorders
- Analysis of diplopia and nystagmus in relation to common cranial nerve and brainstem disorders
- Significance of abnormalities of the pupils, fundi, external ocular movements and the visual fields

- Significance of abnormalities of hearing and of the vestibular system
- Common causes of conductive and sensorineural hearing loss
- Principles of audiological assessment

Rehabilitation of the Neurosurgical Patient

- Distinction between, and relevance of, concepts of limitation, disability and handicap
- Methods of assessment
- Patterns of natural history of recovery after Neurosurgical treatment, outcome and confounding factors
- Use of components of rehabilitation provided by specific neurosurgical and paraneurosurgical disciplines and

interdisciplinary approaches, including community and family reintegration

Evidence based Neurosurgery; Audit and Trial design

- To understand the provisional nature of knowledge
- To be able to acknowledge and identify failure of current treatments
- To cope with uncertainty and biological variability
- To be able to critically assess the neurosurgical literature
- To be aware of the relevant rational and quantitative methods to resolve uncertainty

Relevant topics

- Principles of audit and randomized controlled trials
- Outcome assessment

- Design and appraisal of clinical studies - evaluation of published reports
- Clinical trials: design, randomization, patient numbers, end points and power; statistical analysis, confidence intervals and clinical significance.
- Drug studies : phases 1 - 4
- Informed consent
- Issues of organization and delivery of neurosurgical care

1. Common Neurosurgical Presentations

- **Impaired consciousness and non-traumatic coma due to:**

- Meningitis
- Encephalitis
- Intracranial haemorrhage
- Acutely raised ICP
- Hydrocephalus
- Hypoxaemia and ischaemia
- Cardiogenic shock
- Hypoglycaemia
- Epilepsy
- Metabolic encephalopathies
- Drugs and toxins
- Traumatic coma
- Weakness and paralysis
- Ocular, cranial nerve, limb, trunk and respiratory muscle weakness

- **Headache - acute and chronic- associated with**

- Benign headache syndromes
- Migraine, cluster headache and related syndromes
- Space occupying lesions
- Meningitic disorders
- Intracranial haemorrhage

- Trigeminal neuralgia
- Atypical craniofacial pain syndrome

▪ **Dizziness, unsteadiness and falls**

- Cerebellar, vestibular, extrapyramidal and autonomic dysfunction

▪ **Pain and sensory loss**

- Musculoskeletal, neurogenic and neuropathic pain and sensory loss

▪ **Movement disorder associated with;**

- Parkinson's disease
- Iatrogenic movement disorders
- Dystonic syndromes
- Choreiform syndromes

▪ **Hearing disorder**

- Conductive and sensorineural hearing loss

▪ **Visual disorder**

- Common bulbar, retrobulbar, sellar, parasellar and optic pathway disorders
- Nystagmus and diplopia

▪ **Language and speech disturbance presentations;**

- Dysphasias
- Speech dyspraxia
- Dyslexia
- Dysarthria

▪ **Swallowing disorders with neurological causes of dysphagia**

▪ **Disorders of the Sphincteric and sexual function**

- Neurological enuresis
- Constipation
- Diarrhea
- Urgency of micturition/dribbling

▪ **Memory and cognitive disorders associated with;**

- Head injury
- Subarachnoid haemorrhage

- Hydrocephalus
- Structural lesions of the frontal and temporal lobes
- Disorders of the limbic system

- **Acute and chronic presentations of organic and psychiatric behavioral disorders relating to;**

- Alcohol and drug abuse
- Encephalitis
- Organic dementia
- Psychosis

2. Common Neurosurgical Skills and Procedures

- On completion of the initial training in Part I, the trainees will be competent in all aspects of the basic, operative and non-operative care of surgical patients
- During Part II training, they will understand the importance of neurosurgical care and management with particular reference to common neurosurgical presentations recognizing and preventing secondary insults to the central nervous system. They will be capable of resuscitating, assessing and initiating the surgical management of patients deteriorating as a result of intracranial and systemic complications. They will demonstrate sound judgment when seeking more senior support, prioritizing neurosurgical interventions and escalating the level of neurosurgical care.

Essential Neurosurgical 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

Essential Operative Competencies:
Initial Surgical Approaches;

- Burr hole
- Craniotomy - convexity
- Craniotomy - pterional
- Craniotomy - midline supratentorial
- Craniotomy - midline posterior fossa
- Lateral posterior fossa
- Lumbar fenestration
- Laminectomy

Neuro-Traumatology:

General Management of the Head Injured Patient:

- Neurosurgical management of acutely raised intracranial pressure
- Indications for operation intervention including the use of pressure monitoring
- Principles, diagnosis and confirmation of brain death
- Principles of intensive care of head injured patients
- Principles of spinal stabilization and radiological assessment in head injury patients
- Role of neurological rehabilitation
- Clinical assessment of the multiply-injured patient.
- Neurological assessment of the head-injured patient including:

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

- Prioritization of clinical risk
- Interpretation of CT scans and plain radiology
- Accurate documentation
- Indications for ICP monitoring
- Insertion of ICP monitor
- Insertion of frontal subdural and intraparenchymal ICP monitors

- using a standard frontal burr hole and/or twist drill craniostomy
- Calibration, zeroing and interpretation of ICP traces
- Potential complications of the procedure
- Burr hole evacuation of chronic subdural haematoma
- Management of anti-platelet and anti-coagulant medication
- Neurological assessment of patients with a CSDH
- Interpretation of CT scans
- Post-operative assessment and management

- Performance of single and multiple frontal and parietal burr hole
- Craniotomy for supratentorial traumatic haematoma, in particular:
- Planning and siting of craniotomies for evacuation of extradural and subdural haematomas
- Handling the "tight" brain
- Achieving haemostasis in the coagulopathic patient
- Achieving haemostasis from the skull base and venous sinuses
- Elevation of compound depressed skull fracture with dural repair
- Delayed cranioplasty of skull vault
- Management of soft tissue trauma
- Indications for primary and secondary closure of wounds
- Indications for antibiotic prophylaxis
- Assessment of tissue perfusion and viability
- Wound exploration under local and general anaesthesia
- Wound debridement
- Arrest of scalp haemorrhage
- Layered closure of the scalp without tension
- Suturing technique
- Wound drainage and head bandaging
- Use of external mobilization including cervical collars and spinal boards
- Application of halo traction
- Application of a halo-body jacket
- The role of posttraumatic neurological rehabilitation

General Management of Hydrocephalus:

- 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
- 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

General Management of Subarachnoid Haemorrhage:

- Principles of resuscitation and timing of interventions.
- Indications for CT scanning, diagnostic lumbar punctuure, CT angiography and digital subtraction angiography.
- Principles of management of post-haemorrhagic hydrocephalus
- Indications for endovascular and surgical intervention
- Interpretation of CT scans including assessment of intracranial blood load, haematomas and hydrocephalus
- Basic interpretation of cerebral angiography
- Diagnostic & therapeutic lumbar puncture
- To undertake an atraumatic lumbar puncture
- Interpretation of basic microscopy and biochemistry
- Principles of spectrophotometry
- Management of delayed secondary ischaemia
- Principles governing the augmentation of cerebral blood flow
- Assessment of a deteriorating patient
- Recognition and management of secondary insults
- Interpretation of CT scans
- Management of hypervolaemic hypertension
- Insertion of central venous catheter

- Insertion of lumbar drain
- Insertion of external ventricular drain
- Management of post-haemorrhagic hydrocephalus
- Indications for external ventricular drainage and lumbar subarachnoid drainage
- Assessment of the unconscious and deteriorating SAH patient
- Interpretation of CT scans

- 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
- External ventricular drainage, ventriculoperitoneal shunting, lumbar CSF drainage and shunting, ventriculo-

cisternostomy

- Insertion of ventricular drain/access device

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

Assessment and Peri-Operative Management of Patients with Space-Occupying Intracranial Lesions:

- Craniotomy for superficial, lobar supratentorial intrinsic tumour. In particular:

- Safe patient positioning
- Planning and siting of craniotomy with and without image-guidance
- Intra-operative management of raised ICP
- Appropriate exposure of the tumour, using operating microscope as necessary
- Safe use of fixed retractors
- Precise use of suction, electro-coagulation and ultrasonic aspiration
- Intracranial haemostasis

- Advanced surgical techniques including awake craniotomy; stereotactic craniotomy, intraoperative neurophysiological monitoring
- Advanced image guidance with integration of functional data; Intraoperative imaging techniques
- Use of intraoperative chemotherapy wafers

- Third ventriculostomy
- The management of low grade intrinsic tumours using advanced techniques
- The surgical approaches to tumours of the ventricular system and pineal gland including the transfrontal
transventricular excision of intraventricular tumours and cysts

▪Transcallosal transventricular excision of lesions of the third ventricle and foramen of Munro
- Indications for biopsy of intracranial tumours
- Risks of biopsy
- Principles of image-guided surgery
- Principles of radiosurgery and stereotactic radiotherapy and the indications for their use as adjunctive
and/or primary treatment modalities.
- Indications for neuroimaging
- 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)
- Management of raised intracranial pressure
- Principles of operative management
- Detection and management of post-operative complications e.g. cerebral swelling, intracranial haematomas
and intracranial sepsis; the management of post-operative seizures
- Basic interpretation of CT and MRI scans
- Interpretation of CT and MRI scans and selection of biopsy targets

Assessment and Peri-Operative Management of Patients with Space-Occupying Intraspinal Lesions:

- Assessment and perioperative management of patients presenting with acute spinal disorders e.g. cauda equina and spinal root compression
- General and basic surgical management of patients with malignant spinal cord compression
- The surgical management of degenerative spinal disorders e.g. lumbar compressive radiculopathies by lumbar microdiscectomy and associated microsurgical decompressions
- The surgical management of compressive cervical myeloradiculopathies including the multi-disciplinary management of patients with intracranial neoplasia extradural spinal biopsy and decompression by laminectomy in selected patients without segmental instability
- Instrumented posterior spinal stabilization
- 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
- The operative management of supra-tentorial intrinsic tumours
- The operative management of convexity meningiomas e.g. use of duraplasty and cranioplasty

CNS Sepsis:

- 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

Paediatric Neurosurgery:

All trainees will undertake at least 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. 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, paediatricneurointensive care, the principles of paediatric neuro-rehabilitation 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:

Paediatric Neuro-oncology:

- Stereotactic and image guided biopsy of paediatrictumours
- 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:

- Decompressive craniectomy
- Cranioplasty
- Management of growing fractures
- Craniofacial reconstruction including the management of simple craniosynostosis, syndromic craniosynostosis, post-traumatic deformity
- Management of CSF fistulae

Paediatric Hydrocephalus:

- Assessment of the ill child with hydrocephalus, impaired consciousness and sepsis
- Differential diagnosis of shunt malfunction
- Interpretation of CT scans in shunted children
- Taping and draining from an Ommaya reservoir
- Taping a shunt
- External ventricular drainage

Spinal Dysraphism:

- Management of neonatal spina bifida, meningoceles and encephaloceles
- Spinal cord tethering syndromes
- Management of congenital and acquired spinal deformity e.g. syndromic spinal deformity and post-operative spinal deformity

Functional Neurosurgery:

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

Surgical Management of Pain:

- Implantation of spinal cord stimulators
- Insertion of intrathecal drug delivery systems
- Ablative surgical treatment for pain including DREZ lesioning, cordotomy and myelotomy
- 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

Surgical Management of Spasticity:

- Neurosurgical and surgical treatments for spasticity
- Implantation of intrathecal drug delivery systems
- Other surgical treatments for spasticity including phenol blocks, neurectomies and rhizotomy.

Surgical Management of Epilepsy:

- 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

Surgical Management of Movement Disorders:

- Multidisciplinary assessment and management 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. Trainees with a special interest in neurovascular surgery will develop additional expertise in:

Intracranial Aneurysms:

- Surgical and endovascular strategies for the management of ruptured and un-ruptured intracranial aneurysms
- Surgical treatment of ruptured aneurysms of the anterior circulation

▪Principles of microvascular reconstruction and bypass for complex aneurysms

Intracranial Vascular Malformations:

- Surgical, endovascular and radiosurgical strategies for the management of arteriovenous malformations
- Surgical treatment of superficial cortical arteriovenous malformations

Other Vascular Disorders:

- Surgical and endovascular treatment of dural arteriovenous fistulae
- Image-guided resection of cavernomas
- Management of primary intracerebral haematomas
- The management of venous occlusive disorders
- Neurosurgical, 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:

- Standard variations of fronto-basal, fronto-orbital, transzygomatic infratemporal, transtemporal, far-lateral, transphenoidal and transmaxillary approaches

Cranial Base Meningiomas:

Resection of anterior fossa (olfactory groove and suprasellar) meningiomas; tentorial and petrous temporal meningiomas; petroclival meningiomas

Pituitary and SellarTumours:

Microsurgical and endoscopic transphenoidal resection of pituitary tumours

Pterional, subfrontal, interhemispheric and transventricular approaches to suprasellar tumours

Acoustic Neuromas:

Retrosigmoid, translabyrinthine and middle fossa resection of acoustic neuromas

Other skull-base tumours:

Management of other cranial nerve schwannomas, glomus tumours and malignant primary and secondary tumours of the skull-base

Management of cranio-facial trauma:

Management of fronto-orbital disruption

Repair of CSF Fistulae:

- Management of postoperative 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:

Reduction and internal stabilization of atlanto-axial, sub-axial and thoraco-lumbar fractures and dislocations

Metastatic Disease of the Spine:

- Posterior decompression and stabilization using pedicle screw, hook and sub-laminar wire constructs
- Corporectomy and instrumented reconstruction of the anterior column
- Primary tumours of the spine
- Techniques for local ablation of benign lesions and en bloc resections of malignant tumours
- Transpedicular and open vertebral and disc biopsy in vertebral osteomyelitis and discitis

Intradural Tumours:

The radical resection of intradural, extra-medullary tumours; biopsy and optimal resection of intramedullary tumours

Syringomyelia and Hind Brain Anomalies:

Foramen magnum decompression, syringostomy, syringopleural shunting, detethering and duroplasty

Advanced Surgery of the Ageing and Degenerative Spine:

- Management of osteoporotic collapse, vertebroplasty, kyphoplasty
- Stabilization of the osteoporotic spine
- Operative management degenerative spondylolisthesis and scoliosis
- The assessment, counseling and pre-operative preparation of patients with lumbar radiculopathies
- Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms
- Primary lumbar microdiscectomy
- 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
- The assessment, counseling and pre-operative preparation of patients with cervical myeloradiculopathies
- Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms
- Single level anterior cervical discectomy with and without fusion
- Standard anterolateral approach to the cervical spine
- Use of fluoroscopy or plain radiographs to confirm spinal level
- Radical and subtotal excision of the cervical disc, PLL, central and unco-vertebral osteophytes
- Protection and full decompression of the spinal cord and spinal nerve roots
- Interbody fusion using autologous bone with or without interbody cages

The Rheumatoid and Ankylosed Spine:

- Management of atlanto-axial subluxation
- Cranial settling and odontoid migration
- Sub-axial degeneration; cervico-dorsal kyphosis

Spinal Deformity:

Multidisciplinary management of patients with spinal dysraphism, diastematomyelia etc

SPECIFIC LEARNING OUTCOMES :

On completion of the training programme, Neurosurgery trainees including those pursuing an academic pathway will be expected to have demonstrated competence in all aspects of the published syllabus. The specific training component would be targeted for establishing clearly defined standards of knowledge and skills required to practice Neurosurgery at secondary and tertiary care level with proficiency in the Basic and applied clinical neurosciences, Basic neurosurgical care, Neurointensive care, Emergency (A&E) medicine and Complementary surgical disciplines.

1. Neuroanatomy:

- To have a working knowledge of the structure and development of the central and peripheral nervous system together with the related parts of the head and spine and associated structures of neurosurgical importance.

2. Neurophysiology:

- To be familiar with the normal and abnormal physiology and metabolism of the body and central nervous system.
- To be familiar with the basic principles of neuropharmacology and
- Neurochemistry with special reference to the actions, interactions and toxic effects of drugs currently used in neurosurgery.
- To be familiar with the basic principles and interpretation of EEG, EMG and other techniques of applied neurophysiology, particularly those used intra-operatively and in neurointensive care.

3. Neuropathology:

- To be familiar with the pathological changes and cellular organization of the central and peripheral nervous system during disease process.
- To have a working knowledge of the gross and microscopic pathology of diseases affecting the nervous system.
- To recognize gross and microscopic preparations
- To be familiar with the various pathogenic organisms responsible for infections of the nervous system

4. Neuroradiology:

- To be able to recognize and comment on abnormalities present on plain X-Rays of the skull, spine and other regions of neurosurgical interest and to interpret special investigations such as myelograms, angiograms, CT and MRI scans
- To be familiar with the principles of radiobiology and radiotherapy
- To be familiar with the application of radionuclide studies to the diagnosis of neurological disorders.

5. Neurosurgery Related Clinical Competence:

The ability to construct a differential diagnosis, interpret investigations and construct a management plan for common conditions in practice of neurosurgery in the following specialties:

i. Clinical Neurology

- To be able to take a neurological history and to assess the value of different symptom patterns in indicating involvement of specific neurological systems and functions and/or particular disease processes
- To be able to conduct and to demonstrate a reliable clinical examination relating to the nervous system and to elicit and interpret signs of dysfunction of different systems and their components
- To be able to arrive at a well reasoned diagnosis and to recognize the common neurological disorders and differentiate those amenable to surgical treatment
- To be conversant with all common neurosurgical disorders
- To be able to describe in detail and to discuss the choice of the appropriate conventional neurosurgical procedures available
- To be conversant with safety in the operating theatre, the use of instruments and infection control procedures
- To demonstrate competence in all aspects of the care of the patient during diagnostic tests, at operations, in the postoperative period and during rehabilitation

- To be familiar with the principles of psychiatry, neuro-psychology, neuro-opthalmology, neuro-otology and neuro-anaesthesia
- To be able to demonstrate those attitudes that reflect awareness of, and respect for, individuality and autonomy of patients and careers at all stages of management, including counseling and providing explanations of the nature of disease and potential methods of treatment

ii. **Paediatric Neurosurgery**:

The resident shall be proficient in 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.

iii. Neuro-oncology:

The training is based on advances in basic oncological science and the sophisticated delivery of intra-lesional therapies for the management of malignant intrinsic tumours of the nervous system with 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 organization of oncology services.

iv. 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 and disabling psychiatric diseases

v.Neurovascular Surgery:

Residents should be proficient in working closely with their interventional colleagues dealing with complex aneurysms, vascular malformations and occlusive cerebrovascular diseases.

vi. Skull-base surgery:

Residents are expected to flourish in technical advances in microsurgery, surgical approaches and reconstructions in the routine practice of 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 maxillofacial surgeons. The resident should also be aware of the adjuvant treatments with sophisticated radiosurgery and fractionated stereotactic radiotherapy for patients with skull-base tumours

vii. Spinal surgery:

Spinal surgery is now the largest subspecialty in neurosurgery and accounts for more than 50% of the operative workload of some departments in European hospitals. The resident should demonstrate a comprehensive service delivery for primary and secondary spinal malignancy, spinal trauma, spinal pain and degenerative spinal disorders.

viii. Traumatology:

The resident must be able to provide a prompt neurosurgical intervention and neurointensive care and management in patients with head injury which remains a major cause of death and disability in children and young adults.

6. Research Experience:

All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist
of original bench top laboratory research, clinical research or a combination of both. The research work shall be compiled in the form of a thesis which is to be submitted for evaluation by each resident before end of the training. The designated Faculty will organize and mentor the residents through the process, as well as journal clubs to teach critical appraisal of the literature.

SECTION III

Competency Levels:

Key to Competency levels in clinical skills:

1. Observer Status
2. Assistant Status
3. Performed Under Supervision
4. Performed independently

A candidate is expected to attain the laid down level of competence for the following procedures by the end of each year as given below:

COMPETENCY LEVELS IN PATIENT MANAGEMENT

	Year 1 (06 months)	Year 3	Year 4	Year 5
Patient Management & Procedures				
Taking History	3	4	4	4
Physical Examination	1	4	4	4
Ordering investigation	2	4	4	4
Performing Myelography	1	4	4	4
Interpreting Result	2	4	4	4
Decision making	2	3	3	4
Bur Hole	2	4	4	4
Shunt	2	4	4	4
Ventricular Drain	2	4	4	4

Elevation of depressed fracture	2	4	4	4
Spinal decompression	2	3	4	4
Lumber disc Surgery	2	3	4	4
Tuberculous spine	2	3	4	4
Craniotomy for extradural/subdural	2	3	4	4
Cervical decompression	2	2	3	4
Spinal tumours	2	2	3	4
Gliomas	2	3	4	4
Brain abscess	2	3	4	4
Spinal fusion	2	2	3	3
Spinal Instrumentation	2	2	2/3	3
Trigeminal rhizotomies	2	2	2/3	2
Cervical disc prolapse	2	2	2/3	2
Syringomylia	2	2	2/3	2
Meningiomas	2	2	2/3	3
Aneurysm Surgery	1	1	2/3	2
Cerebellopontine angle tumors	1	1	2/3	2
Brain stem tumors	1	1	2/3	2
Arteriovenous	1	1	2/3	2
Orbital Tumours	1	1	2/3	2
Skull Base Tumours	1	1	2/3	2
Pituitary Tumours	1	2	3	3
Craniopharyngioma	1	2	2/3	3
Cranioplasty	1	2	3	4

Methods of Teaching & Learning during course conduction

As a policy, active participation of students at all levels will be encouraged.
Following teaching modalities will be employed:

1. Problem Based learning
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Clinico-pathological Conferences
6. SEQ as assignments on the content areas
7. Skill teaching in ICU, Operation theatres, emergency and ward settings
8. Self study, assignments and use of internet
9. Bedside teaching rounds in ward
10. OPD & Follow up clinics
11. Long and short case presentations

In addition to the conventional teaching methodologies interactive strategies like conferences will also be introduced to improve both communication and clinical skills in the upcoming consultants. Conferences must be conducted regularly as scheduled and attended by all available faculty and residents. Residents must actively request autopsies and participate in formal review of gross and microscopic pathological material from patients who have been under their care. It is essential that residents participate in planning and in conducting conferences.

1. Clinical Case Conference

Each resident will be responsible for at least one clinical case conference each month. The cases discussed may be those seen on either the consultation or clinic service or during rotations in specialty areas. The resident, with the advice of the Attending Surgeon on the Consultation Service, will prepare and present the case(s) and review the relevant literature.

2. Monthly Student Meetings

Each affiliated neurosurgical college approved to conduct training for MS Neurosurgery will provide a room for student meetings/discussions such as:

a. Journal Club Meeting

b. Core Curriculum Meetings

c. Skill Development

a. Journal Club Meeting

A resident will be assigned to present, in depth, a research article or topic of his/her choice of actual or potential broad interest and/or application. Two hours per month should be allocated to discussion of any current articles or topics introduced by any participant. Faculty or outside researchers will be invited to present outlines or results of current research activities. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department.

b. Core Curriculum Meetings

All the core topics of Neurosurgery should be thoroughly discussed during these sessions. The duration of each session should be at least two hours once a month. It should be chaired by the chief resident (elected by the residents of the relevant discipline). Each resident should be given an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

c. Skill Development

Two hours twice a month should be assigned for learning and practicing clinical skills.

List of skills to be learnt during these sessions is as follows:

1. Residents must develop a comprehensive understanding of the indications, contraindications, limitations, complications, techniques, and interpretation of results of those technical procedures integral to the discipline
2. Residents must acquire knowledge of and skill in educating patients about the technique, rationale and ramifications of procedures and in obtaining procedure-specific informed consent. Faculty supervision of residents in their performance is required, and each resident's experience in such procedures must be documented by the program director.
3. Residents must have instruction in the evaluation of neurosurgical literature, clinical epidemiology, clinical study design, relative and absolute risks of disease, neurosurgical statistics and neurosurgical decision-making.
4. Training must include cultural, social, family, behavioral and economic issues, such as confidentiality of information, indications for life support systems, and allocation of limited resources.
5. Residents must be taught the social and economic impact of their decisions on patients, the primary care physician and society. This can be achieved by attending the bioethics lectures
6. Residents should have instruction and experience with patient counseling skills and community education.

7. This training should emphasize effective communication techniques for diverse populations, as well as organizational resources useful for patient and community education.
8. Residents should have experience in the performance of neurosurgery related clinical laboratory and radionuclide studies and basic laboratory techniques, including quality control, quality assurance and proficiency standards
9. Each resident will manage at least the following essential neurosurgical cases and observe and participate in each of the following procedures, preferably done on patients under supervision initially and then independently;

3. Annual Grand Meeting

Once a year all residents enrolled for MS Neurosurgery should be invited to the annual meeting at RMU Rawalpindi. One full day will be allocated to this event. All the chief residents from affiliated institutes will present their annual reports. Issues and concerns

related to their relevant courses will be discussed. Feedback should be collected and suggestions should be sought in order to involve residents in decision making.
The research work done by residents and their literary work may be displayed.
In the evening an informal gathering and dinner can be arranged. This will help in creating a sense of belonging and ownership among students and the faculty.

A crisp detail about modern Tools of Assessment intended to be used for thecourse

- **360-DEGREE EVALUATION INSTRUMENT-MULTI-SOURCE FEEDBACK (MSF):**

  360-degree evaluations consist of measurement tools completed by multiple people in a person's sphere of influence. Evaluators completing rating forms in a 360-degree evaluation usually are superiors, peers, subordinates, and patients and families. Most 360-degree evaluation processes use a survey or questionnaire to gather information about an individual's performance on several topics (e.g., teamwork, communication, management skills & decision-making). Most 360-degree evaluations use rating scales to assess how frequently a behavior is performed (e.g., a scale of 1 to 5, with 5 meaning "all the time" and 1 meaning "never"). The ratings are summarized for all evaluators by topic and overall to provide feedback.Evaluators provide more accurate and less lenient ratings when the evaluation is intended to give formative feedback rather than summative evaluations. A 360-degree evaluation can be used to assess interpersonal and communication skills, professional behaviors, and some aspects of patient care and systems-based practice.

- **CHART STIMULATED RECALL ORAL EXAMINATION (CSR)**

  In a chart stimulated recall (CSR) examination patient cases of the examinee (resident) are assessed in a standardized oral examination. A trained and experienced physician examiner questions the examinee about the care provided probing for reasons behind the work-up, diagnoses, interpretation of clinical findings, and treatment plans. The examiners rate the examinee using a well-established protocol and scoring procedure. In efficiently designed CSR oral exams each patient case (test item) takes 5 to 10 minutes. A typical CSR exam is

two hours with one or two physicians as examiners per separate 30 or 60-minute session.These exams assess clinical decision-making and the application or use of neurosurgical knowledge with actual patients.

- **CHECKLIST EVALUATION**

  Checklists consist of essential or desired specific behaviors, activities, or steps that make up a more complex competency or competency component. Typical response options on these forms are a check ( ) or "yes" to indicate that the behavior occurred or options to indicate the completeness (complete, partial, or absent) or correctness (total, partial, or incorrect) of the action. The forms provide information about behaviors but for the purpose of making a judgment about the adequacy of the overall performance, standards need to be set that indicate, for example, pass/fail or excellent, good, fair, or poor performance. Checklists are useful for evaluating any competency and competency component that can be broken down into specific behaviors or actions. Documented evidence for the usefulness of checklists exists for the evaluation of patient care skills (history and physical examination, procedural skills) and for interpersonal and communication skills. Checklists have also been used for self-assessment of practice-based learning skills (evidence-based medicine). Checklists are most useful to provide feedback on performance because checklists can be tailored to assess detailed actions in performing a task.

- **OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE)**

  In an objective structured clinical examination (OSCE) one or more assessment tools are administered at 12 to 20 separate standardized patient encounter stations, each station lasting 10-15 minutes. Between stations candidates may complete patient notes or a brief written examination about the previous patient encounter. All candidates move from station to station in sequence on the same schedule. Standardized patients are the primary assessment tool used in OSCEs, but OSCEs have included other assessment tools such as data interpretation exercises using clinical cases and clinical scenarios with mannequins, to assess technical skills.OSCEs have been administered in most of the neurosurgical schools worldwide, many residency programs, and by the licensure board examinations. The OSCE format provides a standardized means to assess: physical examination and history taking skills; communication skills with patients and family members, breadth and

depth of knowledge; ability to summarize and document findings; ability to make a differential diagnosis, or plan treatment; and clinical judgment based upon patient notes.

- **PROCEDURES (OPERATIONS), OR CASE LOGS**

  Procedures(operative), or case logs document each patient encounter by neurosurgical conditions seen, surgical operation or procedures performed. The logs may or may not include counts of cases, operations, or procedures. Patient case logs currently in use involve recording of some number of consecutive cases in a designated time frame. Operative logs in current use vary; some entail comprehensive recording of operative data by CPT code while others require recording of operations or procedures for a small number of defined categories.

  Logs of types of cases seen or procedures performed are useful for determining the scope of patient care experience. Regular review of logs can be used to help the resident track what cases or procedures must be sought out in order to meet residency requirements or specific learning objectives. Patient logs documenting clinical experience for the entire residency can serve as a summative report of that experience; as noted below, the numbers reported do not necessarily indicate competence.

- **PATIENT SURVEYS**

  Surveys of patients to assess satisfaction with hospital, clinic, or office visits typically include questions about the physician's care. The questions often assess satisfaction with general aspects of the physician's care, (e.g., amount of time spent with the patient, overall quality of care, physician competency (skills and knowledge), courtesy, and interest or empathy). More specific aspects of care can be assessed including: the physician's explanations, listening skills and provision of information about examination findings, treatment steps, and drug side effects. A typical patient survey asks patients to rate their satisfaction with care using rating categories (e.g., poor, fair, good, very good, excellent) or agreement with statements describing the care (e.g., "the doctor kept me waiting," --Yes, always; Yes, sometimes; or No, never or hardly ever). Each rating is given a value and a satisfaction score calculated by averaging across responses to generate a single score overall or separate scores for different clinical care activities or settings. Patient feedback accumulated from single encounter questionnaires can assess satisfaction with patient care competencies (aspects of data gathering, treatment, and management; counseling, and education; preventive care); interpersonal and communication skills; professional

behavior; and aspects of systems-based practice (patient advocacy; coordination of care). If survey items about specific physician behaviors are included, the results can be used for formative evaluation and performance improvement. Patient survey results also can be used for summative evaluation, but this use is contingent on whether the measurement process meets standards of reliability and validity.

- **PORTFOLIOS**

  A portfolio is a collection of products prepared by the resident that provides evidence of learning and achievement related to a learning plan. A portfolio typically contains written documents but can include video- or audio-recordings, photographs, and other forms of information. Reflecting upon what has been learned is an important part of constructing a portfolio. In addition to products of learning, the portfolio can include statements about what has been learned, its application, remaining learning needs, and how they can be met. In graduate neurosurgical education, a portfolio might include a log of clinical procedures performed; a summary of the research literature reviewed when selecting a treatment option; a quality improvement project plan and report of results; ethical dilemmas faced and how they were handled; a computer program that tracks patient care outcomes; or a recording or transcript of counseling provided to patients. Portfolios can be used for both formative and summative evaluation of residents. Portfolios are most useful for evaluating mastery of competencies that are difficult to evaluate in other ways such as practice-based improvement, use of scientific evidence in patient care, professional behaviors, and patient advocacy. Teaching experiences, morning report, patient rounds, individualized study or research projects are examples of learning experiences that lend themselves to using portfolios to assess residents.

- **RECORD REVIEW**

  Trained staff in an institution's neurosurgical records department or clinical department perform a review of patients' paper or electronic records. The staff uses a protocol and coding form based upon predefined criteria to abstract information from the records, such as medications, tests ordered, procedures performed, and patient outcomes. The patient record findings are summarized and compared to accepted patient care standards. Standards of care are available for more than 1600 diseases on the Website of the Agency for HealthCare Research and Quality (http://www.ahrq.gov/).Record review can provide evidence about clinical decisionmaking, follow-through in patient management and preventive health services, and appropriate use of

clinical facilities and resources (e.g., appropriate laboratory tests and consultations). Often residents will confer with other clinical team members before documenting patient decisions and therefore, the documented care may not be directly attributed to a single resident but to the clinical team.

- **SIMULATIONS AND MODELS**

  Simulations used for assessment of clinical performance closely resemble reality and attempt to imitate but not duplicate real clinical problems. Key attributes of simulations are that: they incorporate a wide array of options resembling reality, allow examinees to reason through a clinical problem with little or no cueing, permit examinees to make life-threatening errors without hurting a real patient, provide instant feedback so examinees can correct a mistaken action, and rate examinees' performance on clinical problems that are difficult or impossible to evaluate effectively in other circumstances. Simulation formats have been developed as paper-andpencil branching problems (patient management problems or PMPs), computerized versions of PMPs called clinical case simulations (CCX®), role-playing situations (e.g., standardized patients (SPs), clinical team simulations), anatomical models or mannequins, and combinations of all three formats. Mannequins are imitations of body organs or anatomical body regions frequently using pathological findings to simulate patient disease. The models are constructed of vinyl or plastic sculpted to resemble human tissue with imbedded electronic circuitry to allow the mannequin to respond realistically to actions by the examinee. Virtual reality simulations or environments (VR) use computers sometimes combined with anatomical models to mimic as much as feasible realistic organ and surface images and the touch sensations (computer generated haptic responses) a physician would expect in a real patient. The VR environments allow assessment of procedural skills and other complex clinical tasks that are difficult to assess consistently by other assessment methods.Simulations using VR environments have been developed to train and assess surgeons performing arthroscopy of the knee and other large joints, anesthesiologists managing life-threatening critical incidents during surgery, surgeons performing wound debridement and minor surgery, and neurosurgical students and residents responding to cardio-pulmonary incidents on a full-size human mannequin. Written and computerized simulations have been used to assess clinical reasoning, diagnostic plans and treatment for a variety of clinical disciplines as part of licensure and certification examinations. Standardized patients as simulations are described elsewhere.

- **STANDARDIZED ORAL EXAMINATION**

  The standardized oral examination is a type of performance assessment using realistic patient cases with a trained physician examiner questioning the examinee. The examiner begins by presenting to the examinee a clinical problem in the form of a patient case scenario and asks the examinee to manage the case. Questions probe the reasoning for requesting clinical findings, interpretation of findings, and treatment plans. In efficiently designed exams each case scenario takes three to five minutes. Exams last approximately 90 minutes to two and one-half hours with two to four separate 30 or 60-minute sessions. One or two physicians serve as examiners per session. An examinee can be tested on 18 to 60 different clinical cases.These exams assess clinical decisionmaking and the application or use of neurosurgical knowledge with realistic patients. Multiple-choice questions are better at assessing recall or understanding of neurosurgical knowledge.

- **STANDARDIZED PATIENT EXAMINATION (SP)**

  Standardized patients (SPs) are well persons trained to simulate a neurosurgical condition in a standardized way or actual patients who are trained to present their condition in a standardized way. A standardized patient exam consists of multiple SPs each presenting a different condition in a 10-12 minute patient encounter. The resident being evaluated examines the SP as if (s) he were a real patient, (i.e., the resident might perform a history and physical exam, order tests, provide a diagnosis, develop a treatment plan, or counsel the patient). Using a checklist or a rating form, a physician observer or the SPs evaluate the resident's performance on appropriateness, correctness, and completeness of specific patient care tasks and expected behaviors (See description of Checklist Evaluation…). Performance criteria are set in advance. Alternatively or in addition to evaluation using a multiple SP exam, individual SPs can be used to assess specific patient care skills. SPs are also included as stations in Objective Structured Clinical Examinations (See description of OSCE).SPs have been used to assess history-taking skills, physical examination skills, communication skills, differential diagnosis, laboratory utilization, and treatment. Reproducible scores are more readily obtained for history-taking, physical examination, and communication skills. Standardized patient exams are most frequently used as summative performance exams for clinical skills. A single SP can assess targeted skills and knowledge.

- **WRITTEN EXAMINATION (MCQ)**

  Written or computer-based MCQ examination is composed of multiple-choice questions (MCQ) selected to sample neurosurgical knowledge and understanding of a defined body of knowledge, not just factual or easily recalled information. Each question or test item contains an introductory statement followed by four or five options in outline format. The examinee selects one of the options as the presumed correct answer by marking the option on a coded answer sheet. Only one option is keyed as the correct response. The introductory statement often presents a patient case, clinical findings, or displays data graphically. A separate booklet can be used to display pictures, and other relevant clinical information. In computer-based examinations the test items are displayed on a computer monitor one at a time with pictures and graphical images also displayed directly on the monitor. In a computer-adaptive test fewer test questions are needed because test items are selected based upon statistical rules programmed into the computer to quickly measure the examinee's ability.Neurosurgical knowledge and understanding can be measured by MCQ examinations. Comparing the test scores on in-training examinations with national statistics can serve to identify strengths and limitations of individual residents to help them improve. Comparing test results aggregated for residents in each year of a program can be helpful to identify residency training experiences that might be improved.

- **mini-Clinical Evaluation Exercise (mini-CEX**)

  This tool evaluates a clinical encounter with a patient to provide an indication of competence in skills essential for good clinical care such as history taking, examination and clinical reasoning. The trainee receives immediate feedback to aid learning. This can be used at any time and in any setting when there is a trainee and patient interaction and an assessor is available.

- **Direct Observation of Procedural Skills (DOPS)**
- DOPS is an assessment tool designed to evaluate the performance of a trainee in undertaking a practical procedure, against a structured checklist. The trainee receives immediate feedback to identify strengths and areas for development.

- **Case-based Discussion (CbD)**

  The CbD assesses the performance of a trainee in their management of a patient to provide an indication of competence in areas such as clinical reasoning, decision-making and application of neurosurgical knowledge in relation to patient care. It also serves as a method to document conversations about, and presentations of, cases by trainees. The CbD should focus on a written record (such as written case notes, out-patient letter, and discharge summary). A typical encounter might be when presenting newly referred patients in the outpatient department.

- **Acute Care Assessment Tool (ACAT)**

  The ACAT is designed to assess and facilitate feedback on a doctor's performance during their practice on the Acute Neurosurgical Take. Any doctor who has been responsible for the supervision of the Acute Neurosurgical Take can be the assessor for an ACAT.

- **Audit Assessment (AA)**

  The Audit Assessment tool is designed to assess a trainee's competence in completing an audit. The Audit Assessment can be based on review of audit documentation OR on a presentation of the audit at a meeting. If possible the trainee should be assessed on the same audit by more than one assessor.

- **Teaching Observation (TO)**

  The Teaching Observation form is designed to provide structured, formative feedback to trainees on their competence at teaching. The Teaching Observation can be based on any instance of formalized teaching by the trainee who has been observed by the assessor. The process should be trainee-led (identifying appropriate teaching sessions and assessors).

SECTION IV

Intermediate *Examinations(IMM)*M.S. Neurosurgery:

All candidates admitted in M.S. Neurosurgery courses shall appear in Intermediate examination at the end of second calendar year.

Eligibility Criteria:

The candidates appearing in Intermediate Examination of the M.S. Neurosurgery Programme are required:

a) To have submitted certificate of completion of mandatory workshops.

b) To have submitted certificate of completion of first two years of training from the supervisor/ supervisors of rotations.

c) To have submitted continuous internal assessment proforma from his/her own supervisor on 03 monthly basis and also from his/her supervisors during rotation, achieving a cumulative score of 75%.

d) To have submitted evidence of payment of examination fee.

Intermediate Examination Schedule and Fee:

a) Intermediate Examination at completion of two years training, will be held twice a year.

b) There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination.

c) Examination fee will be determined periodically by the University.

d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.

e) The Controller of Examinations will issue Roll Number Slips on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

Intermediate Module Examination (IMM):

S.No.	TOPICS
1	Trauma (ATLS principles, shock management, torso trauma, Neuro trauma, extremity trauma
2	Acute abdomen (intestinal obstruction, peritonitis)
3	Burns and De-gloving injuries
4	Diabetic foot and limb ischemia
5	Perioperative management and Pain management
6	Surgical infections/Necrotizing fasciitis /Gas gangrene
7	Nutrition and electrolyte balance
8	Thyroid disorders
9	Breast disorders
10	Upper GI disorders
11	Lower GI disorders
12	Abdominal hernias
13	Hepatobiliary disorders

Paper I (MCQs)		
S.No.	**Table of Specifications**	**Marks distribution**
1	Head and neck including thyroid and parathyroid disorders	10
2	Salivary gland disorders	05
3	Breast disorders	10
4	Acute abdomen	05
5	Abdominal wall hernias	05
6	Upper GI disorders	10
7	Lower GI disorders	10
8	Hepatobiliary disorders	10
9	Arterial, venous and lymphatic disorders	10
Paper II (MCQs)		
1	ATLS principles, shock management	05
2	Torso trauma	10
3	Surgical site infection /diabetic foot	05

4	Perioperative and ICU care	05
5	Nutrition and electrolytes balance	10
6	Urology	10
	Paeds surgery	10
	Orthopedics	10
	Neurosurgery (Topic details written in section V)	10

Neurosurgery topics for IMM Examination

	Head trauma	02
	Assessment of head injury(GCS)	01
	Spine injuries	02
	Hydrocephalus	01
	Meningocele/myelomeningocele	01
	Headache	01
	Backache	01
	Epilepsy	01

Details of marks distribution

S.No	Assessment Tools	MARKS ALLOCATION		PASS PERCENTAGE
1	Paper I	75 X 2	150	60%

	(75 MCQ)			
2	Paper II (75 MCQ)	75 X 2	150	60%
3	TOACS (passing written component is TOACS eligibility)	150	150	60%
TOTAL MARKS		450		

Final Examination:

M.S. Neurosurgery

At the end of 5th Calendar year of the Programme

Eligibility Criteria:

To appear in the Final Examination the candidate shall be required:

i) To have submitted the result of passing Intermediate Examination.

ii) To have submitted the certificate of completion of training, issued by the Supervisor will be mandatory.

iii) To have achieved a cumulative score of 75% in Continuous Internal assessments of all training years.

iv)To have got the thesis accepted and will then be eligible to appear in Final Examination.

v) To have submitted no dues certificate from all relevant departments including library, hostel, cashier etc.

vi) To have submitted evidence of submission of examination fee.

Final Examination Schedule and Fee

a) Final examination will be held twice a year.

b) The candidates have to satisfy eligibility criteria before permission is granted to take the examination.

c) Examination fee will be determined and varied at periodic intervals by the University.

d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.

e) The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

Details of Marks Distribution for FINAL EXAMINATION:

S. No	Assessment Tools	Marks Allocation		Pass %age
1	Paper I (100 MCQs)	100 × 1	Theory marks 200	60%
2	Paper II (10 SEQs)	10 × 10		
3	Short Cases (04 cases)	4 × 25	Clinical marks 300	60%
4	Long Case (01 case)	01 × 100		
5	OSCE/ TOACS (10 stations)	10 × 10		
6	Thesis	200	200	75%
7	Internal Assessment	300	300	
8	**Total Marks**	**1000**		

Course content Allocation for Assessment MCQs and SAQs

S. No	Topics	No. of MCQs	No of SAQs
1	Neuro-anatomy	07	
2	Neuro-physiology	04	
3	Neuro-pathology	04	
4	Neuro-radiology	05	
5	Clinical Neurology	10	
6	Pediatric Neurosurgery	15	02(Neonatology,Childhood)
7	Neuro-oncology	05	01
9	Neuro-vascular surgery	07	01
10	Skull-Base surgery	05	01
11	Spinal surgery	25	03(Cervical,Thoracic,Lumbar)
12	Traumatology	10	02(Head,Spine)
13	Functional Neurosurgery	03	
14	**Total**	**100**	**10**

Declaration of Results

For the declaration of result

I. The candidate must get his Thesis accepted.

II. The candidate must have passed the final written examination with 50 % marks and the clinical & oral examination securing 50% marks. The cumulative passing score from the written and clinical / oral examination shall be 60%.

III.The MS degree shall be awarded after acceptance of thesis and success in the final examination.

IV. On completion of stipulated training period, irrespective of the result (pass or fail) the training slot of the candidate shall be declared vacant.

SECTION-V

Details of curriculum of MSNeurosurgery Program

RAWALPINDI MEDICAL

UNIVERSITYRAWALPINDI

1. ***Curriculum of 1st year(initial 06 months)MSNeurosurgery***
2. ***Curriculum of 3rd ,4th and 5th year MSNeurosurgery***

CURRICULUM FOR 1st YEAR (Initial 06 months)

MSNEUROSURGERY

RAWALPINDI MEDICAL UNIVERSITY

RAWALPINDI

CLINICAL CURRICULUM FOR 1ST YEAR (initial 06 months) MSNEUROSURGERY

TOPICS TO BE TAUGHT	LEARNING OBJECTIVES **Student should be able to know:**	TEACHING METHOD	ASSESSMENT
1.History Taking **(Knowledge)**	• To progressively develop the ability to obtain a relevant focused history from increasingly complex patients and challenging circumstances • To record accurately and synthesize history with clinical examination and formulation of management plan according to likely clinical evolution • Recognizes the importance of different elements of history • Recognizes the importance of clinical (particularly cognitive impairment), psychological, social, cultural and nutritional factors particularly those relating to ethnicity, race, cultural or religious beliefs and preferences, sexual orientation, gender and disability • Recognizes that patients do not present history in structured fashion and that the history may be influenced by the presence of acute and chronic neurosurgical conditions • Knows likely causes and risk factors for conditions relevant to mode of presentation • Recognizes that history should inform examination, investigation and management	Bedside teaching in wards and outpatient departments	mini-CEX
2.History Taking **(Skills)**	• Identify and overcome possible barriers (e.g. cognitive impairment) to effective communication • Manage time and draw consultation to a close	Bedside teaching in wards and outpatient	mini-CEX

	appropriately • Supplement history with standardized instruments or questionnaires when relevant • Manage alternative and conflicting views from family, careers and friends • Assimilate history from the available information from patient and other sources • Recognize and interpret the use of non-verbal communication from patients and careers • Focus on relevant aspects of history	departments	
3.History Taking (Behaviors)	• Show respect and behave in accordance with Good Neurosurgical Practice	Bedside teaching in wards and outpatient departments	mini-CEX
4.Clinical examination(knowledge)	• To progressively develop the ability to perform focused and accurate clinical examination in increasingly complex patients and challenging circumstances To relate physical findings to history in order to • establish diagnosis and formulate a management plan Understand the need for a valid clinical examination • Understand the basis for clinical signs and the relevance of positive and negative physical signs • Recognize constraints to performing physical examination and strategies that may be used to overcome them • Recognize the limitations of physical examination and the need for adjunctive forms of assessment to confirm diagnosis	Bedside teaching in wards and outpatient departments	CbD mini-CEX
5.Clinical examination	• Perform an examination relevant to the presentation	Bedside teaching in	CbD

(skills)	and risk factors that is valid, targeted and time efficient • Recognize the possibility of deliberate harm in vulnerable patients and report to appropriate agencies • Interpret findings from the history, physical examination and mental state examination, appreciating the importance of clinical, psychological, religious, social and cultural factors • Actively elicit important clinical findings • Perform relevant adjunctive examinations including cognitive examination such as Mini Mental state Examination (MMSE) and Abbreviated Mental Test Score (AMTS)	wards and outpatient departments	mini-CEX
6.Clinical examination (Behaviors)	• Show respect and behaves in accordance with Good Neurosurgical Practice	Bedside teaching in wards and outpatient departments	CbD, miniCEX,
7.Time management and decision making	• To become increasingly able to prioritize and organize clinical and clerical duties in order to optimize patient care. To become increasingly able to make appropriate clinical and clerical decisions in order to optimize the effectiveness of the clinical team resource	Bedside teaching in wards and outpatient departments	CbD, miniCEX
8.Decision making and clinical reasoning	• To progressively develop the ability to formulate a diagnostic and therapeutic plan for a patient according to the clinical information available • To progressively develop the ability to prioritize the diagnostic and therapeutic plan • To be able to communicate the diagnostic and therapeutic plan appropriately	Bedside teaching in wards & OPD	CbD, mini-CEX

9.Gross Anatomy Cranium and spine	Students should be able to • Cortical surface anatomy • Central sulcus on axial imaging • Surface anatomy of the cranium • Surface landmarks of spine levels • Cranial foramina and their contents • Internal capsule • Cerebellopontine angle anatomy • Occipitoatlantoaxial-complex anatomy • Spinal cord anatomy.	LGIS	MCQs & SAQs
10.Vascular Anatomy	• Cerebral vascular territories • Cerebral vascular anatomy • Cerebral venous anatomy • Spinal cord vasculature	LGIS	MCQs & SAQs
11.Neurophysiology and Regional Brain Syndrome	• Neurophysiology • Regional brain syndromes • Jugular foramen syndromes.	LGIS	MCQs & SAQs

12.Sodium Homeostasis and osmolality	• Serum osmolality and sodium concentration • Hyponatremia • hypernatremia	PBL, SGD	MCQs & SAQs
13.General Neuro-critical care	• Parenteral agents for hypertension • Hypotension (Block) • Acid inhibitors • Rhabdomylysis	LGIS	MCQs & SAQs
14.Endocrinology	• corticosteroids • Hypothyroidism • Pituitary Embryology and neuroendocrinology	LGIS	MCQs & SAQs

CURRICULUM FOR 3RD YEAR

MS NEUROSURGERY

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TOPICS TO BE TAUGHT	LEARNING OBJECTIVES Student should be able to know:	TEACHING METHOD	ASSESSMENT
1. Hematology	• Circulating blood volume • Blood component therapy • Anticoagulation considerations in neurosurgery Extramedullary hematopoiesis	LGIS	MCQs & SAQs
2. Neurology	• Dementia • Headache • Parkinsonism • Multiple sclerosis • Acute disseminated encephalomyelitis • Motor neuron diseases • Guillain-Barré syndrome • Myelitis • Neurosarcoidosis.	SGD	MCQs & SAQs

3. Neurovascular disorders and Neurotoxicology	• Posterior reversible encephalopathy syndrome (PRES) • Crossed cerebellar diaschisis • Vasculitis and vasculopathy • Neurotoxicology	SGD	MCQs & SAQs
4. Imaging and angiography	• CAT scan (AKA CT scan) • Magnetic resonance imaging (MRI) • Angiography • Myelography • Radionuclide scanning	LGIS, Bed Side Teaching in ward	MCQs & SAQs
5. Plain radiology and contrast agents	• C-Spine X-rays • Lumbosacral (LS) spine X-rays • Skull X-rays • Contrast agents in neuroradiology • Radiation safety for neurosurgeons	Bedside teaching & SGD	MCQs & SAQs
6. Electro-diagnostics	• Electroencephalogram (EEG) • Evoked potential • NCS/EMG.	LGIS	MCQs & SAQs

7. Primary intracranial anaomalies	• Arachnoid cysts, intracranial • Craniofacial development • Dandy Walker malformation • Aqueductal stenosis • Agenesis of the corpus callosum • Absence of the septum pellucidum • Intracranial lipomas • Hypothalamic hamartomas	Bedside teaching & SGD	MCQs & SAQs DOPS
8. Primary spinal anomalies	• Spinal arachnoid cysts • Spinal dysraphism (spina bifida) • Klippel-Feil syndrome • Tethered cord syndrome • Split cord malformation • Lumbosacral nerve root anomalies	LGIS	MCQs & SAQs DOPS miniCEX
9. Primary craniospinal anomalies	• Chiari malformations • Neural tube defects • Neurenteric cysts	Bedside teaching & SGD	MCQs & SAQs miniCEX DOPS
10. Coma	• Coma and coma scales • Posturing • Etiologies of coma • Herniation • Hypoxic coma.	LGIS	MCQs & SAQs

11. Brain death and organ donation	• Brain death in adults • Brain death • Brain death in Organ and tissue donation	Bedside teaching & SGD	MCQs & SAQs DOPS
12. Bacterial infections of parenchyma and meninges and complex infections	• Meningitis • Cerebral abscess • Subdural empyema • Neurologic involvement in HIV/AIDS • Lyme disease—neurologic manifestations • Nocardia brain abscess	LGIS, Bedside Teaching	MCQs & SAQs DOPS
13. Skull , spine and post - surgical infections	• Shunt infection • External ventricular drain (EVD)-related infection • Wound infections • Osteomyelitis of the skull • Spine infections	Bedside teaching & SGD	MCQs & SAQs DOPS
14. Other non- bacterial infections	• Viral • Creutzfeldt-Jakob disease • Parasitic infections of the CNS • Fungal infections of the CNS • Amebic infections of the CNS .	LGIS	MCQs & SAQs

15. Cerebrospinal fluid	• General CSF characteristics • Bulk flow model • CSF constituents • Cranial CSF fistula • Spinal CSF • Meningitis in CSF • Evaluation of the patient with CSF fistula • Treatment for CSF fistula • Intracranial hypotension	LGIS	MCQs & SAQs
16. Hydrocephalus –general aspects	• Basic definition • Epidemiology • Etiologies of • Signs and symptoms of HCP • CT/MRI criteria for hydrocephalus • Differential diagnosis of • Chronic HCP External hydrocephalus (AKA benign external • hydrocephalus) • X-linked • "Arrested hydrocephalus" • Entrapped fourth ventricle • Normal pressure hydrocephalus (NPH) • Hydrocephalus and pregnancy	LGIS	MCQs & SAQs DOPS
17. Treatment of hydrocephalus	• Neurosurgical treatment of hydrocephalus • Spinal taps • Surgical • Endoscopic third ventriculostomy • Shunts • Shunt • Specific shunt • Surgical insertion techniques • Instructions to patients	Skill Teaching in OT & SGD	MCQs & SAQs DOPS

18. Seizure classification and anti-convulsant pharmacology	• Seizure classification • Antiepileptic drugs	LGIS	MCQs & SAQs
19. Special types of seizures	• New onset seizures • Posttraumatic seizures • Alcohol withdrawal seizures • Nonepileptic seizures • Febrile • Status epilepticus	LGIS	MCQs & SAQs
20. Pain	• Major types of pain • Neuropathic pain syndromes • Craniofacial pain syndromes • Postherpetic neuralgia • Complex regional pain syndrome (CRPS)	Bedside teaching & SGD	MCQs & SAQs
21. Peripheral nerves	• Peripheral nerves – definitions and grading scales • Muscle innervation • Peripheral nerve injury/	LGIS	MCQs & SAQs DOPS

22. Entrapment neuropathies	• Entrapment neuropathy – definitions and associations • Mechanism of injury • Occipital nerve • Median nerve • Ulnar nerve • Radial nerve • Injury in the hand • Axillary nerve • Suprascapular nerve • Meralgia paresthetica • Obturator nerve entrapment • Femoral nerve • Common peroneal nerve palsy • Tarsal tunnel	LGIS, Skill teaching in OT	MCQs & SAQs DOPS
23. Non-Entrapment peripheral neuropathies	• Etiologies of peripheral neuropathy • Classification • Clinical • Syndromes of peripheral neuropathy • Peripheral nerve injuries • Missile injuries of peripheral nerves • Thoracic outlet syndrome	LGIS, Skill Teaching in OT	MCQs & SAQs DOPS
24. Neuropthmology	• Visual fields • Pupillary • Extraocular muscle (EOM) system • Neurophthalmologic syndromes • Miscellaneous neurophthalmologic signs.	Bedside teaching & SGD	MCQs & SAQs DOPS

25. Neurotology	• Dizziness and • Meniere's disease • Facial nerve • Hearing loss	LGIS	MCQs & SAQs DOPS
26. Head trauma –general Information ,Grading , initial management	• Head trauma – general • Grading • Transfer of trauma • Management in E/R • Radiographic evaluation • Admitting orders for minor or moderate head injury • Patients with associated severe systemic injuries • Exploratory burr holes. .	Bedside teaching & SGD	MCQs & SAQs DOPS
27. Concussion, high altitude Cerebral Edema,Cerebrovascular injuries	• Concussion • Other TBI definitions and concepts • High-altitude cerebral • Traumatic cervical artery dissections.	SGD	MCQs & SAQs
28. Neuro-Monitoring in head trauma	• General • Intracranial pressure (ICP • Adjuncts to ICP monitoring • Treatment measures for elevated ICP	Bedside teaching & SGD	MCQs & SAQs DOPS

29. Skull fractures	• Types of skull fractures • Linear skull fractures over the convexity • Depressed skull fractures • Basal skull fractures • Craniofacial fractures Pneumocephalus	LGIS, Skill Teaching in OT	MCQs & SAQs DOPS
30. Traumatic hemorrhagic conditions	• Posttraumatic parenchymal injuries • Hemorrhagic contusion • Epidural hematoma. • Acute subdural hematoma • Chronic subdural hematoma • Spontaneous subdural hematoma • Traumatic subdural hygroma • Extraaxial fluid collections in children • Traumatic posterior fossa mass lesions	Bedside teaching , SGD and skill teaching in OT	MCQs & SAQs DOPS
31. Gunshot wounds and non-missile penetrating brain injuries	• Gunshot wounds to the head • Non-missile penetrating trauma	LGIS, skill teaching in OT	MCQs & SAQs DOPS

32. Pediatric head injury	• Epidemiology of pediatric head injury and comparison to adults • Management • Outcome. • Cephalhematoma • Skull fractures in pediatric patients • Retroclival hematoma • Nonaccidental trauma (NAT)	Bedside teaching ,SGD& skill teaching in OT	MCQs & SAQs DOPS
33. Head injury –long term management, Complications and Outcome	• Airway management • Deep-vein thrombosis (DVT) prophylaxis • Nutrition in the head-injured patient • Posttraumatic hydrocephalus. • Outcome from head trauma • Late complications from traumatic brain injury	LGIS& Skill teaching in OT	MCQs & SAQs DOPS

CURRICULUM FOR 4th YEAR

MS NEUROSURGERY

RAWALPINDI MEDICAL UNIVERSITY

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1. Primary tumors ---Classification and Tumor Markers	• Classification of nervous system tumors • Brain tumors—general clinical aspects • Pediatric brain tumors • Medications for brain tumors • Chemotherapy for brain tumors • Intraoperative pathology consultations (“frozen section • Select commonly utilized stains in neuropathology	LGIS	MCQs & SAQs

2. Syndromes involving Tumors	• Neurocutaneous disorders • Familial tumor syndromes	LGIS	MCQs & SAQs
3. Diffuse Astrocytic and Oligodentroglial tumors	• Incidence • Risk factors for diffuse gliomas • Classification and grading of astrocytic tumors • General features of gliomas • Diffuse astrocytomas • Glioblastomas • Diffuse midline glioma, H3 K27M-mutant • (WHO grade IV) • Oligodendroglial • Oligoastrocytic • Multiple • Treatment of WHO grade II diffuse • Treatment of WHO grade III & IV diffuse gliomas • Response to treatment • Treatment for recurrent GBM • Outcome.	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
4. Ohers Astrocytic Tumors	• Pilocytic astrocytomas (PCAs) (WHO grade I • Subependymal giant cell astrocytoma • (SEGA) (WHO grade I • Pleomorphic xanthoastrocytoma (PXA) (WHO grade II • Anaplastic pleomorphic xanthoastrocytoma (WHO • grade III)	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS

5. Ependymal , Choroid Plexus and Neuronal tumors and Other Gliomas	• Ependymal tumors • Other • Choroid plexus tumors • Neuronal and mixed neuronal-glial tumors.	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
6. Pineal region and Embryonal tumors	• Pineal region tumors • Embryonal tumors	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
7. Tumors of the Cranial , spinal and Peripheral nerves	• Vestibular • erineurioma (WHO grade I-III • Malignant peripheral nerve sheath tumors (MPNST) • (no WHO grade)	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
8. Meningeal , mesenchymal and melanocytic tumors	• Mesenchymal, non-meningothelial tumors • Melanocytic tumors	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS

9. Lymphomad , histiocytic tumors , Germ cell tumors and tumors of the sellar origin	• Lymphomas (CNS) • Histiocytic tumors • Germ cell tumors (GCT) • Tumors of the sellar region	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
10. Pituitary tumors---General information and classification	• Pituitary tumors – key concepts • General tumor types • Epidemiology • Differential diagnosis of pituitary tumors • Clinical presentation of pituitary tumors • Specific types of pituitary tumors	LGIS, Bedside Teaching, Skill teaching in OT	MCQs & SAQs miniCEX, DOPS
11. Pituitary adenomas ---- Evaluation and nonsurgical management	• Evaluation • Management/treatment recommendations • Radiation therapy for pituitary adenomas	LGIS, Bedside Teaching	MCQs & SAQs miniCEX, DOPS
12. Pituitary adenomas ---surgical management , outcome and Recurrence management	• Surgical treatment for pituitary adenomas • Outcome following transsphenoidal surgery • Follow-up suggestions for pituitary adenomas. • Recurrent pituitary adenomas	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

13. Esthesioneuroblastoma, Cyst and tumor like lesions	• Esthesioneuroblastoma • Rathke's cleft cyst • Colloid cyst • Epidermoid and dermoid tumors • Pineal cysts (PCs)	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
14. Pseudotumor cerebri and Empty sella syndrome	• Pseudotumor cerebri • Empty sella syndrome	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
15. Tumors and tumor like lesions of the Skull	• Skull tumors • Non-neoplastic skull lesions	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
16. Tumors of spine and spinal cord	• Spine tumors – general information • Compartmental locations of spinal tumors • Differential diagnosis: spine and spinal cord tumors • Intra-dural extramedullary spinal cord tumors • Intramedullary spinal cord tumors • Primary bone tumors of the spine	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

17. Metastatic and hematopoietic tumors	• Cerebral metastases • Spinal epidural metastases. • Hematopoietic tumors	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
18. Spine injuries---general information	• Introduction • Terminology • Whiplash-associated disorders • Pediatric spine injuries • Cervical bracing • Follow-up schedule • Sports-related cervical spine injuries • Neurological assessment. • Spinal cord injuries	LGIS & Bedside teaching	MCQs , SAQs DOPS
19. Management of Spinal Cord Injury	• Spinal trauma management – general information • Management in the field • Management in the hospital • Radiographic evaluation and initial • C-spine immobilization • Traction/reduction of cervical spine injuries • Timing of surgery following spinal cord injury	SGD & Bedside Teaching	MCQs & SAQs DOPS
20. Occipital-atlanto-axial Injuries (Occiput to C2).	• Atlantooccipital dislocation • Occipital condyle fractures • Atlantoaxial subluxation/dislocation • Atlas (C1) fractures • Axis (C2) fractures. • Combination C1 & C2 injuries	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

21. Subaxial (C3 through C7) injuries and Fractures	• Classification systems • Clay shoveler's fracture • Vertical compression injuries. • Flexion injuries of the subaxial cervical spine • Distraction flexion injuries • Extension injuries of the subaxial cervical spine • Treatment of subaxial cervical spine fractures • Spinal cord injury without radiographic abnormality • (SCIWORA)	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
22. Thoracic , Lumbar and Sacral supine Fractures	• Assessment and management of thoracolumbar • fractures. • Surgical treatment • Osteoporotic spine fractures • Sacral fractures	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
23. Penetrating Spine Injuries and Long TermConsiderations of Spine Injuries	• Gunshot wounds to the spine • Penetrating trauma to the neck • Delayed cervical instability. • Delayed deterioration following spinal cord injuries • Chronic management issues with spinal cord injuries	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs DOPS

24. Low back pain and Radiculopathy	• Low back pain – general information • Intervertebral disc • Nomenclature for disc pathology • Vertebral body marrow changes • Clinical terms • Disability, pain and outcome determinations • Differential diagnosis of low back pain • Initial assessment of the patient with back pain • Radiographic evaluation • Electrodiagnostics for low back problems • Bone scan for low back problems • Thermography for low back problems • Psychosocial factors • Treatment. • Chronic low back pain • Coccydynia. • Failed back surgery syndrome	LGIS, Bedside Teaching	MCQs & SAQs DOPS
25. Lumbar and thoracic Intervertabral Disc herniation / Radiculopathy	• Lumbar disc herniation and lumbar radiculopathy • Thoracic disc herniation.	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

26. Cervical Disc Herniation	• Cervical disc herniation – general information • Cervical nerve root syndromes (cervical radiculopathy) • Cervical myelopathy and SCI due to cervical disc • herniation • Differential diagnosis • Physical exam for cervical disc herniation • Radiologic evaluation • Treatment	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
27. Degenerative Cervical Disc Disease and cervical Myelopathy	• Cervical disc degeneration – general information Pathophysiology • Clinical • Differential diagnosis • Evaluation • Treatment • Coincident cervical and lumbar spinal stenosis	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
28. Thoracic and Lumbar Degenerative Disc disease	• Degenerative disc disease – general information • Anatomic substrate • Risk factors • Associated conditions • Clinical presentation • Differential diagnosis • Diagnostic evaluation • Treatment • Outcome	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

29. Adult spinal Deformity and degenerative scoliosis	• Adult spinal deformity - general information • Epidemiology • Clinical evaluation • Diagnostic testing • Pertinent spine measurements • SRS-Schwab classification of adult spinal deformity • Treatment/management	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
30. Special Conditions Affecting the Spine	• Paget's disease of the spine • Anklyosing and ossifying conditions of the spine • Scheuermann's kyphosis • Miscellaneous conditions affecting the spine	LGIS, Bedside Teaching	MCQs & SAQs DOPS
31. Other non-spine conditions with spine implications	• Rheumatoid arthritis • Down syndrome • Morbid obesity	LGIS, Bedside Teaching	MCQs & SAQs DOPS
32. Special Conditions Affecting the Spinal Cord	• Spinal vascular malformations • Spinal meningeal cysts • Juxtafacet cysts of the lumbar spine • Syringomyelia • Posttraumatic syringomyelia • Spinal cord herniation (idiopathic) • Spinal epidural lipomatosis (SEL) • Craniocervical junction and upper cervical spine • Abnormalities	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

CURRICULUM FOR 5th YEAR

MS NEUROSURGERY

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1. Aneurysm—Introduction , Grading, Special Conditions	• Aneurysms – Introduction, Grading, Special • Conditions. • Introduction and overview • Etiologies of SAH • Incidence • Risk factors for SAH • Clinical features • Work-up of suspected SAH • Grading SAH • Pregnancy and intracranial hemorrhage • Hydrocephalus after SAH	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS

2. Critical care for Aneurysm Patients	• Critical Care of Aneurysm Patients • Initial management of SAH • Re-bleeding • Neurogenic stress cardiomyopathy (NSC) • Neurogenic pulmonary edema • Vasospasm • Post-op orders for aneurysm clipping.	LGIS, Bedside Teaching	MCQs & SAQs DOPS
3. SAH and CereberalAneyrysm Rupture	• SAH from Cerebral Aneurysm Rupture • Epidemiology of cerebral aneurysms • Etiology of cerebral aneurysms • Location of cerebral aneurysms. • Presentation of cerebral aneurysms. • Conditions associated with aneurysms • Treatment options for aneurysms • Timing of aneurysm surgery • General technical considerations of aneurysm surgery	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs ,DOPS
4. Aneurysm type by Location	• Aneurysm Type by Location • Anterior communicating artery aneurysms • Distal anterior cerebral artery aneurysms • Posterior communicating artery aneurysms • Carotid terminus (bifurcation) aneurysms • Middle cerebral artery (MCA) aneurysms • Supraclinoid aneurysms • Posterior circulation aneurysms	LGIS, Bedside Teaching	MCQs & SAQs
5. Special Aneurysms and Non-aneurysmal SAH	• Special Aneurysms and Non-Aneurysmal SAH • Unruptured aneurysms • Multiple aneurysms • Familial aneurysms • Traumatic aneurysms • Mycotic aneurysms • Giant aneurysms • Cortical subarachnoid hemorrhage • SAH of unknown etiology	LGIS, Bedside Teaching	MCQs & SAQs

	• Pretruncalnonaneurysmal SAH (PNSAH)		
6. Vascular Malformations	• Vascular malformations – general information and • classification • Arteriovenous malformation (AVM) • Developmental venous anomalies (DVA) (venous • angiomas) • Angiographically occult vascular malformations. • Osler-Weber-Rendu syndrome • Cavernous malformation • Dural arteriovenous fistulae (DAVF) • Vein of Galen malformation • Carotid-cavernous fistula • Sigmoid sinus diverticulum	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs miniCEX, DOPS
7. Stroke---- general information and Physiology	• Definitions • Cerebrovascular hemodynamics • Collateral circulation • "Occlusion" syndromes Stroke in young adults • Atherosclerotic carotid artery disease	LGIS, Bedside Teaching	MCQs & SAQs

8. Evaluation and treatment for acute ischemic stroke	• Stroke management – general information • (time = brain) • Rapid initial evaluation/management • NIH stroke scale (NIHSS) • General management for acute ischemic stroke (AIS) • Imaging in acute ischemic stroke (AIS) • Management of TIA or stroke • Carotid endarterectomy • Carotid angioplasty/stenting	LGIS, Bedside Teaching	MCQs & SAQs
9. Special conditions	• Totally occluded internal carotid artery • Cerebellar infarction • Malignant middle cerebral artery territory infarction • Cardiogenic brain embolism • Vertebrobasilar insufficiency • Bow hunter's stroke • Cerebral venous thrombosis • Moyamoya disease • Extracranial-intracranial (EC/IC) bypass.	LGIS, Bedside Teaching	MCQs & SAQs
10. Cerebral Arterial Dissections	• Cerebral Arterial Dissections • Cerebral arterial dissections – key concepts • Nomenclature • Pathophysiology • Epidemiology • Sites of dissection • Clinical • Evaluation • Overall outcome • Vessel specific information.	LGIS	MCQs & SAQs

11. Intracerebral haemorrhage	• Intracerebral Hemorrhage • Intracerebral hemorrhage – general information • Epidemiology • Locations of hemorrhage within the brain • Etiologies • Clinical • Evaluation • Initial management of ICH • Surgical treatment • Outcome • ICH in young adults. • Intracerebral hemorrhage in the newborn • Other causes of intracerebral hemorrhage • in the newborn	LGIS, Bedside Teaching& skill teaching in OT	MCQs & SAQs DOPS
12. Outcome assessment	• Outcome Assessment • Cancer • Head injury • Cerebrovascular events • Spinal cord injury	LGIS	MCQs & SAQs
13. Intraoperative Dyes , OR Equipment , Surgical hemostasis and bone Extenders	• Intraoperative Dyes, OR Equipment, Surgical • Hemostasis & Bone Extenders • Introduction • Intraoperative dyes • Operating room equipment • Surgical hemostasis • Localizing levels in spine surgery • Bone graft	LGIS	MCQs & SAQs

14. Craniotomies –General information and Cortical Mapping	• Craniotomies – General Information & Cortical • Mapping • Craniotomy – general information • Intraoperative cortical mapping (brain mapping	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS
15. Posterior Fossa Craniotomies	• Posterior Fossa Craniotomies • Indications • Position • Paramedian suboccipital craniectomy • Midline suboccipital craniectomy • Extreme lateral posterior fossa approach • Cranioplasty for suboccipital craniectomy • Post-op considerations for p-fossa craniotomies	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS
16. Supra-tentorial Craniotomies	• Supratentorial Craniotomies • Pterional craniotomy • Temporal craniotomy • Frontal craniotomy • Petrosal craniotomy • Occipital craniotomy.	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS
17. Approaches to Lateral and third ventricles	• Approaches to the Lateral and Third Ventricles, • Decompressive Craniectomies &Cranioplasy • Approaches to the lateral ventricle • Approaches to the third ventricle • Interhemispheric approach • Cranioplasty • Decompressive craniectomy	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS

18. Spine , Cervical	• Spine, Cervical • Anterior approaches to the cervical spine • Transoral approach to anterior craniocervical junction • Occipitocervical fusion • Anterior odontoid screw fixation • Atlantoaxial fusion (C1–2 arthrodesis) • C2 screws • Anterior cervical vertebral body screw-plate fixation • Zero profile interbody devices	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs, miniCEX DOPS
19. Spine, Thoracic and Lumbar	• Spine, Thoracic and Lumbar • Anterior access to the cervicothoracic junction/upper • thoracic spine • Anterior access to mid and lower thoracic spine • Thoracic pedicle screws • Anterior access to thoracolumbar junction • Anterior access to the lumbar spine • Instrumentation/fusion pearls for the lumbar and • lumbosacral spine • Lumbosacral pedicle screws • Lumbar cortical bone trajectory screw fixation • Translaminar lumbar screw fixation • Posterior lumbar interbody fusion (PLIF and TLIF) • Minimally invasive lateral retroperitoneal transpsoas • interbody fusion • Transfacet pedicle screws • Facet fusion • S2 screws • Iliac fixation • Post-op clinic visits—lumbar and/or thoracic	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs, miniCEX DOPS

	spine fusion. .		
20. Miscellaneous Surgical Procedures	• Miscellaneous Surgical Procedures • Percutaneous ventricular puncture • Percutaneous subdural tap • Lumbar puncture • Lumbar catheter CSF drainage • C1–2 puncture and cisternal tap • Ventricular catheterization • CSF diversionary procedures • Ventricular access device • Sural nerve biopsy • Nerve blocks • Multistranded cable for spine fusion	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs, DOPS
21. Functional Neurosurgery and Stereotactic Neurosurgery	• Functional Neurosurgery & Stereotactic • Neurosurgery • Introduction • Stereotactic surgery • Deep brain stimulation • Torticollis • Spasticity • Neurovascular compression syndromes • Sympathectomy .	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS

22. Pain Procedures	• Pain Procedures • Prerequisites for pain procedures • Choice of pain procedure • Types of pain procedures. • Cordotomy • Commissural myelotomy • Punctate midline myelotomy • CNS narcotic administration • Spinal cord stimulation (SCS) • Deep brain stimulation (DBS) • Dorsal root entry zone (DREZ) lesions.	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS
23. Seizure surgery	• Seizure Surgery • Indications for seizure surgery • Pre-surgical evaluation • Surgical techniques • Surgical procedures • Risks of seizure surgery • MRI guided laser interstitial thermal therapy (MRGLITT) • Postoperative management for seizure surgery (epilepsy • surgery) • Outcome	LGIS, Bedside Teaching & skill teaching in OT	MCQs & SAQs DOPS
24. Radiation therapy (XRT)	• Radiation Therapy (XRT) • Introduction • Conventional external beam radiation • Stereotactic radiosurgery and radiotherapy Interstitial brachytherapy	SGD	MCQs & SAQs

25. Endovascular neurosurgery	• Endovascular Neurosurgery • Endovascular neurosurgery – introduction • Pharmacologic agents • Neuroendovascular procedure basics • Diagnostic angiography for cerebral subarachnoid • hemorrhage • Disease-specific intervention	SGD	MCQs & SAQs

SECTION – VI

CURRICULUM OF RESEARCH&MANDATORY WORKSHOPS

FOR

MS SCHOLARS & POST GRADUATE TRAINEES

Of

RAWALPINDI MEDICAL UNIVERSITY

INTRODUCTION

With advent of EvidenceBasedPractice over last two to three decades in medical science, merging the best research **evidence** with good clinical expertise and patient values is inevitable in decision making process for patient care. Therefore apart from receiving per excellence knowledge of the essential principles of medicine and necessary skills of clinical procedures, the trainees should also be well versed and skillful in research methodologies. So the training in research being imperative is integrated longitudinally in all four year's training tenure of the trainees.

The purpose of the research training is to provide optimal knowledge and skills regarding research methods and critical appraisal. The expected outcome of this training is to make trainees dexterous and proficient to practically conduct quality research through amalgamation of their knowledge, skills and practice in research methodologies.

ORIENTATION SESSION FOR POST GRADUATE TRAINEES:

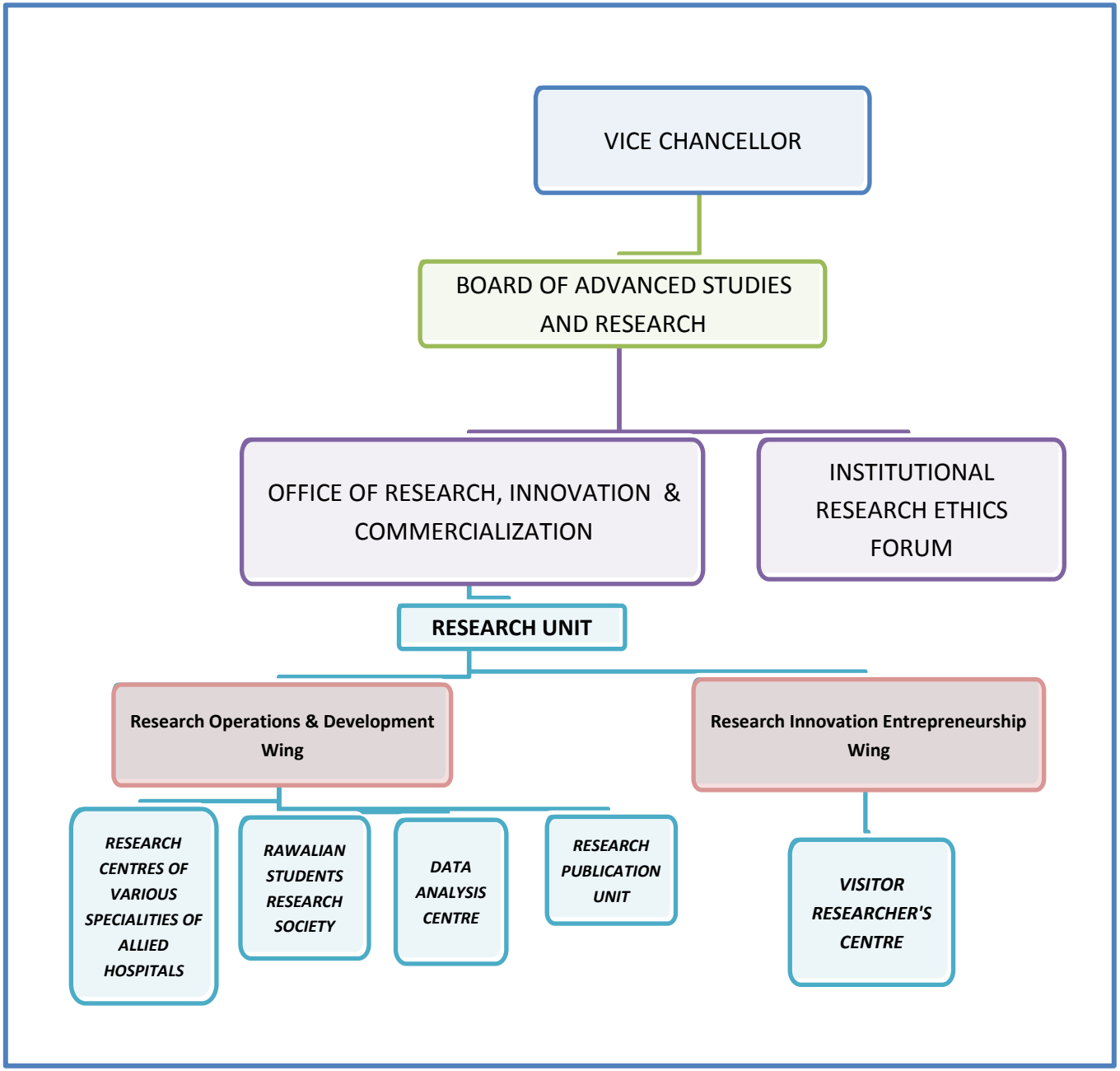
I. At the beginning of the research course, an orientation session or an introductory session of one hour duration will be held, organized by Director, Deputy Directors of ORIC (Office of Research Commercialization and Innovation) of RMU to make trainees acquainted to the research courses during four years post graduate training, the schedule of all scholarly and academic activities related to research and the assessment procedures.

II. Trainees will also be introduced to all the facilitators of the course, organizational structure of ORIC (Annexure 1) and the terms of references of corresponding authorities (Annexure 2) for any further information and facilitation.

III. All the curriculum details and materials for assistance and guidance will be provided to trainees during the orientation session.

IV. The research model of RMU as given in Figure 1 and will be introduced to the newly inducted trainees of RMU.

Figure 1.MODEL OF RESEARCH AT RAWALPINDI NEUROSURGICAL UNIVERSITY


VICE CHANCELLOR
BOARD OF ADVANCED STUDIES AND RESEARCH
OFFICE OF RESEARCH, INNOVATION & COMMERCIALIZATION
INSTITUTIONAL RESEARCH ETHICS FORUM
RESEARCH UNIT
Research Operations & Development Wing
Research Innovation Entrepreneurship Wing
RESEARCH CENTRES OF VARIOUS SPECIALITIES OF ALLIED HOSPITALS
RAWALIAN STUDENTS RESEARCH SOCIETY
DATA ANALYSIS CENTRE
RESEARCH PUBLICATION UNIT
VISITOR RESEARCHER'S CENTRE

The research training component for Post Graduate Trainees comprises of 05 years and the Distribution and curriculum for each year is mentioned as follows:

RESEARCH & THESIS WRITING

- Research and Thesis have to be completed during training period.
- Research topic selection is must in first 06 months of 3rd year. Synopsis writing and approval from IRF & BASR are must in second half of 3rd year.
- In 4th year of training Thesis should be written and completed, while in 5th year after appropriate defense Thesis should be approved by BASR.

Research Experience & Workshops:

The active research component program must ensure meaningful, supervised research experience with appropriate protected time for each resident while maintaining the essential clinical and surgical experience. Residents must learn the design and interpretation of research studies, responsible use of informed consent, and research methodology and interpretation of data.

The program must provide instruction in the critical assessment of new therapies and of the medical literature. Residents will be advised and supervised by qualified staff members in the conduct of research.

To help conduction of Research and facilitate Thesis writing following workshops are mandatory during training that will be organized by RMU:

- Communication skills
- Computer & IT skills
- Synopsis writing, Research Methodology & Biostatistics
- Primary Surgical Skills

Clinical Research

Each resident will participate in at least one clinical research study to become familiar with

1. Research design
2. Research involving human subjects including informed consent and operations of the Institutional Review Board and ethics of human experimentation
3. Data collection and data analysis
4. Research ethics and honesty
5. Peer review process

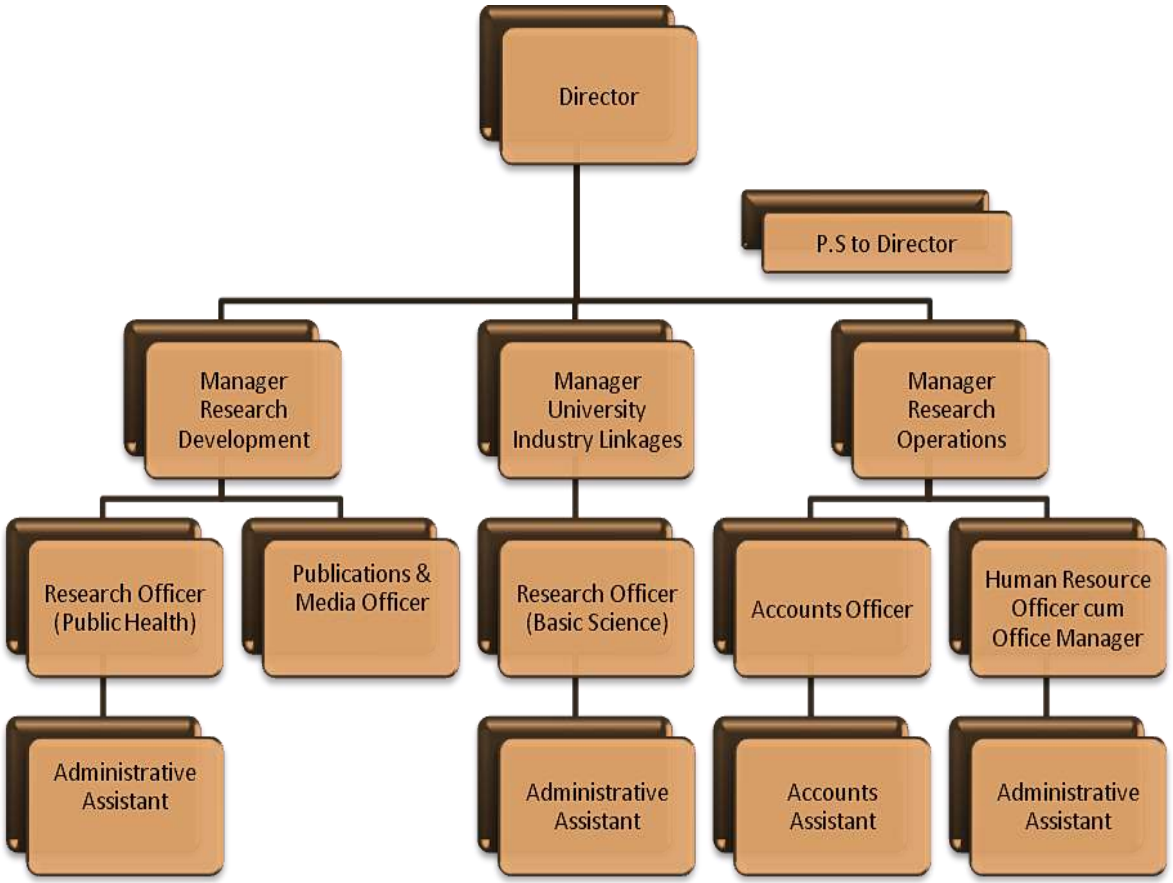
This usually is done during the consultation and outpatient clinic rotations.

Thesis

The candidates shall prepare their synopsis as per guidelines provided by Institutional Research Forum/Ethical Review Board (IRF/ERB) and Board of Advanced Studies & Research (BASR). The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, collect and analyze data. Synopsis of research project should be approved in 3rd year of MS Neurosurgery program by IRF/ERB and BASR. In 4th year Thesis work should be completed, and in 5th year it should be approved from BASR.

ANNEXURE 1

THE ORGANIZAITONAL CHART OF ORIC OF RMU



Note: Managers of ORIC are also referred to as Deputy Directors in RMU

MANDATORY WORKSHOPS

WORKSHOPS (3 hours each for 2-5 days)

S.NO	NAME OF THE WORKSHOP	LEARNING OBJECTIVES	TOPICS TO BE COVERED
1.	**Biostatistics & Research Methodology (4 days)**	• To understand the basics of Bio-Statistics • To critique why research is important? • To discuss the importance of Selecting a Field for Research • To prepare oneself for Participation in National and International Research • To prepare oneself for Participation in Pharmaceutical Company Research • To interpret the importance of research ideas & Criteria for a good research topic • To discuss Ethics in Health Research • To learn to write a Scientific Paper • To learn to make a Scientific Presentation • To learn to make a purposeful literature search	1. Introduction to Bio-Statistics 2. Introduction to Bio- Neurosurgical Research Why research is important? 3. What research to do? i. Selecting a Field for Research ii. Drivers for Health Research iii. Participation in National and International Research iv.Participation in Pharmaceutical Company Research v. Where do research ideas come from vi. Criteria for a good research topic Ethics in Health Research 4. Writing a Scientific Paper 5. Making a Scientific Presentation & Searching the Literature

2.	**Introduction to computer/Information**	By the end of this workshop student should be able to:	1.Hardware and Software • Understand the main components of a computer,

	Technology & Software (5 days)	• Appropriately start up and shut down your computer. • Navigate the operating system and start applications. • Perform basic functions of file management. • Perform basic functions in a word processor and spreadsheet. • Manage print settings and print documents. • • Receive and send email. Use a web browser to navigate the Internet. • work with windows, toolbars, and command menus • perform basic word processing and graphic tasks make a Power Point presentation explore Web browsing basics • ... • back up files save, copy, and organize your work to enter data accurately in software of Statistical Package for Social Sciences	including input and output devices. • Understand the function of communication devices such as smartphones and tablets. • Understand the role of Operating Systems, programs and apps. 2.Windows • Turning on the computer and logging on. • The Windows screen. • Running programs from the Start Menu. • Minimising, maximising, moving, resizing and closing windows. • Logging off and shutting down your computer. 3.Working with Programs • Running multiple programs. • Desktop icons and creating a desktop shortcut. • Managing programs from the taskbar. • Closing programs. 4.File Management • Managing Windows Explorer. • Creating, moving, renaming and deleting folders and files. • Understandings file extensions. • Viewing storage devices and network connections. • Managing USB flash drives. 5.Word Processing • Creating documents in Microsoft Word. • Typing text, numbers and dates into a document. • Easy formatting. • Checking the spelling in your document. • Making and saving changes to your document. • 6.Power Point Making Power Point presentation

			7.Spreadsheets • Understanding spreadsheet functionality.

			• Creating spreadsheets in Microsoft Excel. • Typing text numbers and dates into a worksheet. • Easy formulas. • Easy formatting. • Charting your data. • Making and saving changes to your workbook. • Printing a worksheet. 8.Printing • Print preview. • Print settings. • Managing the print queue. 9.Using Email • The Outlook mail screen elements. • Composing and sending an email message. • Managing the Inbox. 10.Accessing the Internet • Going to a specific website and bookmarking. • Understanding how to search/Google effectively. • Copy and paste Internet content into your documents and emails. • Stopping and refreshing pages. • Demystifying the Cloud. • Understanding social media platforms such as Facebook and Twitter. • Computer security best practices. 11.Statistical Package for Social Sciences • general understanding for data entry •

3.	**communication skills (3 days)**	• To learn to use Non-medicinal Interventions in Communication Skills of Clinical Practice • To discuss the importance of counseling • To role play as a counselor • To learn to manage a conflict	1. Use of Non-medicinal Interventions in Clinical Practice Communication Skills 2. Counseling 3. Informational Skills 4. Crisis Intervention/Disaster 5. Management Conflict Resolution 6. Breaking Bad News
		resolution • To learn to break a bad news • To discuss the importance of Neurosurgical Ethics, Professionalism and Doctor-Patient Relationship Hippocratic Oath • To learn to take an informed consent • To illustrate the importance of confidentiality • To summarize Ethical Dilemmas in a Doctor's Life	7. Neurosurgical Ethics, Professionalism and Doctor-Patient Relationship Hippocratic Oath 8. Four Pillars of Neurosurgical Ethics (Autonomy, Beneficence, Non-malficence and Justice) 9. Informed Consent and Confidentiality 10. Ethical Dilemmas in a Doctor's Life
4.	**Primary surgical skills (3 days)**	• Introduction to fundamentals of surgical skills • Explain principals of universal precautions • Demonstrate procedures for handwashing, gowning and glowing • Demonstrate operation theatre protocols such as maintenance of sterile field and handling of surgical instruments • Demonstrate technique of secure surgical knots • Demonstrate basic surgical suturing with instruments	• Blood cultures • Ureteral catheterization • Handling of diathermy • Handling of surgical instruments • Suture materials • Drain insertions • surgical knot tying • suturing of wounds • Hand washing • Scrubbing, gowning and glowing • Basic wound management

SECTION – VII

LOG BOOK for Neurosurgery (Templates)

MSNEUROSURGERY

RAWALPINDI MEDICAL UNIVERSITY

RAWALPINDI

ENROLMENT DETAILS

Program of Admission _____

Session _____

Registration / Training Number _____

Name of Candidate _____

Father's Name _____

Date of Birth _____ / _____ / _____ CNIC No. _____

Present Address _____

_____

Permanent Address _____

_____

E-mail Address _____

Cell Phone _____

Date of Start of Training _____

Date of Completion of Training _____

Name of Supervisor _____

Designation of Supervisor _____

Qualification of Supervisor _____

Title of department / Unit _____

Name of Training Institute / Hospital _____

INTRODUCTION OF LOGBOOK:

A structured book in which certain types of educational activities and patient related information is recorded, usually by hand. Logbooks are used all over the world from undergraduate to postgraduate training, in human, veterinary and dental medicine, nursing schools and pharmacy, either in paper or electronic format .

Logbooks provide a clear setting of learning objectives and give trainees and clinical teachers a quick overview of the requirements of training and an idea of the learning progress. Logbooks are especially useful if different sites are involved in the training to set a (minimum) standard of training. Logbooks assist supervisors and trainees to see at one glance which learning objectives have not yet been accomplished and to set a learning plan.The analysis of logbooks can reveal weak points of training and can evaluate whether trainees have fulfilled the minimum requirements of training.

Logbooks facilitate communication between the trainee and clinical teacher. Logbooks help to structure and standardize learning in clinical settings. In contrast to portfolios, which focus on students' documentation and selfreflection of their learning activities, logbooks set clear learning objectives and help to structure the learning process in clinical settings and to ease communication between trainee and clinical teacher. To implement logbooks in clinical training successfully, logbooks have to be an integrated part of the curriculum and the daily routine on the ward. Continuous measures of quality management are necessary.

Reference

BraunsKS,NarcissE,SchneyinckC,BöhmeK,BrüstleP,HolzmannUM,etal. Twelve tips for successfully implementing logbooks in clinical training. Med Teach. 2016 Jun 2; 38(6): 564–569.

INDEX:*LOG OF*

3. **DIDACTIC LECTURES/INTERACTIVE LECTURES**
4. **JOURNAL CLUB**
5. **PROBLEM CASE DISCUSSION**
6. **INDOOR PATIENTS**
7. **OPD AND CLINICS**
8. **EMERGENCY PROCEDURES (OBSERVED, ASSISTED,PERFORMED UNDER SUPERVISION & PERFORMED INDEPENDENTLY)**
9. **ELECTIVE PROCEDURES (OBSERVED, ASSISTED, PERFORMED UNDER SUPERVISION & PERFORMED INDEPENDENTLY)**
10. **MULTIDISCIPLINARY MEETINGS**
11. **CLINICOPATHOLOGICAL CONFERENCE**
12. **MORBIDITY/MORTALITY MEETINGS**
13. **HANDS ON TRAINING/WORKSHOPS**
14. **PUBLICATIONS**
15. **CLINICAL ASSESMENT RECORD**

SECTION-1

MORNING REPORT PRESENTATION/ CASE PRESENTATION (LONG AND SHORT CASES)

SR#	DATE	REG# OF PATIENT	DIAGNOSIS & BRIEF DESCRIPTION	SIGNATURES OF THE SUPERVISOR

SECTION-2 TOPIC PRESENTATION/SEMINAR

SR#	DATE	NAME OF THE TOPIC & BRIEF DETAILS OF THE ASPECTS COVERED	SIGNATURES OF THE SUPERVISOR

SECTION -3

JOURNAL CLUB

SR#	DATE	TITLE OF THE ARTICLE	NAME OF JOURNAL	DATE OF PUBLICATION	SIGNATURES OF THE SUPERVISOR

SECTION-4

CASE DISCUSSION

SR #	DATE	REG.# OF THE PATIENT DISCUSSED	DIAGNOSIS	BRIEF DESCRIPTION OF THE CASE	SIGNATURES OF THE SUPERVISOR

SECTION -5

RECORD OF TOTAL EMERGENCY CASES SEEN ON EMERGENCY CALL DAYS

SR.#	DATE	TOTAL NUMBER OF CASES ATTENDED	SIGNATURES OF THE SUPERVISOR
1			
2			
3			
4			
5			

6			
7			
9			
10			
11			
12			
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23			
24			
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26			
27			

SECTION-6

RECORD OF TOTAL INDOOR CASES SEEN ON CALL DAYS IN THE WARD

SR.#	DATE	TOTAL NUMBER OF CASES ATTENDED	SIGNATURES OF THE SUPERVISOR
1			

2			
3			
4			
5			
6			
7			
9			
10			
11			
12			
13			
14			

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22			
23			
24			
25			
26			
27			
28			

SECTION -7

RECORD OF TOTAL OPD/CLINIC CASES SEEN ON OPD CALL DAYS

SR.#	DATE	TOTAL NUMBER OF CASES ATTENDED	SIGNATURES OF THE SUPERVISOR
1			
2			
3			
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5			
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25			

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28			

SECTION-8

EMERGENCY PROCEDURES

SR.#	DATE	REG NO. OF PATIENT	NAME OF PROCEDURE	OBSERVED/ASSISTED/PERFORMED UNDER SUPERVISION/PERFORMED INDEPENDENTLY	PLACE OF PROCEDURE	SIGNATURES OF THE SUPERVISOR

SECTION-9

ELECTIVE PROCEDURES

SR.#	DATE	REG NO. OF PATIENT	NAME OF PROCEDURE	OBSERVED/ASSISTED/PERFORMED UNDER SUPERVISION/PERFORMED INDEPENDENTLY	PLACE OF PROCEDURE	SIGNATURES OF THE SUPERVISOR

SECTION -10

MULTI DICIPLINARY MEETINGS

SR#	DATE	BRIEF DESCRIPTION	SIGNATURES OF THE SUPERVISOR

SECTION-11

CLINICOPATHOLOGICAL CONFERENCE (CPC)

SR#	DATE	BRIEF DESCRIPTION OF THE TOPIC/CASE DISCUSSED	SIGNATURES OF THE SUPERVISOR

SECTION -12

MORBIDITY/MORTALITY MEETINGS

SR#	DATE	REG. # OF THE PATIENT DISCUSSED	BRIEF DESCRIPTION	COMMENTS/SUGGESTIONS	SIGNATURES OF THE SUPERVISOR

SECTION -13

HANDS ON TRAINING/WORKSHOPS

SR#	DATE	TITLE	VENUE	FACILITATOR	SIGNATURES OF THE SUPERVISOR

SECTION-14

PUBLICATIONS

SNO.	NAME OF PUBLICATION	TYPE OF PUBLICATION ORIGINAL ARTICLE/EDITORIAL/CASE REPORT ETC	NAME OF JOURANL	DATE OF PUBLICATION	PAGE NO.	SIGNATURES OF THE SUPERVISOR

SECTION-15

CLINICAL ASSESSMENT RECORD

SR.#	TOPIC OF CLINICAL TEST/ EXAMINATION	TYPE OF THE TEST& VENUE OSPE, MINICEX, CHART STIMULATED RECALL, DOPS, SIMULATED PATIENT, SKILL LAB e.t.c	TOTAL MARKS	MARKS OBTAINED	SIGNATURES OF THE SUPERVISOR

Portfolio (Templates)

MSNEUROSURGERY

RAWALPINDI MEDICAL UNIVERSITY

RAWALPINDI

ENROLMENT DETAILS

Program of Admission _____

Session _____

Registration / Training Number _____

Name of Candidate _____

Father's Name _____

Date of Birth _____ / _____ / _____ CNIC No. _____

Present Address _____

_____

Permanent Address _____

_____

E-mail Address _____

Cell Phone _____ Date

of Start of Training _____

Date of Completion of Training _____

Name of Supervisor _____

Designation of Supervisor _____

Qualification of Supervisor _____

Title of department / Unit _____ Name

of Training Institute / Hospital _____

Introduction of portfolio

What is a portfolio?

A collection of a learner's various documents and assessments throughout residency that reflect their professional development over time. May include referral letters and procedure logs (Rider et al., 2007).Portfolios also frequently include self-assessments, learning plans, and reflective essays (Epstein, 2007).

<u>What should be included in a portfolio?</u>

resident may include the following components in his or her portfolio:

- Curriculum Vitae (CV)
- Personal Publications
- Research abstracts presented at professional conferences
- Presentations at teaching units/departmental meetings and teaching sessions
- Patient (case) presentations
- Log of clinical procedures
- Copies of written feedback received (direct observations, field notes, daily evaluations)
- Quality improvement project plan and report of results
- Summaries of ethical dilemmas (and how they were handled)
- Chart notes of particular interest
- Photographs and logs of neurosurgical procedures performed
- Consult/referral letters of particular interest
- Monthly faculty evaluations
- 360-degree evaluations
- Copies of written instructions for patients and families
- Case presentations, lectures, logs of neurosurgical students mentored • Learning plans
- Writing assignments, or case-based exercises assigned by program director
- List of hospital/university committees served on
- Documentation of managerial skills (e.g., schedules or minutes completed by resident)
- Copies of billing sheets with explanations

- Copies of written exams taken with answer sheets
- In-training Evaluation Report (ITER) results
- Format can be as simple as material collected in a three-ringed binder or as sophisticated as information stored in a handheld Pocket PC (PPC).
- Patient confidentiality should be assured when any clinical material is included in the portfolio.
- Should be resident-driven and include a space for residents to reflect on their learning experiences.

Why portfolio is required?

Can be used as a:

- Formative learning tool: To help develop self-assessment and reflection skills.
- Summative evaluation tool: To determine if a competency has been achieved.
- Useful for evaluating competencies that are difficult to evaluate in more traditional ways such as:
    - Practice-based improvement
    - Use of scientific evidence in patient care
    - Professional behaviors (Rider et al., 2007)
- Purpose is to highlight for the resident the need for ongoing learning and reflection to achieve and maintain competencies.
- Enormous flexibility in using the portfolio as a learning tool: Portfolio may focus on one area (e.g., assessments pertaining to professionalism in a learner with attitudinal issues) without losing its effectiveness for the broader scope of competencies.
- Number and frequency of entries may vary. Expectations, including minimum standards, should be defined with the resident from the outset.
- Portfolios can be powerful tools for guided self-assessment and reflection (Holmboe&Carracio, 2008).

Evidence:

- Evidence suggests that an assessment of skills is most valid when the tool used places the learner in an environment and/or situation that closely mimics that in which the learner will later practice the mastered skill (Wiggins et al.,

1998). In that way, portfolios have the advantage of reflecting not just what residents can do in a controlled examination situation but what they actually do at work with real patients (Jackson et al., 2007).

- As an evaluation tool, the reliability and validity of a portfolio are dependent on the psychometric characteristics of the assessment and judging methods used in the portfolio process (Holmboe&Carracio, 2008).
- Research is still needed to determine whether portfolios can be a catalyst for self-directed, lifelong learning (O'Sullivan et al., 2002).

Practicality/Feasibility:

Portfolios can be time consuming for the resident to assemble and for the preceptor to assess.

References:

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2. Challis M. (1999). AMEE neurosurgical education guide no. 11 (revised): Portfolio-based learning and assessment in neurosurgical education. *Neurosurgical Teacher*, 21, 370-86.

3. Colbert, C.Y., Ownby, A.R., & Butler, P.M. (2008). A review of portfolio use in residency programs and considerations before implementation. *Teaching and Learning in Medicine, 20*(4), 340-345.

4. Danner, E.F., & Henson, L.C. (2007). The portfolio approach to competency-based assessment at the Cleveland Clinic Lerner College of Medicine. *Academic Medicine*, 82(5), 493-502.

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13. Jackson, N., Jamieson, A., & Khan, A. (2007). *Assessment in neurosurgical education and training: A practical guide*. Abingdon, UK: Radcliffe.

14. Michels, N.R.M., Driessen, E.W., Muijtjens, A.M.M., Van Gaal, L.F., Bossaert, L.L., & De Winter, B.Y. (2009). Portfolio assessment during neurosurgical internships: How to obtain a reliable and feasible assessment procedure. *Education for Health, 22*(3), 313.

15. O'Sullivan, P.S., Cogbill, K.K., McClain, T., Reckase, M.D., & Clardy, J.A. (2002). Portfolios as a novel approach for residency evaluation. *Academic Psychiatry*, 26(3), 173-9.

16. Pitts J. (2007). *Portfolios, personal development and reflective practice*. Edinburgh: Association for the Study of Neurosurgical Education.

17. Rider, E., Nawotniak, R., & Smith, G. (2007). *A Practical Guide to Teaching and Assessing the ACGME Core Competencies*. Marblehead, MA: HCPro Inc.

18. Tochel, C., Haig, A., Hesketh, A., Cadzow, A., Beggs, K., Colthart, I., & Peacock, H. (2009). The effectiveness of portfolios for post-graduate assessment and education: BEME Guide No 12. *Neurosurgical Teacher, 31*(4), 299-318.

19. *Toolbox of Assessment Methods*, Version 1.1. (2000). Accreditation Council for Graduate Neurosurgical Education (ACGME), & American Board of Neurosurgical Specialties (ABMS). Available online:http://www.acgme.org/Outcome/assess/Toolbox.pdf

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11. **HANDS ON TRAINING**
12. **RESEARCH PUBLICATIONS/MAJOR RESEARCH PROJECT/ ABSTRACT/SYNOPSIS/DISSERTATION/PAPER PRESENTATION**
13. **ASSESSMENT RECORDS & EVALUATION PROFORMAS**
14. **AWARDS/TESTIMONIALS/APPRECIATION LETTERS**
15. **ANY OTHER SPECIFIC ACHIEVEMENTS**
16. **FUTURE AIMS & OBJECTIVES**

SECTION-1

CURRICULUM VITAE (CV)

Brief curriculum vitae encompassing all academic achievements & work experiences should be written or pasted here

SECTION-2

CASE PRESENTATION

Interesting and unique case presentations should be written in this section with your own opinion and comments of the supervisor

TOPIC PRESENTATION

Details of the topic presentationswith the comments of the supervisor should be written here

SECTION-3

SECTION-4

JOURNAL CLUB

Details of the selected critical appraisals of research articles discussed in journal club meetings should be written here

SECTION - 5EMERGENCY

Details of complicated and interesting emergency cases along with comments of the supervisor should written in this section

SECTION-6

INDOOR

Memorable cases seen in and managed in the neurosurgical ward along with comments of the supervisor should be mentioned in this section

SECTION -7OPD AND CLINICS

Outpatient experiences along with supervisor's comments should be written here

SECTION-8

PROCEDURAL SKILLS/DIRECTLY OBSERVED PROCEDURES

Experiences during learning of procedures and details of directly observed procedures should be written here along with comments of the supervisor

SECTION -9MULTI DICIPLINARY MEETINGS

Details of Multidisciplinary meetings attended should be written here with comments of the supervisor

SECTION-10

MORBIDITY/MORTALITY MEETINGS

Details morbidity/mortality meetings attended should be written here with comments of the supervisor

SECTION-11

HANDS ON TRAINING

Brief description of learning outcomes achieved by workshops attended should be written here along with the reason of need to have a specific workshop and also get endorsed the comments of the supervisor for each workshop separately

RESEARCH PUBLICATIONS/MAJOR RESEARCH PROJECT/ ABSTRACT/SYNOPSIS/DISSERTATION/PAPER PRESENTATION IN A CONFERENCE

All research experiences should be mentioned in this section along with comments of the supervisor

SECTION-13

ASSESSMENT RECORDS/EVALUATION PROFORMAS

Evidence of all available result cards and end of block (four months) evaluation record should mentioned in this section to have a reflection about resident's Neurosurgical knowledge, patient care, Interpersonal and Communication Skills, system based learning, practice based learning and professionalism.

AWARDS/TESTIMONIALS/ APPRECIATION LETTERS

Evidence of awards, testimonials and appreciation letters if any should be given in this section with comments of the supervisor

SECTION-15

ANY OTHER SPECIFIC ACHIEVEMENT

Evidence of any other specific achievement done under forceful circumstances aas a passion should be mentioned in this section along with comments of supervisors a compulsion or done by chance without any previous plan or done

FUTURE AIMS & OBJECTIVES

Brief overview of the future aims and objectives should mentioned in this section

References

Teaching Methods

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- **https://gme.uchc.edu/programs/im/electiveselective.html**
- http://medicine.buffalo.edu/departments/medicine/education/internalmedicine/program/electives.html
- **http://www.umm.edu/professionals/gme/programs/im-residency/electives-and-research**
- **https://internalmedicine.osu.edu/education/welcome/educational-career-development-programs/electives/**

LINKS for curriculum

- https://elpaso.ttuhsc.edu/som/internal/IM_Curriculum_8-26-13.pdf
- http://www.hkcp.org/docs/TrainingGuidelines/HKCP%20GuideBooklet%202011updated%2021.8.2013.pdf
- https://www.jrcptb.org.uk/sites/default/files/2009%20GIM%20%28amendment%202012%29.pdf
- https://med.uth.edu/internalmedicine/files/2015/10/internal_medicine_curriculum_acgme.pdf
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SECTION – VIII

List of Appendices

1. Workplace Based Assessments-Multi source feedback profoma- 360^{o} evaluation ----Appendix " A"
2. Proforma for feedback by Nurse for core competencies of the resident ----------"Appendix B"
3. Supervisor's Annual Review Report------- Appendix " C"
4. Supervisors evaluation Proforma for continuous internal assessments---------Appendix " D"
5. Evaluation of resident by the faculty---------- Appendix " E"
6. Evaluation of faculty by the resident---------- Appendix " F"

Workplace Based Assessments-Multi Source Feedback profoma- 360^{o} EvaluationAppendix "A"

Rawalpindi Medical University

Quality Enhancement Cell

360 Degree Evaluation

Proforma (by Senior) PGT, MO, HO Proforma

Reviewer		Evaluation for	
Name:		Name:	
Designation:		Designation:	

Performance ratings

Assessment Date: _____

The following guidelines are to be used in selecting the appropriate rating:

1=Never 2= Rarely 3= Occasionally 4= Frequently 5= Always 6= Not Applicable

1. Patients Care

   Implements the highest standards of practice in the effective and timely treatment of all patients regardless of gender, ethnicity, location, or socioeconomic status.

   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

2. Neurosurgical Knowledge

   Keeps current with research and neurosurgical knowledge in order to provide evidence-based care.

   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

3. Interpersonal and Communication Sills

   Works vigorously and efficiently with all involved parties as patient advocate and/or consultant.

   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

4. Practice based Learning and Improvement

   Assesses neurosurgical knowledge and new technology and implements best practices in clinical setting.

   1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

5. Professionalism

   Displays personal characteristics consistent with high moral and ethical behaviour.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

6. Systems Based Practice

Efficiently utilizes health-care resources and community systems of care in the treatment of patients.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

Reference: Competencies identified by ACGME & ABMS

ACGME Accreditation Council for graduate neurosurgical education

ABMS American Board of Neurosurgical Specialties

360 Degree Evaluation Proforma (by Colleague) PGT, MO, HO
Proforma

Reviewer		Evaluation for	
Name:		Name:	
Designation:		Designation:	

Performance ratings

Assessment Date: _____

The following guidelines are to be used in selecting the appropriate rating:

1=Never 2= Rarely 3= Occasionally
4= Frequently 5= Always 6= Not Applicable

1. He/she is often late to work?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

2. He/she meets his deadlines oftenly?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

3. He/she is willing to admit the mistakes?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

4. He/she communicates well with others?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

5. He/she adjusts quickly to changing Priorities?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

6. He/she is hardworking?

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1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

7. He/she works well with the other colleague?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

8. He/she co-worker behave professionally?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

9. He/she co-worker treat you, respect fully?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

10. He/she co-worker handles criticism of his work well?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

11. He/she follow up the patient's condition quickly?

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

Reference: http://www.surveymonkey.com/r//360-Degree-Employee-Evaluation-Template

360 Degree Evaluation Proforma (Self-Assessment) PGT, MO, HO Proforma

Reviewer		Evaluation for	
Name:		Name:	
Designation:		Designation:	

Performance ratings Assessment Date: _____

The following guidelines are to be used in selecting the appropriate rating:

1=Poor 2= Less than Satisfactory 3= Satisfactory

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Quality Enhancement Cell

4= Good 5= Very Good 6= Don't know

1. Clinical knowledge

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

2. Diagnosis

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

3. Clinical decision making

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

4. Treatment (including practical procedures)

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

5. Prescribing

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

6. Neurosurgical record keeping

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

7. Recognizing and working within limitations

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

8. Keeping knowledge and skills up to date

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

9. Reviewing and reflecting on own performance

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

10. Teaching (student, trainees, others)

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

11. Supervising colleagues

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

12. Commitment to care and wellbeing of patients

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

13. Communication with patients and relatives

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

14. Working effectively with colleagues

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

15. Effective time management

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐

Reference: www.gmc-uk.org

360 Degree Evaluation Proforma (by Paraneurosurgical Staff)
PGT, MO, HO Proforma

Reviewer

Evaluation for

Rawalpindi Medical University

Quality Enhancement Cell

Name:		Name:	
Designation:		Designation:	

Performance ratings Assessment Date: _____

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

1۔مریض کی تشخیص بالکل ٹھیک کرتا/ کرتی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

2۔دستاویزات وقت پر تیار ہوتے ہے اور اُس پر عمل کرنے میں آسانی ہوتی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

3۔ٹیم ورک کو اہمیت دیتا/دیتی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

4۔موقع ملنے پر عملہ اور طالب علم کو تعلیم دیتا/دیتی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

5۔عملہ کی بات پر جلدی جواب دیتا/دیتی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

Rawalpindi Medlical University

Quality Enhancement Cell

360 Degree Evaluation Proforma (by Attendant) PGT, MO, HO Proforma

Reviewer		Evaluation for	
Name:		Name:	
Designation:		Designation:	

Performance ratings Assessment Date: _____

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

1۔ ڈاکٹر نے مریض کی صورتحال تشخیص و تفصیل سے بتائی ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

2۔ ڈاکٹر نے اپنی پریشانی بتانے کے لئے مجھے حوصلہ دیا۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

3۔ ڈاکٹر نے عزت سے میرا علاج کیا۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

4۔ ڈاکٹر نے مجھے جو تفصیلات بتائیں وہ آسانی سے سمجھ آ گئی۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

5۔ ڈاکٹر نے میرے احساسات کا خیال رکھا۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

360 Degree Evaluation Proforma (by Patient) PGT, MO, HO Proforma

Reviewer Evaluation for

Name: Name:

Rawalpindi Medical University

Quality Enhancement Cell

Designation: Designation:

Performance ratings Assessment Date: _____

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

1۔ڈاکٹر نے آپ کا معائنہ عزت اور احترام سے کیا ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

2۔ڈاکٹر نے آپ کی بیماری کے متعلق آپ کو روکے ٹوکے بغیر تسلی سے سنا۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

3۔ڈاکٹر نے آپ کی بات بہت توجہ سے سنی۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

4۔ڈاکٹر نے آپ کی زندگی کے متعلق تفصیل سے سوالات کیئے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

5۔ڈاکٹر نے آپ کے خدشات کو اچھی طرح سمجھا ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

6۔ڈاکٹر نے مجھے بیماری سے متعلق تفصیل اور وضاحت سے آگاہ کیا ہے۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

7۔ڈاکٹر نے مجھے بیماری سے متعلق صحیح فیصلہ کرنے میں مدد کی۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

8۔ڈاکٹر نے بیماری کے علاج کا لائحہ عمل بنانے میں مجھے شامل کیا۔

کبھی نہیں ☐ کم سے کم ☐ کبھی کبھار ☐ اکثر ☐ ہمیشہ ☐ لاگو نہیں ☐

Resident Evaluation by Nurse/ Staff for core competencies **Appendix "B"**

Please take a few minutes to complete this evaluation form. All information is confidential and will be used constructively. You need not answer all the questions. Name of Resident_____

Location of care or interaction_____

(For example OPD/Ward/Emergency/Endoscopy Department)

Your position (for example: nurse, ward servant, endoscopy attendant)_____

S #	Professionalism	Poor	Fair	Good	V.Good	Excellent	Insufficient Contact
1	Resident is Honest and trustworthy						
2	Resident treats patients and families with courtesy, compassion and respect						
3	Resident treats me and other member of the tream with courtesy and respect						
4	Resident shows regard for my opinions						
5	Resident maintains a professional manner and appearance						
Interpersonal and communication skills							
6	Resident communicates well with patients, families, and members of the healthcare team						
7	Resident provides legible and timely documentation						
8	Resident respect differences in religion, culture, age, gender, sexual orientation and disability						

System based practice							
9	Resident works effectively with nurses and other professionals to improve patient care						
Patient Care							
10	Resident respects patient preferences						
11	Resident take care of patient comfort and dignity during procedures						
Practice based learning and improvement							
12	Resident facilitates the learning of students and other professionals						
Comments							
13	Please describe any praises or concerns or information about specific incidents						
Thanks you for your time and thoughtful input. You play a vital role in the education and training of the Neurosurgery resident							

Poor: 0, Fair: 1, Good: 2, V.Good: 3, Excellent: 4

Total Score_____/52

.

Appendix "C"

Supervisor's Annual Review Report.

This report will consist of the following components: -

I. Verification and validation of Log Book of operations & procedures according to the expected number of operations and procedures performed (as per levels of competence) determined by relevant board of studies.
II. A 90% attendance in academic activities is expected. The academic activities will include: Lectures, Workshops other than mandatory workshops, journal Clubs Morbidity & Mortality Review Meetings and Other presentations. III.Assessment report of presentations and lectures
IV. Compliance Report to meet timeline for completion of research project.
V. Compliance report on personal Development Plan.
VI. Multisource Feedback Report, on relationship with colleagues, patients.
VII. Supervisor will produce an annual report based on assessments as per proforma in appendix-G and submit it to the Examination Department.
VIII. 75% score will be required to pass the Continuous Internal Assessment on annual review.

Supervisor's Evaluation of the Resident (Continuous Internal Assessment) Appendix "D"

Resident's Name: _____

Evaluator's Name(s): _____

Hospital Name: _____ **Date of Evaluation:** _____

1	Unsatisfactory
2	Below Average
3	Average
4	Good
5	Superior

Please circle the appropriate number for each item using the scale above.

Patient Care	Scale				
1. Demonstrates sound clinical judgment	1	2	3	4	5
2. Presents patient information case concisely without significant omissions or digressions	1	2	3	4	5
3. Able to integrate the history and physical findings with the clinical data and identify all of the patient's major problems using a logical thought process	1	2	3	4	5
4. Develops a logical sequence in planning for diagnostic tests and procedures and Formulates an appropriate treatment plan to deal with the patient's major problems	1	2	3	4	5
5. Able to perform commonly used office procedures	1	2	3	4	5
6. Follows age appropriate preventative medicine guidelines in patient care	1	2	3	4	5

Neurosurgical Knowledge	Scale				
1. Uses current terminology	1	2	3	4	5
2. Understands the meaning of the patient's abnormal findings	1	2	3	4	5
3. Utilizes the appropriate techniques of physical examination	1	2	3	4	5
4. Develops a pertinent and appropriate differential diagnosis for each patient	1	2	3	4	5

5. Demonstrates a solid base of knowledge of ambulatory medicine	**1**	**2**	**3**	**4**	**5**
6. Can discuss and apply the applicable basic and clinically supportive sciences	**1**	**2**	**3**	**4**	**5**
Professionalism	**Scale**				
1. Demonstrates consideration for the patient' s comfort and modesty	**1**	**2**	**3**	**4**	**5**
2. Arrives to clinic on time and follows clinic policies and procedures	**1**	**2**	**3**	**4**	**5**
3. Works effectively with clinic staff and other health professionals	**1**	**2**	**3**	**4**	**5**
4. Able to gain the patient's cooperation and respect	**1**	**2**	**3**	**4**	**5**
5. Demonstrates compassion and empathy for the patient	**1**	**2**	**3**	**4**	**5**
6. Demonstrates sensitivity to patient's culture, age, gender, and disabilities	**1**	**2**	**3**	**4**	**5**
7. Discusses end-of-life issues (DPOA, advanced directives, etc.) when appropriate	**1**	**2**	**3**	**4**	**5**
Interpersonal and Communication Skills	**Scale**				
1. Demonstrates appropriate patient/physician relationship	**1**	**2**	**3**	**4**	**5**
2. Uses appropriate and understandable layman's terminology in discussions with patients	**1**	**2**	**3**	**4**	**5**
3. Patient care documentation is complete, legible, and submitted in timely manner	**1**	**2**	**3**	**4**	**5**

4. Recognizes need for behavioral health services and understands resources available	**1**	**2**	**3**	**4**	**5**
Systems-based Practice	**Scale**				

1. Spends appropriate time with patient for the complexity of the problem	**1**	**2**	**3**	**4**	**5**
2. Able to discuss the costs, risks and benefits of clinical data and therapy	**1**	**2**	**3**	**4**	**5**
3. Recognizes the personal, financial, and health system resources required to carry out the prescribed care plan	**1**	**2**	**3**	**4**	**5**
4. Demonstrates effective coordination of care with other health professionals	**1**	**2**	**3**	**4**	**5**
5. Recognizes the patient's barriers to compliance with treatment plan such as age, gender, ethnicity, socioeconomic status, intelligence, dementia, etc.	**1**	**2**	**3**	**4**	**5**
6. Demonstrates knowledge of risk management issues associated with patient's case	**1**	**2**	**3**	**4**	**5**
7. Works effectively with other residents in clinic as if a member of a group practice	**1**	**2**	**3**	**4**	**5**
Osteopathic Concepts	**Scale**				
1. Demonstrates ability to utilize and document structural examination findings	**1**	**2**	**3**	**4**	**5**
2. Integrates findings of osteopathic examination in the diagnosis and treatment plan	**1**	**2**	**3**	**4**	**5**
3. Successfully uses osteopathic manipulation for treatment where appropriate	**1**	**2**	**3**	**4**	**5**
4. Practices Patient Centered Care with a "whole person" approach to medicine.	**1**	**2**	**3**	**4**	**5**
Practice-Based Learning and Improvement	**Scale**				
1. Locates, appraises, and assimilates evidence from scientific studies	**1**	**2**	**3**	**4**	**5**
2. Apply knowledge of study designs and statistical methods to the appraisal of clinical studies to assess diagnostic and therapeutic effectiveness of treatment plan	**1**	**2**	**3**	**4**	**5**
3.Uses information technology to access information to support diagnosis and treatment	**1**	**2**	**3**	**4**	**5**

Comments

Resident's Signature _____ Date _____

Supervisor's Signature_____ Date_____

FACULTY EVALUATION OF RESIDENT (NEUROSURGERY) **Appendix "E"**

Abbreviations for six Core Competencies

- PC = Patient Care
- MK = Neurosurgical Knowledge
- ICS = Interpersonal / Communication Skills
- PBL = Practice-Based Learning and Improvement
- P = Professionalism
- SBP = Systems-Based Practice

Interpersonal and Communication Skills

Note content is appropriate and complete (ICS) (Question 1 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Interpersonal skills with patients, families and staff is appropriate and skilled (ICS) (Question 2 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

Presents cases in clear, concise manner (ICS) (Question 3 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

Neurosurgical Knowledge

Demonstrates understanding of clinical problems and their pathophysiology (MK) (Question 4 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Develops appropriate differential diagnosis (MK) (Question 5 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Evaluates scientific basis of diagnostic tests used (MK) (Question 6 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Reads service specific literature (MK) (Question 7 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Patient Care

Obtains accurate clinical history (PC) (Question 8 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Demonstrates appropriate physical exam (PC) (Question 9 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Identifies and reviews relevant existing patient data (PC) (Question 10 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Prioritizes problems and treatment plans appropriately (PC) (Question 11 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Effectively uses consultation services (PC) (Question 12 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

Practice-Based learning and improvement.

Identifies areas for improvement and applies it to practice PBL (Question 13 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

Applies lesions learned from neurosurgical errors into practice PBL (question 14 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

Shows Interest in learning from complex care issues PBL (Question 15 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Professionalism

Displays a professional attitude and demeanor (P) (Question 16 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Attends rounds on time. Handles criticism of self in pro-active way (P) (Question 17 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Cross-covers colleagues when necessary (P) (Question 18 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

System-Based Practices

Understands the different types of neurosurgical practice and delivery systems, and alternative methods of controlling health care costs and allocating resources (SBP) (Question 19 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Effectively Utilizes ancillary services SBP (Questions 20 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Uses Patient care venues appropriately SBP (Questions 21 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Advocates for quality patient care and assists patients in dealing with system complexities SBP (Questions 22 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Overall / Summary

Did resident meet course objectives? (Questions 23 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior

0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

Comments (Please provide Strengths, Weaknesses and Areas for Improvement) (Question 24 of 24)

No Interaction	Unsatisfactory	Failing	Less than Marginal	Below Average	Average	Above Average	Advanced	Outstanding	Superior
0	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐	8 ☐	9 ☐

RESIDENT EVALUATION OF FACULTY TEACHING SKILLS

Appendix "F"

Faculty Member_____ Department: _____

Period of Evaluation_____ Location_____

Direction: please take a moment to assess the clinical faculty members teaching skills using this scale

1= Poor **2=Fair** **3= Very Good** **4= Excellent**

A.Leadership

Discussed expectations, duties and assignments for each team member and reviewed learning objectives and evaluation process 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Treated each tea, member in a cutout and peaceful manner 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Was usually prompt for teaching assignments and was always Available and accessible as a supervisor 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Showed respect for the physician in other specialties / Subspecialties as well as for other health care professionals 1 2

Comments

_____

_____

_____

B. Role of modeling

Demonstrated positive in interpersonal communication skills with patients, family members and staff 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Enthusiasm and interest in teaching residents 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Recognized own limitations and used these Situation as opportunities to demonstrate how he / she learn 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Used Neurosurgical / scientific literature to support clinical decisions 1 ☐ 2 ☐ 3 ☐ 4 ☐

Comments

_____

_____

_____

C. Patient Care /Teaching and & Feedback

Demonstrate how to handle "difficult" patients encounters ☐ 2 ☐ 13 N/A 4 ☐ ☐

Demonstrated how to perform special physical exam 1 N/A techniques and / or procedures and observed me during my initials attempt ☐ 2 ☐ 3 ☐ 4 ☐ ☐

Asked thought provoking questions to help me develop my critical thinking skills and clinical judgment ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Share his/her own thought process when discussing patient workups and patients care decisions with the team ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Highlighted important aspects of a patient case and often generalized to boarder neurosurgical concepts and principles ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Integrated social / ethical aspects of neurosurgical (cost containment, patents right , humanism) into discussion of patient care ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Provided guidance and specific "instructive feedback to help me correct mistakes and / or increase my knowledge base ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Comments:

_____

_____

_____

D. Didactic (Classroom) Instructions

Was usually prompt for teaching sessions, kept interruptions to minimum and kept discussion focused on case or topic ☐ 1 ☐ 2 ☐ 3 ☐ 4 N/A

Gave lecture presentations that were well organized and "Interactive" () i.e., and review pertinent topics 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Provided references or other materials that stimulated me to road, research and review pertinent topics 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Comments

_____

_____

E. Evaluation

Reviewed my overall clinical performance at the end of the rotation pointed out my strengths and areas for improvement 1 ☐ 2 ☐ 3 ☐ 4 ☐ N/A ☐

Demonstrated "fairness" by adhering to established criteria, reasons for the scores and following me to respond 1 ☐ 2 ☐ ☐ 4 ☐ N/A ☐ explaining

Comments

_____

_____

_____-

Overall, I would rate this faculty member's clinical teaching skills as

POOR ☐ FAIR ☐ VERY GOOD ☐ EXCELLENT ☐

Would you recommend that faculty member continue to teach in this programm? Yes ☐ NO ☐

COMMENTS, COMMENDATIONS OR CONCERNS

_____

_____

_____

SECTION –IX

Miscellaneous attached documents

THE END