UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY
DIVISION OF NEUROSURGERY
KENYATTA NATIONAL HOSPITAL
PO Box 19676, 00100, NAIROBI
KENYA.

NEUROLOGICAL SURGERY
TRAINING PROGRAMME
2010-2011

FACULTY

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission statement</td>
<td>3</td>
</tr>
<tr>
<td>Division of Neurosurgery Goals and Objectives</td>
<td>3</td>
</tr>
<tr>
<td>Program Outline</td>
<td>3</td>
</tr>
<tr>
<td>Core Competencies for Neurosurgery Training</td>
<td>5</td>
</tr>
<tr>
<td>Reference List for Teaching Tools and Methods</td>
<td>9</td>
</tr>
<tr>
<td>Policy on Supervision and Evaluation</td>
<td>9</td>
</tr>
<tr>
<td>Residency Competency Goals and Objectives</td>
<td>13</td>
</tr>
<tr>
<td>Basic Sciences and Principles of Surgery</td>
<td>15</td>
</tr>
<tr>
<td>Clinical Neurosciences</td>
<td>23</td>
</tr>
<tr>
<td>Basic Clinical Neurosurgery</td>
<td>27</td>
</tr>
<tr>
<td>Intermediate Clinical Neurosurgery</td>
<td>30</td>
</tr>
<tr>
<td>Final Stage Clinical Neurosurgery</td>
<td>35</td>
</tr>
<tr>
<td>Evaluation Form</td>
<td>46</td>
</tr>
<tr>
<td>Resident Rotation</td>
<td>47</td>
</tr>
</tbody>
</table>
MISSION STATEMENT
The mission of the Division of Neurosurgery is to provide optimal neurosurgical care to Kenyans and to train physicians as neurosurgical specialists who will become leaders in their field in Africa. The division is also committed to the advancement of neurosurgery as part of the neurosciences at the University of Nairobi. These goals are accomplished through the high calibre faculty, house officers, and support staff.

Goals and Objectives
To provide general and subspecialty neurosurgical services to patients.
To provide the training needed for our house officers to excel in surgical care and in research.
To provide instruction in the basic and clinical neurosciences to medical students, allied health students, and to house officers in other disciplines.
To promote and support basic science and clinical research in the neurosciences.
To achieve national and international recognition of our clinical and research endeavours.

PROGRAM OUTLINE
The Master of Medicine in Neurosurgery Program of The University of Nairobi is a six year Training Program with a mandatory two years of independent clinical work at the Kenyatta National Hospital after graduation. This two year period may also be spent in an approved busy Neurosurgical Unit within Kenya or outside Kenya.

Post Graduate Year 1 & 2 (PG Yr 1&2)
PG Yr 1 Residents undertake Clinical Duties at The Kenyatta National Hospital in Neurosurgery (3 months). The Clinical duties may be undertaken as weekend and night calls. The Residents undertake courses in Applied Anatomy and Neuroanatomy (Department of Human Anatomy) and Neurophysiology and Surgical Physiology (Department of Medical Physiology) at The Chiromo Campus. Residents will be examined in those two subjects at the end of PG Yr 1.

PG Yr 2 Residents rotate in The General Surgery/Paediatric Surgery Wards (6 months), Orthopaedic Surgery (3 months), and Neurosurgery/ICU (3 months) at The Kenyatta National Hospital. During that period they are expected to complete The Surgery logbook. Seminars on Principles of Surgery are given during that period on Wednesdays 8:00 AM-9:00 AM, Department of Surgery. Residents are expected to attend all the teaching sessions in General Surgery and Orthopaedic Surgery. There is a Departmental Written and a Clinical Examination. The Departmental Examination contributes thirty percent of the marks in the Final Principles of Surgery University Examination. The Surgery logbook must be handed in one month prior to sitting for the Principles of Surgery Examination. Successful completion of the log book is required before sitting for the Principles of Surgery Examination.

Post Graduate Year 3
PG Yr 3 Residents work in the Neurosurgical Unit at the Kenyatta National Hospital while undertaking courses in Neuropathology and General Pathology (Departments of Pathology & Microbiology), Neuroradiology (Department of Radiology), Neuro-otology (Department of Surgery-Division of ENT) and Neuro-opthalmology (Department of Ophthalmology). Residents undertake a three month Clinical Rotation in Neurology (Department of Internal Medicine). The Residents co-ordinate the weekly Neuropathology and Neuroradiology Conferences. They are expected to sit for University Examinations at the end of the academic year in the areas mentioned.

Post Graduate Year 4, 5 & 6
Neurosurgical outpatient clinics.
Nerosurgical Outpatient Clinics are held every Monday at 2:00 PM and every Tuesday at 2:00 PM at the Surgical Outpatient Clinic (SOPC), No. 24. All Residents, except the on-call Resident, are expected to attend. The Monday Clinic is also a Teaching Session for Final Year Medical Students. The Clinics are co-ordinated by the PGY 5/6 on-duty Resident.

Clinical rounds
Neurosurgery Resident Teaching and Hospital Rounds are held every day by the On-duty Consultant. Patient management Rounds are conducted twice a day, in the morning and late afternoon, after operative cases are completed, by the on-call Resident under the guidance of the On-duty Consultant.

Neurosurgical Grand Round
Neurosurgical Grand Round is held every Thursday from 9:15 AM to 11:00 AM. The Grand Round consists of presentations by Neurosurgery Residents.

Journal Club, Morbidity & Mortality Conference
Journal Club is held every first Monday of the month at 12:00 NOON. Morbidity and Mortality Conference is held every last Monday of the Month at 12:00 NOON. The Journal Club provides critical review of literature related to the care and evaluation of patients with neurosurgical disorders. Faculty and residents review each death and complication of the preceding month at the Morbidity and Mortality Conference. Interesting cases are discussed in depth. These Conferences are co-ordinated by the Chief Resident.

Neuroradiology Conference.
Neuroradiology Conference is held every Thursday at 8:00 AM. This conference reviews images of pre-operative cases and is co-ordinated by the PGY 3 Residents and the Radiology Residents.

Neuropathology (Clinico-pathological-CPC) Conference
Neuropathology Conference is held every Friday at 7:30 AM. This is a multidisciplinary conference that incorporates neuroradiology and neuropathology for review of interesting neurosurgical cases and is co-ordinated by the PGY 3 Residents and the Pathology Residents.

Principles and Practice of Neurosurgery Seminars
Seminars on Principles and Practice of Neurosurgery are given during the year on Thursdays 11:00 AM-1:00 PM, Department of Surgery.

Case Discussion Seminars
Case discussion seminars are held on Mondays 10:30 AM-1:00 PM.

Assessment
There is a Departmental Written Assessment and a Clinical and Oral Examination on completion of the Lecture schedule during PG Yr 4, 5 and 6 levels of Training. The Departmental Assessment contributes thirty percent of the marks in the Final Principles and Practice of Neurosurgery University Examination. The Neurosurgery logbook must be handed in one month prior to sitting for the Final MMed Neurosurgery Examination. Successful completion of the log book is required before sitting for the final MMed Neurosurgery Examination.

Dissertation
Residents are required to undertake research and write a dissertation. The research theme shall be within the area of Neurosurgery and Neurosciences and will be agreed upon between the candidate and the faculty academic supervisors. Residents are expected to attend a Clinical Epidemiology Course conducted by the Clinical Epidemiology Unit during their period of training and familiarise themselves with Research Methodologies. The Dissertation must be submitted three months to the date
of the Final MMed Neurosurgery Examination. Successful completion of the
dissertation is required before sitting for the final MMed Neurosurgery Examination.

Pre-Registration
The newly qualified neurosurgeon must work at the Kenyatta National Hospital (or at
a similar Local or International Neurosurgical Unit) for a minimum period of two
years before seeking Board Registration.

CORE COMPETENCIES FOR NEUROSURGERY TRAINING
This residency program requires its residents to obtain competence in the six areas
listed below to the level expected of a new practitioner. Toward this end, the program
has defined the specific knowledge, skills, behaviours, and attitudes required, and will
provide the educational experiences as needed in order for the residents to
demonstrate the following:

1. Patient care that is compassionate, appropriate, and effective for the treatment
   of health problems and the promotion of health with specific reference to
   neurosurgical conditions. At a minimum residents are expected to:
   1) Gather and understand essential patient information in a timely manner
   2) Generate an appropriate differential diagnosis
   3) Implement an effective plan of management
   4) Prioritize and stabilize multiple patients simultaneously
   5) Competently perform neurosurgical operative procedures
   6) Manage Complications
   7) Analyze Outcomes
   8) Counsel and educate patients and families.
   9) Provide health care services aimed at preventing health problems and maintaining
      health.
   10) Work with health care professionals to provide patient-focused care.

2. Teaching tools and methods the program uses to deliver the opportunity for
    resident(s) to develop this competency
   1, 2, 3, 4, 6, Daily rounds,
   1, 2, 6, Teaching rounds
   3, 7, 10, Specialty practice guidelines
   1, 2, 3, 8, 9, Clinic
   5, 6, Intra-operative teaching
   1-9 M&M, Neuroradiology, Neuropathology Conferences
   1-9 Case Management Conferences

3. Feedback and measurement used to gauge the resident(s) development of this
   competency
   1-10, Faculty evaluation
   2, M&M, Neuroradiology, Neuropathology Conferences
   1-9 Daily observation and evaluation by Consultants
   1-9 MMed NS Part I, II and III Continuous Assessment Examinations
   2, 5, 6 MMed NS log books

4. Documentation used to verify attainment of this competency by residents
   1-10 Faculty Evaluations are completed every 12 months
   1-10 Residents are given daily feedback from the Program Director and Consultants
   1-10 Continuous Assessment Examination
   1-10 MMed NS Part I, II, III University Examinations

Medical Knowledge: Residents must demonstrate knowledge about
established and evolving biomedical, clinical, and cognate sciences, with specific
reference to basic and clinical neurosciences, as well as the application of this
knowledge to patient care. Among other things, residents are expected to:
1) Generate a differential diagnosis and properly sequence critical actions for patient care, including management of complications, morbidity and mortality.
2) Synthesize and properly utilize acquired patient data.
3) Identify neurosurgical emergencies.
4) Know how to access current medical information.
5) Understand how to treat neurosurgical conditions.
6) Incorporate evidence-based principles
Teaching tools and methods the program uses to deliver the opportunity for resident(s) to develop this competency
1-6, Surgery Texts
1-6 Surgery Journals
1-6 Teaching Rounds & Case Management Conferences
1-6, Lectures
4, 5, 6, Pubmed/online journals
1-6 Self-directed study
1, 2, 3, 5 M&M Conferences
1, 2, 4, 5, 6 Case Management Conferences
2, 4, Journal Club
Feedback and measurement used to gauge the resident(s) development of this competency
1-6 Faculty evaluations
1-6 MMed NS Part I, II, III Continuous Assessment Examinations
1, 2, 3, 5 M&M Conference
4, 5, Publications
1, 2, Presentations
1, 2, 3, 5 MMed NS logbooks
1-6 Daily observation and evaluation by Consultants
Documentation used to verify attainment of this competency by residents
1-6 Residents are given daily feedback from the Program Director and Consultants
1-6 Faculty Evaluations are completed every 12 months
Practice-based learning and improvement that involves the investigation and evaluation of care for their patients, the appraisal and assimilation of scientific evidence, and improvements in patient care. At a minimum, residents are expected to:
1) Analyze and assess their practice experience and perform practice-based improvement.
2) Locate, appraise and utilize scientific evidence related to their patients’ health problems.
3) Apply knowledge of study design and statistical methods to critically appraise the medical literature.
4) Utilize information technology to enhance their education and improve patient care.
5) Facilitate the learning of students and other health care professionals
Teaching tools and methods the program uses to deliver the opportunity for resident(s) to develop this competency
1 MMed NS log books
1, 2, 3, 4, Journal Club
2, 4, 5 Case Management Conferences
1-5 M&M conference
1-5 Core competency lectures
Feedback and measurement used to gauge the resident(s) development of this competency
1-5 M&M Conferences
1-5 Evaluations by Faculty
1-5 Daily observation and evaluation by consultants
2, 3, 4 MMed NS Part I, II, III Continuous assessment examination
Documentation used to verify attainment of this competency by residents
1-5 Residents are given daily feedback from the Program Director and Consultants
1-5 Faculty Evaluations are completed every 12 months
Residents must be able to demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and other health professionals. At a minimum, residents are expected to:
1) Develop an effective therapeutic relationship with patients and their families, with respect for diversity and cultural, ethnic, spiritual, emotional, and age-specific differences.
2) Demonstrate effective participation in and leadership of the health care team.
3) Develop effective written communication skills.
4) Maintain relevant and legible medical records
5) Effectively communicate with out-of-hospital personnel as well as non-medical personnel.
6) Involve patients in medical decisions
7) Strengthen listening and non-verbal communication skills
Teaching tools and methods the program uses to deliver the opportunity for resident(s) to develop this competency
1-7 Mentoring from Consultants
1-7 Daily interactions with patients, families and health care staff
5, 7 Case Management Conferences
Feedback and measurement used to gauge the resident(s) development of this competency
1-7 Evaluation by Faculty
1-7 Daily observation and evaluation by Consultants
Documentation used to verify attainment of this competency by residents
1-7 Residents are given daily feedback from the Program Director and Consultant
1-7 Program Evaluations are completed every 12 months
Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to patients of diverse backgrounds. At a minimum, residents are expected to:
1) Treat patients/family/staff/ paraprofessional personnel with respect.
2) Demonstrate sensitivity to patient’s pain, emotional state, and gender/ethnicity issues.
3) Discuss death honestly, sensitively, patiently, and compassionately.
4) Exemplify integrity
5) Accept responsibility/accountability
6) Demonstrate reliability
7) Maintain calm, even temperament
8) Exhibit self-awareness and knowledge of limits.
9) Respond to the comments of other team members, patients, families, and peers openly and responsibly.
Teaching tools and methods the program uses to deliver the opportunity for resident(s) to develop this competency
1-9 Daily examples of standards set by Consultants
1, 4, 6, Establishment of dress code
1-9 Daily interactions with patients and health care professionals in the operating room, the clinic and on the floor
4, 5, 6, 7, 8, 9 Case Management Conferences
Feedback and measurement used to gauge the resident(s) development of this competency
1-9 Daily observation and evaluation by Consultants
1-9 Program Evaluation
Documentation used to verify attainment of this competency by residents
1-9 Residents are given daily feedback from the Program Director and Consultants
1-9 Performance Evaluations are completed every 12 months

Systems-based practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. At a minimum, residents are expected to:
1) Understand, access, appropriately utilize, and evaluate the effectiveness of the resources, providers, and systems necessary to provide optimal neurosurgical care.
2) Understand different medical practice models and delivery systems and how to best utilize them to care for the individual patient.
3) Practice cost-effective health care and resource allocation that does not compromise quality of care.
4) Advocate, coordinate, and facilitate patient care.
5) Understand principles of and advance practices for patient safety at the institutional and individual level

Teaching tools and methods the program uses to deliver the opportunity for resident(s) to develop this competency
1-5 Clinicopathological Conferences
1-5 Core competency lectures
1-5 Observation of faculty utilizing cost-effective healthcare
1, 2, 5 Case Management Conferences
Feedback and measurement used to gauge the resident(s) development of this competency
1-5 Evaluations by Faculty
1-5 Program Evaluation
1, 2, 5 MMed NS Part III Continuous assessment examinations
Documentation used to verify attainment of this competency by residents
1-5 Performance Evaluations are completed every 12 months

Didactic Modules
Learning Objectives:
1. For the resident to model their independent lifelong learning process in neurosurgery, based upon didactic topic specific series provided by the faculty.
2. For the resident to study specific topics in advance of the lectures.
3. To improve the resident's teaching and communication skills through participation in didactic lectures.

Journal Club
Goals and Objectives
To acquire critical analysis of journals

Learning Objectives:
1) To develop a clinical question on which to base the selection of a journal club article.
2) To succinctly describe the study design, methodology and results in five minutes.
3) To be able to discuss the strengths and weaknesses of the study design and methodology.
4) To draw their own conclusions based upon the study design and results; and then compare this to the author's conclusions.

REFERENCE LIST FOR TEACHING TOOLS AND METHODS

Neurosurgery Texts
(available in the library)
5. Kemp. Operative Neurosurgery Vol 1 & 2

Suggested Reading:
1. Rhoton: Cranial Anatomy and Surgical Approaches. Rhoton AL. Schaumburg, IL: The Congress of Neurological Surgeons, 2003, (also available on line)

Neurosurgery Journals
1. Journal of Neurosurgery (Monthly publication of the American Association of Neurological Surgeons)
2. Neurosurgery (Monthly publication of the Congress of Neurological Surgeons)

Instruments
1. Surgical Loupes

In addition to these requirements, residents are expected to attain competence as outlined in the curriculum for each level of training.

EVALUATION OF RESIDENTS, FACULTY AND PROGRAM

Basis of Evaluations of Residents
Every twelve months evaluations of the residents of this program are performed. These evaluations are based upon six general competencies; patient care, medical knowledge, practice-based learning and improvement, communication and interpersonal skills, professionalism, and systems-based practice.

The residency program requires residents to develop proficiency in the competencies and all evaluations of residents follow the six areas, listed below. Toward this end, the program defines the specific knowledge, skills, and attitudes required and provides educational experiences for our residents to demonstrate knowledge of the competencies.

1. PATIENT CARE
Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.
Residents are expected to:
• communicate effectively and demonstrate caring and respectful behaviors when interacting with patients and their families
• gather essential and accurate information about their patients
• make informed decisions about diagnostic and therapeutic interventions based on
patient information and preferences, up-to-date scientific evidence, and clinical judgment
• develop and carry out patient management plans
• counsel and educate patients and their families
• use information technology to support patient care decisions and patient education
• perform competently all medical and invasive procedures considered essential for the area of practice
• provide health care services aimed at preventing health problems or maintaining health
• work with health care professionals, including those from other disciplines, to provide patient-focused care

2. MEDICAL KNOWLEDGE
Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to patient care. Residents are expected to:
• demonstrate an investigatory and analytic thinking approach to clinical situations
• know and apply the basic and clinically supportive sciences

3. PRACTICE-BASED LEARNING AND IMPROVEMENT
Residents must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices. Residents are expected to:
• analyze practice experience and perform practice-based improvement activities using a systematic methodology
• locate, appraise, and assimilate evidence from scientific studies related to their patients’ health problems
• obtain and use information about their own population of patients and the larger population from which their patients are drawn
• apply knowledge of study designs and statistical methods to the appraisal of clinical studies and other information on diagnostic and therapeutic effectiveness
• use information technology to manage information, access on-line medical information and support their own education
• facilitate the learning of students and other health care professionals

4. INTERPERSONAL AND COMMUNICATION SKILLS
Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with patients, their patients families, and professional associates. Residents are expected to:
• create and sustain a therapeutic and ethically sound relationship with patients
• use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills
• work effectively with others as a member or leader of a health care team or other professional group

5. PROFESSIONALISM
Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. Residents are expected to:
• demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development
• demonstrate a commitment to ethical principles pertaining to provision or withholding of clinical care, confidentiality of patient information, informed consent, and business practices
• demonstrate sensitivity and responsiveness to patients’ culture, age, gender, and disabilities

6. SYSTEMS-BASED PRACTICE
Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.
Residents are expected to:
• understand how their patient care and other professional practices affect other health care professionals, the health care organization, and the larger society and how these elements of the system affect their own practice
• know how types of medical practice and delivery systems differ from one another, including methods of controlling health care costs and allocating resources
• practice cost-effective health care and resource allocation that does not compromise quality of care
• advocate for quality patient care and assist patients in dealing with system complexities
• know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance

FORMAL YEARLY EVALUATIONS
At the end of each academic year, an appointment is scheduled with the resident to discuss their evaluations, progress and any concerns. The resident has the opportunity to review their evaluations and sign them. This is also an opportunity to discuss any concerns the resident may have about the rotation, faculty and the program in general.

Resident Portfolio
A resident’s portfolio meets the twin needs of training verification for certifying organizations and to assist the resident in determining their strengths and weaknesses. In essence the portfolio will become a quality control tool for resident training and proficiencies.

For the duration of a neurosurgeon’s active career, their training is verified whenever they apply for a license to practice medicine in a new jurisdiction, they apply for hospital privileges, or to be vetted for payment purposes by third party insurers. Periodically, these institutions repeat the credentialing process. The training institution is requested not only to verify the training, but to detail how the resident performed in training, were there any deficiencies, probation, and are they capable of performing certain procedures or not.

The resident portfolio is developed over the 6 years of the resident’s training. Important portions of the portfolio are the yearly evaluations, MMed NS Part I, II and III scores, MMed NS log books, any presentations at meetings, awards and honors, and any disciplinary actions. At the end of training the portfolio is used to generate a very detailed letter of the resident’s training. This letter is then placed in their permanent file and is used for the verification of training for credentialing purposes. Thus, any entity that requests verification of training, with the appropriate release signed by the former resident, is given a detailed assessment performed by those who trained the former resident. This is more accurate and fair than having a program
director or faculty member try to determine the course and results of training of a former resident who graduated years before. The resident is able to view their portfolio at any time and they will take it with them upon completion of their residency.

PROMOTION
Resident evaluations occur at least bi-annually, usually. The faculty evaluates each resident’s performance on his/her clinical rotation. In addition to performance of clinical duties and surgical skills, the following are evaluated.
1. Acquisition of a solid foundation of fundamental surgical knowledge prior to progression in the program to the level of independent but supervised patient management and operative care.
2. Mastery of specific objectives in each year of training.
3. A high level of professionalism, interpersonal communication skills and ethical behavior as related to interpersonal relationships with faculty, peers, staff, medical students, and nurses.
4. Teaching skills
5. Presentations at conferences
6. Academic achievements, presentations at meetings, papers, and research
7. Maintain operative logs, duty hours and conference attendance

PROBATION AND DISMISSAL
It is assumed that residents entering Neurological Surgery will successfully complete the program. The selection process is rigorous and in general applicants are highly motivated and qualified. Once in the program, the faculty is committed to the education and success of the resident.
If a problem arises related to the six core competencies or due to a failure to comply with University or Hospital policies, there is a process for resolving the difficulty. The initial step in the process is a warning to the resident. A warning may be initiated by any faculty member by contacting the Chairman or Program Director and generating a letter documenting the area of concern. The warning will be addressed at a special meeting of the faculty and the resident. The corrective action required by the resident will be given to the resident in writing.
If the deficiency is not corrected after the warning, the resident will be placed on focused review. This only requires a discussion with the resident about the issue and if corrected no other formal action is necessary. If the faculty is not satisfied that the issue is resolved the resident is placed on probation. Probation requires documentation and a formal hearing by a committee of the School/College chaired by the Dean/Principal. The final steps are suspension and/or dismissal.
Each step requires faculty review and approval and complete and frank discussion with the resident. If it is the recommendation of the faculty that the resident be placed on probation, the resident will be informed in writing and have the opportunity to meet with the faculty. The faculty will then determine the length of time the probation will last and the specific action required by the resident to correct the deficiency. A specific faculty member will be appointed to work with and mentor the resident during this period, and meetings will take place at predetermined times. The faculty will also meet with the resident at prescribed intervals to assess the progress of the resident. Failure to rectify the issue causing probation will result in dismissal of the resident. The time frame to rectify the issue will be determined by the seriousness of the issue requiring remedy.
Other issues may lead to warnings which if not corrected may lead to probation.
These include failure to maintain duty and operative logs in a timely manner, failure to attend conferences and violation of the moonlighting rules. Any of these may result in a resident receiving a warning, which if not corrected, could lead to probation. Failure to adhere to any of the other policies outlined in this document could result in a warning which if not properly corrected and dealt with may result in probation and potentially dismissal.

**FINAL EVALUATION**

At the end of the training program, the Program Director completes a final written evaluation of each graduating resident which include a review of the Residents performance during the final period of training and verifies that the resident has demonstrated sufficient professional ability to practice competently and independently.

**Leave and Vacation**

Each resident is allowed 4 weeks of leave. Academic leave may be granted with approval by the Program Director. Requests should be submitted at least 30 days prior to the dates requested for arrangements to be made by the Chief Resident. Copies of conference registration are to be submitted for academic leave.

**Duty Hours**

Duty hours are defined as all clinical and academic activities related to the residency program, i.e., patient care (both inpatient and outpatient), administrative duties related to patient care, the provision for transfer of patient care, time spent in-house during call activities, and scheduled academic activities such as conferences. Duty hours do not include reading and preparation time spent away from University official duty site(s).

**Log book**

Each resident should record all procedures performed on a daily basis. All procedures should be entered within 24 hours.

**RESIDENCY COMPETENCY GOALS AND OBJECTIVES**

This residency program requires its residents to obtain competence in the six areas listed below to the level expected of a new practitioner. Toward this end, the program has defined the specific knowledge, skills, behaviors, and attitudes required, and will provide the educational experiences as needed in order for the residents to demonstrate the following:

1) Patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health with specific reference to neurosurgical conditions. At a minimum residents are expected to:
   a) Gather and understand essential patient information in a timely manner.
   b) Generate an appropriate differential diagnosis.
   c) Implement an effective plan of management.
   d) Prioritize and stabilize multiple patients simultaneously.
   e) Competently perform neurosurgical operative procedures.
   f) Manage Complications
   g) Analyze Outcomes
   h) Counsel and educate patients and families.
   i) Provide health care services aimed at preventing health problems and maintaining health.
   j) Work with health care professionals to provide patient-focused care.

2) Medical Knowledge: Residents must demonstrate knowledge about established and
evolving biomedical, clinical, and cognate sciences, with specific reference to basic and clinical neurosciences, as well as the application of this knowledge to patient care.

Among other things, residents are expected to:

a) Generate a differential diagnosis and properly sequence critical actions for patient care, including management complications, morbidity and mortality.
b) Synthesize and properly utilize acquired patient data.
c) Identify neurosurgical emergencies.
d) Know how to access current medical information.
e) Understand how to treat neurosurgical conditions.
f) Incorporate evidence-based principles

3) Practice-based learning and improvement that involves the investigation and evaluation of care for their patients, the appraisal and assimilation of scientific evidence, and improvements in patient care. At a minimum, residents are expected to:

a) Analyze and assess their practice experience and perform practice-based improvement.
b) Locate, appraise and utilize scientific evidence related to their patients’ health problems.
c) Apply knowledge of study design and statistical methods to critically appraise the medical literature.
d) Utilize information technology to enhance their education and improve patient care.
e) Facilitate the learning of students and other health care professionals.

4) Residents must be able to demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and other health professionals. At a minimum, residents are expected to:

a) Develop an effective therapeutic relationship with patients and their families, with respect for diversity and cultural, ethnic, spiritual, emotional, and age-specific differences.
b) Demonstrate effective participation in and leadership of the health care team.
c) Develop effective written communication skills.
d) Maintain relevant and legible medical records
e) Effectively communicate with out-of-hospital personnel as well as non-medical personnel.
f) Involve patients in medical decisions

g) Strengthen listening and non-verbal communication skills.

5) Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to patients of diverse backgrounds. At a minimum, residents are expected to:

a) Treat patients/family/staff/paraprofessional personnel with respect.
b) Demonstrate sensitivity to patient’s pain, emotional state, and gender/ethnicity issues.
c) Discuss death honestly, sensitively, patiently, and compassionately.
d) Exemplify integrity
e) Accept responsibility/accountability
f) Demonstrate reliability
g) Maintain calm, even temperament
h) Exhibit self-awareness and knowledge of limits.
i) Respond to the comments of other team members, patients, families, and
peers openly and responsibly.
6) Systems-based practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care.
At a minimum, residents are expected to:
a) Understand, access, appropriately utilize, and evaluate the effectiveness of the resources, providers, and systems necessary to provide optimal neurosurgical care.
b) Understand different medical practice models and delivery systems and how to best utilize them to care for the individual patient.
c) Practice cost-effective health care and resource allocation that does not compromise quality of care.
d) Advocate, coordinate, and facilitate patient care.
e) Understand principles of and advance practices for patient safety at the institutional and individual level.
In addition to these requirements, residents are expected to attain competence as outlined in the curriculum for each level of training.

BASIC SCIENCES AND PRINCIPLES OF SURGERY PGY 1, 2

1 Basic sciences
Objective: To acquire and demonstrate underpinning basic science knowledge appropriate for the practice of surgery, including:
- Applied anatomy: Knowledge of anatomy appropriate for surgery
- Physiology: Knowledge of physiology relevant to surgical practice
- Pharmacology: Knowledge of pharmacology relevant to surgical practice centred around safe prescribing of common drugs
- Imaging: Knowledge of the principles, strengths and weaknesses of various diagnostic and interventional imaging methods

Knowledge:
This will include anatomy of thorax, abdomen, pelvis, perineum, limbs, spine, head and neck as appropriate for surgical operations that the trainee will be involved with during core training.
Applied neuroanatomy
Neuroembryology
Objective: To understand basic neuroembryology and its relevance to clinical practice
Knowledge: Embryogenesis of the brain and spinal cord
Embryogenesis of supporting structures - skull and vertebral column
Common anatomical variations and developmental abnormalities
Anatomy of the skull
Objective: To understand the anatomy of the skull
Knowledge: Structure, blood supply, innervation, surface and three-dimensional relationships of the: scalp, skull, meninges, orbit, cranial fossae, cranial foraminae, cranial nerves
Anatomy of the brain
Objective: To understand the structural anatomy of the brain
Knowledge: Cortical topography, Projection and association tracts, Organisation of the basal ganglia, Structure, organisation 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

Anatomy of the spine
Objective: To understand the anatomy of the spine
Knowledge: Structure, blood supply, innervation, surface and three-dimensional relationships of the vertebral column, spinal cord, ascending and descending tracts, spinal nerve roots, cauda equine.

Anatomy of the autonomic and peripheral nervous system
Objective: To understand the anatomy of the autonomic and peripheral nervous system
Knowledge: 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

Physiology:
General physiological principles including: Homeostasis. Thermoregulation
Metabolic pathways and abnormalities. Blood loss and hypovolaemic shock
Sepsis and septic shock. Fluid balance and fluid replacement therapy

This will include the physiology of specific organ systems relevant to surgical care including the cardiovascular, respiratory, gastrointestinal, urinary, endocrine and neurological systems.

Neurophysiology
Functional neurophysiology
Objective: To understand the functional organisation and integration of the central nervous system
Knowledge: Structure and function of neurones 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, Functions of the autonomic nervous system, Hypothalamic-pituitary function

Clinical neurophysiology
Objective: To understand the basic principles of clinical neurophysiology
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 electromyographic studies.
Interpretation of the results of EEG, EMG and NC studies
Objective: To understand the pathophysiology of intracranial disorders
Knowledge: Cerebral blood flow and metabolism, Cerebral autoregulation and vasospasm, Blood brain barrier and cerebral oedema, Intracranial pressure dynamics, Cerebral ischaemia and neuroprotection, CSF hydrodynamics - production and absorption

Pharmacology:
The pharmacology and safe prescribing of drugs used in the treatment of surgical diseases including analgesics, antibiotics, cardiovascular drugs, antiepileptic, anticoagulants, respiratory drugs,
renal drugs, drugs used for the management of endocrine disorders (including diabetes) and local anaesthetics.
The principles of general anaesthesia
The principles of drugs used in the treatment of common malignancies
 Imaging:
Principles of diagnostic and interventional imaging including x-rays, ultrasound, CT, MRI, PET, radiounucleotide scanning
2. Common Surgical Conditions
Objective:
To demonstrate understanding of the relevant basic scientific principles for each of these surgical conditions and to be able to provide the relevant clinical care:
Abdominal pain, Appendicitis, Abdominal swelling, Change in bowel habit, Gastrointestinal haemorrhage, Rectal bleeding, Dysphagia, Dyspepsia, Jaundice, Gastrointestinal malignancy, Inflammatory bowel disease, Diverticular disease, Intestinal obstruction, Adhesions, Abdominal hernias, Peritonitis, Intestinal perforation, Benign oesophageal disease, Peptic ulcer disease, Benign and malignant hepatic, gall bladder and pancreatic disease, Haemorrhoids and perianal disease, Abdominal wall stomata
Breast disease; Breast lumps and nipple discharge, Acute Breast pain, Benign and malignant breast lumps, Mastitis and breast abscess.
Peripheral vascular disease; Presenting symptoms or syndrome, Chronic and acute limb ischaemia, Aneurysmal disease, Transient ischaemic attacks, Varicose veins, Leg ulceration, Atherosclerotic arterial disease, Embolic and thrombotic arterial Disease, Venous insufficiency, Diabetic ulceration.
Genitourinary disease; Presenting symptoms or syndrome, Loin pain, Haematuria, Lower urinary tract symptoms, Urinary retention, Renal failure, Scrotal swellings, Testicular pain, Genitourinary malignancy, Urinary calculus disease, Urinary tract infection, Benign prostatic hyperplasia, Obstructive uropathy.
Trauma and orthopaedics; Presenting symptoms or syndrome, Traumatic limb and joint pain and deformity, Chronic limb and joint pain and deformity, Back pain, Simple fractures and joint dislocations, Fractures around the hip and ankle. Basic principles of Degenerative joint disease. Basic principles of inflammatory joint disease including bone and joint infection. Compartment syndrome. Spinal nerve root entrapment and spinal cord compression. Metastatic bone cancer. Common peripheral neuropathies and nerve injuries.
Disease of the Skin, Head and Neck; Presenting symptoms or syndrome. Lumps in the neck. Epistaxis. Upper airway obstructions. Benign and malignant skin lesions. Benign and malignant lesions of the mouth and tongue.
Neurology and Neurosurgery; Presenting symptoms or syndrome. Headache. Facial pain. Coma. Space occupying lesions from bleeding and tumour
Endocrine; Presenting symptoms or syndrome. Lumps in the neck. Acute endocrine crises. Thyroid and parathyroid disease. Adrenal gland disease. Diabetes
3. Basic surgical skills
Objective:
Preparation of the surgeon for surgery
Safe administration of appropriate local anaesthetic agents
Acquisition of basic surgical skills in instrument and tissue handling.
Understanding of the formation and healing of surgical wounds
Incise superficial tissues accurately with suitable instruments.
Close superficial tissues accurately. Tie secure knots.
Safely use surgical diathermy. Achieve haemostasis of superficial vessels.
Use suitable methods of retraction.
Knowledge of when to use a drain and which to choose.
Handle tissues gently with appropriate instruments.
Assist helpfully, even when the operation is not familiar.
Understand the principles of anastomosis
Understand the principles of endoscopy including laparoscopy
Knowledge:
Principles of safe surgery
Principles of hand washing, scrubbing and gowning
Immunisation protocols for surgeons and patients
Administration of local anaesthesia
Choice of anaesthetic agent
Surgical wounds; Classification of surgical wounds, Principles of wound management
Suture and needle choice. Knot tying. Range and choice of material for suture and ligation
Safe application of knots for surgical sutures and ligatures.
Haemostasis: Surgical techniques. Principles of diathermy
Tissue handling and retraction: Choice of instruments
Biopsy techniques including fine needle aspiration cytology
Use of drains: Indications. Types. Management/removal
Principles of anastomosis
Principles of surgical endoscopy including laparoscopy
Clinical Skills:
Preparation of the surgeon for surgery
Effective and safe hand washing, gloving and gowning
Preparation of a patient for surgery; Creation of a sterile field. Antisepsis. Draping
Administration of local anaesthesia; Accurate and safe administration of local anaesthetic agent
Technical Skills and Procedures:
Preparation of the surgeon for surgery
Effective and safe hand washing, gloving and gowning
Administration of local anaesthesia
Accurate and safe administration of local anaesthetic agent
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
Knot tying: Single handed. Double handed
Instrument. Superficial. Deep
Haemostasis: Control of bleeding vessel (superficial). Diathermy. Suture ligation. Tie ligation
Clip application. Transfixion suture
Tissue retraction: Tissue forceps. Placement of wound retractors
Use of drains: Insertion. Fixation. Removal
Tissue handling: Appropriate application of instruments and respect for tissues.
Biopsy techniques
Skill as assistant: Anticipation of needs of surgeon when assisting

4. The assessment and management of the surgical patient

Objective
To demonstrate the relevant knowledge, skills and attitudes in assessing the patient and manage the patient, and propose surgical or non-surgical management.

Knowledge
The knowledge relevant to this section will be variable from patient to patient and is covered within the rest of the syllabus – see common surgical conditions.

Clinical Skills
Surgical history and examination (elective and emergency)
Construct a differential diagnosis
Plan investigations. Clinical decision making. Team working and planning
Case work up and evaluation; risk management
Active participation in clinical audit events
Appropriate prescribing
Taking consent for intermediate level intervention; emergency and elective
Written clinical communication skills
Interactive clinical communication skills: patients
Interactive clinical communication skills: colleagues

5. Peri-operative care

Objective:
To assess and manage preoperative risk
To manage patient care in the peri-operative period
To conduct safe surgery in the operating theatre environment
To assess and manage bleeding including the use of blood products
To care for the patient in the post-operative period including the assessment of common complications
To assess and plan perioperative nutritional management

Knowledge:
Pre-operative assessment and management:
Cardiorespiratory physiology.
Diabetes mellitus and other relevant endocrine disorders
Fluid balance and homeostasis
Renal failure
Pathophysiology of sepsis – prevention and prophylaxis
Thromboprophylaxis
Laboratory testing and imaging
Risk factors for surgery and scoring systems
Pre-medication and other preoperative prescribing
Principles of day surgery
Intraoperative care:
Safety in theatre including patient positioning and avoidance of nerve injuries. Sharps safety. Diathermy, laser use. Infection risks. Radiation use and risks
Tourniquet use including indications, effects and complications
Principles of local, regional and general anaesthesia
Principles of invasive and non-invasive monitoring
Prevention of venous thrombosis
Surgery in hepatitis and HIV carriers
Fluid balance and homeostasis
Post-operative care:
Post-operative monitoring. Cardiorespiratory physiology. Fluid balance and homeostasis
Diabetes mellitus and other relevant endocrine disorders. Renal failure.
Pathophysiology of blood loss
Pathophysiology of sepsis including SIRS and shock
Multi-organ dysfunction syndrome
Post-operative complications in general
Methods of postoperative analgesia
To assess and plan nutritional management
Post-operative nutrition
Effects of malnutrition, both excess and depletion
Metabolic response to injury
Methods of screening and assessment of nutritional status
Methods of enteral and parenteral nutrition
Haemostasis and Blood Products:
Mechanism of haemostasis including the clotting cascade
Pathology of impaired haemostasis e.g. haemophilia, liver disease, massive haemorrhage. Components of blood. Alternatives to use of blood products
Principles of administration of blood products
Patient safety with respect to blood products
Coagulation, deep vein thrombosis and embolism:
Clotting mechanism (Virchow Triad)
Effect of surgery and trauma on coagulation
Tests for thrombophilia and other disorders of coagulation
Methods of investigation for suspected thromboembolic disease
Principles of treatment of venous thrombosis and pulmonary embolism including anticoagulation
Role of V/Q scanning, CT, pulmonary angiography, D-dimer and thrombolysis
Place of pulmonary embolectomy
Prophylaxis of thromboembolism:
Risk classification and management of DVT
Knowledge of methods of prevention of DVT, mechanical and pharmacological
Antibiotics:
Common pathogens in surgical patients
Antibiotic sensitivities. Antibiotic side-effects
Principles of prophylaxis and treatment
Metabolic and endocrine disorders in relation to perioperative management
Pathophysiology of thyroid hormone excess and deficiency and associated risks from surgery
Causes and effects of hypercalcaemia and hypocalcaemia
Complications of corticosteroid therapy
Causes and consequences of Steroid insufficiency
Complications of diabetes mellitus
Causes and effects of hyponatraemia
Causes and effects of hyperkalaemia and hypokalaemia
Clinical Skills
Pre-operative assessment and management:
History and examination of a patient from a medical and surgical standpoint
Interpretation of pre-operative investigations
Management of co morbidity. Resuscitation
Appropriate preoperative prescribing including premedication
Intra-operative care:
Safe conduct of intraoperative care
Correct patient positioning
Avoidance of nerve injuries
Management of sharps injuries
Prevention of diathermy injury
Prevention of venous thrombosis
Post-operative care:
Writing of operation records
Assessment and monitoring of patient’s condition
Post-operative analgesia
Fluid and electrolyte management
Detection of impending organ failure
Initial management of organ failure
Principles and indications for Dialysis
Recognition, prevention and treatment of post-operative complications
Haemostasis and Blood Products:
Recognition of conditions likely to lead to the diathesis
Recognition of abnormal bleeding during surgery
Appropriate use of blood products
Management of the complications of blood product transfusion
Coagulation, deep vein thrombosis and embolism; Recognition of patients at risk.
Awareness and diagnosis of pulmonary embolism and DVT. Role of duplex scanning, venography and d-dimer measurement. Initiate and monitor treatment of venous thrombosis and pulmonary Embolism. Initiation of prophylaxis
Antibiotics: Appropriate prescription of antibiotics.
Assess and plan preoperative nutritional management. Arrange access to suitable artificial nutritional support, preferably via a nutrition team including Dietary supplements, Enteral nutrition and Parenteral nutrition.
Metabolic and endocrine disorders; History and examination in patients with endocrine and electrolyte disorders. Investigation and management of thyrotoxicosis and hypothyroidism
Investigation and management of hypercalcaemia and hypocalcaemia.
Peri-operative management of patients on steroid therapy
Peri-operative management of diabetic patients
Investigation and management of hyponatraemia
Investigation and management of hyperkalaemia and hypokalaemia
Technical Skills and Procedures:
Surgery log book
6. Assessment and management of patients with trauma (including the multiply injured patient)
Objective:
Assess and initiate management of patients with chest trauma, head injury, spinal cord injury, abdominal and urogenital trauma, vascular trauma, a single or multiple fractures or dislocations, traumatic skin and soft tissue injury, burns, multiply injured patient.
Be able to prioritise management in such situation as defined by ATLS, etc
Knowledge:
General; Scoring systems for assessment of the injured patient, Major incident triage, Differences In children
Shock; Pathogenesis of shock, Shock and cardiovascular physiology, Metabolic response to injury, Adult respiratory distress syndrome, Indications for using uncross matched blood
Wounds and soft tissue injuries; Gunshot and blast injuries, Stab wounds, Human and animal bites, Nature and mechanism of soft tissue injury, Principles of management of soft tissue injuries
Principles of management of traumatic wounds, Compartment syndrome
Burns; Classification of burns, Principle of management of burns
Fractures; Classification of fractures, Pathophysiology of fractures, Principles of management of fractures, Complications of fractures, Joint injuries
Organ specific trauma; Pathophysiology of thoracic trauma, Pneumothorax, Head injuries including traumatic intracranial haemorrhage and brain injury, Spinal cord injury, Peripheral nerve injuries, Blunt and penetrating abdominal trauma including spleen, Vascular injury including iatrogenic injuries and intravascular drug abuse
Crush injury, Principles of management of skin loss including use of skin grafts and skin flaps
Clinical Skills:
General
History and examination, Investigation, Referral to appropriate surgical subspecialties
Resuscitation and early management of patient who has sustained thoracic, head, spinal, abdominal or limb injury according to ATLS and APLS guidelines
Resuscitation and early management of the multiply injured patient
Specific problems; Management of the unconscious patient, Initial management of skin loss
Initial management of burns, Prevention and early management of the compartment syndrome
Technical Skills and Procedures:
See log book
7 Surgical care of the Paediatric patient
Objective:
To assess and manage children with surgical problems, understanding the similarities and differences from adult surgical patients
To understand the issues of child protection and to take action as appropriate
Knowledge:
Physiological and metabolic response to injury and surgery
Fluid and electrolyte balance
Thermoregulation safe prescribing in children
Principles of vascular access in children
Clinical Skills:
History and examination of paediatric surgical patient
Assessment of respiratory and cardiovascular status
Undertake consent for surgical procedures in Paediatric patients
8 Organ and Tissue transplantation
Objective:
To understand the principles of organ and tissue transplantation
Knowledge:
Principles of transplant immunology including tissue typing and rejection
Principles of immunosuppression
Tissue donation and procurement
Indications for whole organ transplantation
9 Management of the dying patient
Objective
Ability to manage the dying patient appropriately.
Palliative Care: Good management of the dying patient in consultation with the palliative care team.
Knowledge
Palliative Care: Care of the terminally ill
Appropriate use of analgesia, anti-emetics and laxatives
Principles of organ donation:
Circumstances in which consideration of organ donation is appropriate
Principles of brain death
Understanding the role of the pathologist and the certification of death
Clinical Skills
Palliative Care:
Symptom control in the terminally ill patient
Principles of organ donation:
Assessment of brain stem death
Certification of death
CLINICAL NEUROSCIENCES (PGY 3)
Principles of neuropathology
Objective: To understand the neuropathology of infection, inflammation, ischaemia, neoplasia and trauma affecting the nervous system
Knowledge: Acute and chronic inflammatory processes in the CNS including Demyelination, Bacterial, fungal and parasitic meningitis, encephalitis and abscess Formation, Viral encephalitis, Slow viruses, CJD and vCJD, HIV associated infections, tumours and leucoencehalopathies, Cytopathology of neurones and glial in response to ischaemia, hypoxia and trauma. Diffuse axonal injury. Macroscopic brain and spinal cord injury including effects of brain shift, herniation and raised ICP.
Classification, epidemiology and pathology of CNS tumours.
Tumour biology, cell kinetics, tumour markers, immunocytochemistry
General Pathology:
Inflammation, Wound healing, Cellular injury, Tissue death including necrosis and apoptosis, Vascular disorders, Disorders of growth, differentiation and morphogenesis
Surgical immunology, Surgical haematology, Surgical biochemistry
Pathology of neoplasia, Classification of tumours, Tumour development and growth including metastasis, Principles of staging and grading of cancers chemotherapy, immunotherapy and hormone therapy
Principles of cancer registration, Principles of cancer screening
The pathology of specific organ systems relevant to surgical care including cardiovascular pathology, respiratory pathology, gastrointestinal pathology, genitourinary disease, breast, exocrine and endocrine pathology, central and peripheral, neurological systems, skin, lymphoreticular and musculoskeletal systems

Microbiology:
Surgically important micro organisms including blood borne viruses
Soft tissue infections including cellulitis, abscesses, necrotising fasciitis, gangrene, Sources of infection, Sepsis and septic shock, Asepsis and antisepsis, Principles of disinfection and sterilisation
Antibiotics including prophylaxis and resistance
Principles of high risk patient management
Hospital acquired infections

Principles of neuroradiology
Objective: To understand the principles of neuroradiological imaging of the structure and function of the nervous system
Knowledge: Interpretation of plain radiographs of the skull and spine, Principles of computerised tomography of the brain, skull and spine
Interpretation of CT scans with particular reference to acute spinal disorders, cranial trauma, hydrocephalus, intracranial tumours and spontaneous intracranial haemorrhage
Principles of basic magnetic resonance imaging
Interpretation of MRI scans with particular reference to acute spinal disorders, cranial trauma, hydrocephalus and intracranial tumours
Principles of advance magnetic resonance imaging including fMRI, DWI and spectroscopy
Interpretation of angiographic images: CTA, MRA and DSA

Principles of neuropsychology
Objective: To understand the principles of neuropsychological assessment.
Knowledge: The principles of neuropsychological assessment
Common neuropsychological problems associated with head injury, subarachnoid haemorrhage, hydrocephalus, structural lesions of the frontal and temporal lobes and disorders of the limbic system
Clinical Skills: Ability to undertake bed-side assessment of cognition and memory

Principles of neurological rehabilitation
Objective: To understand the principles of neurological rehabilitation
Knowledge: The principles of neurological rehabilitation including strategies to optimise the recovery of cognition, communication, continence, selective movement, gait, self-care, psychological stability, social adjustment and employment

Medical ethics
Objective: To understand the ethical issues that commonly arise in the management of patients with neurological disorders

Clinical Skills: Ability to empathise with and support patients and carers.

Principles of neurogenetics
Objective: To understand the principles of neurogenetic studies and their relevance to clinical practice.

Management of Common Neurological Conditions
1. Topic: Impaired consciousness and non-traumatic coma
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with impaired consciousness and nontraumatic coma.
Knowledge: The aetiology, pathophysiology and differential diagnosis of altered consciousness and coma due to meningitis, encephalitis, intracranial haemorrhage, acutely raised ICP, hydrocephalus, hypoxaemia and ischaemia, cardiogenic shock, hypoglycaemia, epilepsy, metabolic encephalopathies, drugs and toxins.
Clinical Skills: Neurological assessment and initial resuscitation of patients in coma or with impaired consciousness. Indications for intubation and ventilation. Treatment of seizures. Establishing a neurological differential diagnosis. Planning and interpreting scans and other investigations. Presentation and summary of cases.

2. Topic: Headache - acute and chronic
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with acute and chronic headache.
Knowledge: The aetiology and differential diagnosis of acute and chronic headache including headache associated with benign headache syndromes, migraine, cluster headache and related syndromes, space occupying lesions, meningeal disorders, intracranial haemorrhage, trigeminal neuralgia, atypical craniofacial pain syndrome. Indications for investigation including scanning, lumbar puncture and angiography.
Clinical Skills: Neurological history taking, Neurological examination, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans and other investigations. Presentation and summary of cases.
Technical Skills and Procedures: Lumbar puncture.

3. Topic: Weakness and paralysis
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with weakness and paralysis.
Knowledge: Common causes of ocular, cranial nerve, limb, trunk and respiratory muscle weakness.
Clinical Skills: Neurological history taking, Neurological examination, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans and other investigations. Presentation and summary of cases.

4. Topic: Dizziness, unsteadiness and falls (Neuro-otology)
Objective: To understand the aetiology, differential diagnosis, investigation and initial
management of patients presenting with dizziness, unsteadiness and falls
Knowledge: Common causes of cerebellar, vestibular, extrapyramidal and autonomic dysfunction
Clinical Skills: Neurological history taking, Neurological examination, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans and other investigations, Presentation and summary of cases
5. Topic: Pain and sensory loss
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with pain and sensory loss
Knowledge: Common causes of musculoskeletal, neurogenic and neuropathic pain and sensory loss
Clinical Skills: Neurological history taking, Neurological examination, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans and other investigations, Presentation and summary of cases, management of patients presenting with hearing loss
6. Topic: Hearing disorders (Neuro-otology)
Knowledge: Common causes of conductive and sensorineural hearing loss, Principles of audiological assessment
Clinical Skills: Neurological history taking, Neurological examination, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans, Interpretation of pure tone audiograms and auditory evoked potentials, Presentation and summary of cases
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with visual disorders
Knowledge: 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
Clinical Skills: Neurological history taking, Neurological examination, Use of computerised visual field assessment, Detailed fundoscopy, Establishing a neurological differential diagnosis, Planning investigation, Interpretation of scans and other investigations, Presentation and summary of cases
8. Topic: Language and speech disturbance
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with disturbances of language and speech
Knowledge: 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
Clinical Skills: Neurological history taking, Neurological examination with assessment of dysphasia and dysarthria. Establishing a neurological differential diagnosis, Planning investigation. Interpretation of scans and other investigations. Presentation and summary of cases
9. Topic: Swallowing disorders
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with swallowing disorders
Knowledge: Neurological causes of dysphagia. Indications for laryngoscopy, videofluoroscopy, nasogastric and percutaneous gastric feeding

10. Topic: Disorders of the Sphincteric and sexual function
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with sphincteric disorders
Knowledge: Common causes of sphincteric and sexual dysfunction, Interpretation of urodynamic studies,

11. Topic: Movement disorder
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with movement disorders

12. Topic: Memory and cognitive disorders
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with disorders of memory and cognition
Knowledge: 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

13. Topic: Behavioural disorders
Objective: To understand the aetiology, differential diagnosis, investigation and initial management of patients presenting with behavioural disorders
Knowledge: The common acute and chronic presentations of organic and psychiatric behavioural disorders relating to alcohol and drug abuse, encephalitis, organic dementia, and psychosis

Neuropharmacology
Objective: To understand the principles of neuropharmacology
Knowledge: Receptor and ion channel function, Neuropeptides and neurotransmitters, Principles of pharmacological neuroprotection.
The pharmacology of anaesthetic agents, muscle relaxants, barbiturates, anticonvulsants and corticosteroids including: mechanisms of action, pharmacodynamics, interactions

CLINICAL NEUROSURGERY

BASIC CLINICAL NEUROSURGERY (PGY 1, 2, 3)

1. Topic: General management of the head injured patient
Objective: To achieve competence in the general management of head-injured patients
Knowledge: Pathophysiology of head injury and of multiple trauma including an
understanding of Cerebral perfusion and oxygenation, Raised intracranial pressure, Impaired intracranial compliance, Intracranial herniation, Medical 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 stabilisation and radiological assessment in head injured patients, Natural history of recovery from head injury including neurological, cognitive and behavioural disability and post-traumatic epilepsy, Role of neurological rehabilitation
Clinical Skills: Clinical assessment of the multiply-injured patient. Neurological assessment of the head-injured patient including Assessment and categorisation of impaired consciousness, Recognition and interpretation of focal neurological deficits, Prioritisation of clinical risk, Interpretation of CT scans and plain radiology
2. Topic: Insertion of ICP monitor
Objective: To achieve competence in the insertion of subdural and intraparenchymal ICP monitors
Knowledge: Indications for ICP monitoring, Applied anatomy of the skull vault, Calibration, zeroing and interpretation of ICP traces, Potential complications of the procedure
Technical Skills and Procedures: Insertion of frontal subdural and intraparenchymal ICP monitors using a standard frontal burr hole and/or twist drill craniostomy.
3. Topic: Burr hole evacuation of chronic subdural haematoma
Objective: To achieve competence in burr hole evacuation of chronic subdural haematomas
Clinical Skills: Neurological assessment of patients with a CSDH. Interpretation of CT scans Obtaining informed consent. Post-operative assessment and management
Technical Skills and Procedures: Performance of single and multiple frontal and parietal burr hole evacuation of CSDHs
4. Topic: Management of soft tissue trauma
Objective: To achieve competence in the management of cranial soft tissue trauma
Knowledge: Anatomy and blood supply of the scalp. Indications for primary and secondary closure of wounds. Indications for antibiotic prophylaxis
Clinical Skills: Assessment of tissue perfusion and viability
Technical Skills and Procedures: 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
5. Topic: General management of subarachnoid haemorrhage (SAH)
Objective: To achieve competence in the general management of subarachnoid haemorrhage (SAH)
Clinical Skills: Interpretation of CT scans including assessment of intracranial blood load, haematomas and hydrocephalus. Basic interpretation of cerebral angiography
Technical Skills and Procedures: Lumbar puncture
6. Topic: Diagnostic lumbar puncture
Objective: To understand the indications for diagnostic lumbar puncture. To undertake an atraumatic lumbar puncture
Knowledge: Indications for diagnostic lumbar puncture. Interpretation of basic microscopy and biochemistry. Principles of spectrophotometry
Technical Skills and Procedures: Lumbar puncture
7. Topic Management of delayed secondary ischaemia
Objective: To recognise and manage delayed cerebral ischaemia following subarachnoid haemorrhage
Knowledge: Pathophysiology of delayed cerebral ischaemia including the impact of secondary insults. Principles governing the augmentation of cerebral blood flow
Technical Skills and Procedures: Insertion of central venous catheter. Insertion of lumbar drain. Insertion of external ventricular drain
8. Topic Management of post-haemorrhagic hydrocephalus
Objective: To achieve competence in the management of post-haemorrhagic hydrocephalus
Knowledge: Pathophysiology of hydrocephalus. Indications for external ventricular drainage and lumbar subarachnoid drainage. Applied anatomy of the skull vault, subdural space and ventricular system. Complications of surgery
Clinical Skills: Assessment of the unconscious and deteriorating SAH patient. Interpretation of CT scans
Technical Skills and Procedures: Insertion of lumbar drain. Insertion of external ventricular drain
9. Topic: Hydrocephalus
Objective: The management of hydrocephalus complicating intracranial haemorrhage, head injury and intracranial space occupying lesions; insertion and taping of CSF reservoirs; insertion and maintenance of lumbar and ventricular drains
Technical Skills and Procedures: Insertion of ventricular drain/access device
Insertion of VP shunt. Revision of VP shunt
10. Topic: Assessment and peri-operative management of patients with spaceoccupying intracranial tumours
Objective: To achieve competence in the assessment and peri-operative management of patients with intracranial tumours
Clinical Skills: Neurological history taking and examination. Basic interpretation of CT and MRI scans
11. Topic: Biopsy of intracranial tumour
Objective: To undertake biopsy of an intracranial tumour under supervision
Clinical Skills: Interpretation of CT and MRI scans and selection of biopsy targets
Technical Skills and Procedures: 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)

12. Topic Acute Spinal Disorders
Objective: To achieve competence in the peri-operative management of patients presenting with acute spinal disorders
Knowledge: The assessment and peri-operative management of patients presenting with spinal cord, cauda equina and spinal root compression. The management of spinal shock. The ward management of patients with spinal instability. The detection and initial management of post-operative complications including compressing haematomas, CSF fistula and spinal sepsis.

INTERMEDIATE STAGE CLINICAL NEUROSURGERY (PGY 3, 4)
1. Topic: General management of the head injured patient
Objective: To achieve competence in all aspects of the general management of head-injured patients
Clinical Skills: Clinical assessment of the head-injured and multiply-injured patient Prioritisation of clinical risk. Interpretation of CT scans and plain radiology Interpretation of multi-modality cerebral monitoring. Ability to assess and advise on the transfer of head-injured patient using imagetransfer and telemedicine

2. Topic: Surgical management of cranial trauma
Objective: To achieve competence in the operative management of head-injured patients
Clinical Skills: Assessment of the head-injured patient. Interpretation of trauma CT scans

3. Topic Neuro-intensive care of the head-injured patient
Objective: To achieve competence in the neuro-intensive care of head-injured patients
Knowledge: Pathophysiology of head injury. The management of raised intracranial pressure, impaired intracranial compliance, and cerebral ischaemia. Prevention and management of secondary insults
Clinical Skills: Assessment of the unconscious patient. Use and interpretation of multimodality monitoring. Interpretation of CT scans. Ability to advise on management of secondary complications and further surgical intervention
4. Topic: Neurological rehabilitation
Objective: To understand the role of post-traumatic neurological rehabilitation
Knowledge: The natural history of recovery from head injury. Understanding of neurological, cognitive and behavioural disabilities following mild and severe head injury. Risks of post-traumatic epilepsy and its management
Clinical Skills: Ability to contribute to the multi-disciplinary assessment of head injured patients. Ability to advise family and carers regarding prognosis, professional and lay support

5. Topic: Primary intracerebral haematomas
Objective: To achieve competence in the operative management of space-occupying spontaneous intracerebral haematomas
Knowledge: Aetiology of supra and infratentorial intracerebral haemorrhage. Pathophysiology of spontaneous intracerebral haemorrhage. Indications for surgical evacuation. Management strategies to reduce the risk of intra-operative re-bleeding in presence of suspected aneurysm or AVM including partial haematoma evacuation, pre or postoperative embolisation and definitive surgical treatment
Clinical Skills: Assessment of patients with intracerebral haematomas and raised intracranial pressure. Interpretation of CT and MRI scans and identification of probable aetiology. Indications for pre-operative CT angiography, MRA and digital subtraction angiography
Technical Skills and Procedures: Craniotomy for supratentorial haematoma including: Planning and siting of craniotomies, Use of ventricular drainage, Intracerebral haemostasis in the coagulopathic patient

6. Topic: Aneurysmal subarachnoid haemorrhage
Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of aneurysmal subarachnoid haemorrhage SAH
Knowledge: Pathophysiology of SAH. Prevention and management of delayed cerebral ischaemia, cerebral vasospasm and hydrocephalus. Relative indications for endovascular and surgical interventions
Clinical Skills: Clinical assessment of patients with aneurysmal SAH
Non operative management of patients undergoing endovascular coiling
Management of delayed cerebral ischaemia
Technical Skills and Procedures: External ventricular drainage. Lumbar subarachnoid drainage. Ventriculoperitoneal shunting

7. Topic: Adult hydrocephalus
Objective: To achieve competence in the assessment and operative management of adult patients with communicating and non communicating hydrocephalus
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with hydrocephalus, including interpretation of CT and MRI scans and identification of shunt malfunction

8. Topic: Paediatric hydrocephalus
Objective: To achieve competence in the assessment of children with hydrocephalus. To undertake emergency external ventricular drainage in children with acute
hydrocephalus
Knowledge: The pathophysiology of CSF circulation. Applied surgical anatomy of the ventricular system. Indications for external ventricular drainage
Clinical Skills: Assessment of the ill child with hydrocephalus, impaired consciousness and sepsis. Differential diagnosis of shunt malfunction.
Interpretation of CT scans in shunted children
Technical Skills and Procedures: Taping and draining from an Ommaya reservoir
Taping a shunt. External ventricular drainage
9. Topic: General principles of neuro-oncology
Objective: To achieve competence in the multi-disciplinary management of patients with intracranial neoplasia
Knowledge: 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 of fractionated radiotherapy, stereotactic radiotherapy and radiosurgery. Role of adjuvant chemotherapy. Principles of clinical trials and their application to neuro-oncology
Principles of palliative care
Clinical Skills: Clinical assessment of patients with raised intracranial pressure and space occupying lesions. Ability to contribute to the multi-disciplinary management of patients with intracranial neoplasia. Empathetic communication with patients and families
*10. Topic Principles of image-guided surgery (optional)
Objective: To achieve competence in image-guided surgery applied to the management of patients with intracranial tumours
Knowledge: An understanding of the principles and practice of frameless image-guided surgery and the principles of frame-based stereotactic surgery
Clinical Skills: Interpretation of CT and MRI scans
11. Topic: Supra-tentorial intrinsic tumours
Objective: To achieve competence in the operative management of supra-tentorial intrinsic tumours
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with supratentorial intrinsic tumours
Technical Skills and Procedures: 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
12. Topic: Convexity meningioma
Objective: To achieve competence in the operative management of a convexity meningiomas
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with convexity meningiomas
Technical Skills and Procedures: Resection of a convexity meningioma, 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, precise use of suction, electro-coagulation and ultrasonic aspiration, use of internal tumour decompression, dissection in the subarachnoid plane using the operating microscope as necessary, intracranial haemostasis, use of duraplasty and cranioplasty

13. Topic: General microbiological principles
Objective: To achieve competence in the general management of CNS infections including ventriculitis, cerebral abscess, subdural empyema and spinal epidural abscess
Knowledge: The pathophysiology of intracranial and spinal sepsis. Principles of antimicrobial chemotherapy. Indications for operative intervention
Clinical Skills: Clinical assessment of patients with CNS infections. Interpretation of CT and MRI scans

14. Topic: Management of intracerebral abscess
Objective: To achieve competence in the operative management of cerebral abscess using burr hole aspiration
Clinical Skills: The assessment and pre-operative preparation of patients with a cerebral abscess
Technical Skills and Procedures: Burr hole aspiration of a cerebral abscess with and without image-guidance

15. Topic: Management of the spinal injury patient
Objective: To achieve competence in all aspects of the non-operative management of spinal injury patients.
Knowledge: Pathophysiology of spinal cord injury. Classification of spinal fracture dislocations. Biomechanics of spinal instability. Indications for halo traction and external stabilisation. Indications for and principles of open reduction and stabilisation
Clinical Skills: Clinical assessment of the spinal injury patient. Management of spinal shock. Interpretation of plain radiology, CT and MRI scans. Liaison with spinal injury units

16. Topic: Malignant spinal cord compression
Objective: To achieve competence in the general management of patients with malignant spinal cord compression.
Knowledge: The pathophysiology of spinal cord compression. The classification, aetiology and natural history of vertebral metastases. Spinal instability associated with vertebral malignancy. Indications for surgical intervention. Role of primary radiotherapy and adjuvant radiotherapy or chemotherapy
Clinical Skills: Clinical assessment of patients with malignant spinal cord compression. Interpretation of plain radiology, CT and MRI scans. Liaison with medical oncologists and radiotherapists.

17. Topic: Surgical management of thoraco-lumbar metastases
Objective: To achieve competence in the basic surgical management of patients with malignant spinal cord compression
Knowledge: Indications for surgery. The principles of operative spinal decompression and stabilisation of patients with spinal cord metastases. Applied surgical anatomy
Principles of peri-operative care. Complications of surgery
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with malignant spinal cord compression
Technical Skills and Procedures: Extradural spinal biopsy and decompression by laminectomy in selected patients without segmental instability. Instrumented posterior spinal stabilisation

18. Topic: Lumbar radiculopathies
Objective: To achieve competence in the surgical management of lumbar compressive radiculopathies by lumbar microdiscectomies and associated microsurgical decompressions.
Knowledge: Indications for operative management of lumbar radiculopathies
Applied surgical anatomy of the lumbar spine with particular reference to degenerative neural compression and morphological variations in vertebral anatomy
Selection of minimally-invasive approaches. Principles of peri-operative care
Complications of surgery
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with lumbar radiculopathies. Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms
Technical Skills and Procedures: 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

19. Topic: Compressive cervical myeloradiculopathies
Objective: To achieve competence in the surgical management of compressive cervical myeloradiculopathies
Knowledge: Indications for operative management of cervical myeloradiculopathies
Applied surgical anatomy of the cervical spinal column with particular reference to the relationships between the bony elements, spinal cord, nerve roots and vertebral arteries. Selection of surgical approaches. Principles of peri-operative care
Complications of surgery
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with cervical myeloradiculopathies. Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms
Technical Skills and Procedures: Single level anterior cervical discectomy with and without fusion. In particular: 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
FINAL STAGE CLINICAL NEUROSURGERY PGY 4, 5, 6

1. Topic: Management of head injured patients
Objective: To achieve competence in all aspects of the advanced operative management of head-injured patients
Clinical Skills: Competence in all aspects of peri-operative management of head-injured patients. Ability to diagnose and confirm brain death
Technical Skills and Procedures: Craniotomy for supra and infratentorial extradural, subdural and intracerebral haematomas
Lobectomy for haemorrhagic contusion
Vault cranioplasty using in-situ or preformed prostheses
Decompressive bifrontal craniotomy with extensive durotomy
Subfrontal extradural or subdural repair of anterior fossa fractures
Combined craniofacial repair of fronto-orbito-maxillary injuries

2. Topic: Aneurysmal Subarachnoid haemorrhage
Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of aneurysmal subarachnoid haemorrhage SAH
Knowledge: Pathophysiology of SAH. Prevention and management of delayed cerebral ischaemia, cerebral vasospasm and hydrocephalus
Relative indications for endovascular and surgical interventions
Clinical Skills: Clinical assessment of patients with aneurysmal SAH
Non operative management of patients undergoing endovascular coiling
Management of delayed cerebral ischaemia
Craniotomy for intracerebral haematoma

3. Topic: Adult hydrocephalus
Objective: To achieve competence in all aspects of the management of adult patients with hydrocephalus
Knowledge: The pathophysiology of CSF circulation. Applied surgical anatomy of the ventricular system. Indications for external ventricular drainage, shunting, lumbar CSF drainage and shunting, ventriculo-cisternostomy. Surgical complications and their management
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with hydrocephalus. Interpretation of pressure studies and CSF infusion studies Interpretation of CT and MRI scans and identification of shunt malfunction

4. Topic: Anterior and middle fossa skull base tumours
Objective: To achieve competence in the surgical management of patients with anterior and middle fossa tumours
Knowledge: Indications for selected approaches in relation to pathology and surgical goals. Applied microsurgical anatomy of the anterior and middle cranial fossae
Principles of intra-operative management of patients undergoing resection of anterior
and middle fossa tumours including olfactory groove, planum sphenoidale, parasellar and sphenoid wing and falcaline meningiomas. Complications of surgery and their management

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

Technical Skills and Procedures: Standard pterional and subfrontal approaches including: Pterional resection and basal drilling, Subfrontal approach to the optic nerve, chiasm and internal carotid arteries, Sylvian fissure splitting and exposure of the MCA bifurcation, CSF drainage by chiasmatic cisternal suction, intra-operative ventricular puncture and lamina terminalis fenestration, Bi-Frontal/Frontal and parietal parafalcalcine approaches, Microsurgical resection of superficial skull base meningioma, Anterior interhemispheric, fronto-orbital, zygomatic and temporo-zygomatic approaches

5. Topic: Transphenoidal surgery

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

Knowledge: Pathophysiology of the hypothalamic-pituitary axis. Indications for surgery. Selection of surgical approaches: sublabial, transnasal and endoscopic

Applied surgical anatomy of the skull base. Principles of peri-operative care

Complications of surgery and their management

Clinical Skills: The assessment, counselling and pre-operative preparation of patients with pituitary, sellar and parasellar tumours. Interpretation of CT and MRI scans

Technical Skills and Procedures: Microsurgical transphenoidal approach.

Transphenoidal resection of non-functioning macroadenoma

6. Topic: Movement disorders

Objective: To understand the management of patients with movement disorders

Knowledge: The aetiology and pathophysiology of movement disorders. Indications for medical, minimally-invasive and surgical management. Complications of surgery and their management

Clinical Skills: Surgical aspects of the multi-disciplinary assessment of patients with movement disorders

Technical Skills and Procedures: None

7. Topic: Midline tumours

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

Knowledge: Indications for surgery. Applied surgical anatomy of midline structures

Selection of surgical approaches including principles of endoscopic biopsy and/or Resection. Principles of intra-operative management of patients undergoing resection of midline sellar, para-sellar, pineal and third ventricular tumours including colloid cysts. Complications of surgery and their management

Clinical Skills: The assessment, counselling and pre-operative preparation of patients with midline tumours. Interpretation of CT and MRI scans


Transfrontal endoscopic biopsy

8. Topic: Malignant posterior fossa tumours

Objective: To achieve competence in the surgical management of superficial, hemispheric and midline intrinsic posterior fossa tumours and metastases
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with posterior fossa malignant tumours. Interpretation of CT and MRI scans
Technical Skills and Procedures: Competence in midline, paramedian and retrosigmoid posterior fossa craniotomies including: safe patient positioning in the prone and semi-prone positions exposure of the lateral and sigmoid sinuses exposure and decompression of the foramen magnum use of cisternal CSF drainage safe use of fixed retractors exposure and resection of superficial, lateral and mid-line intrinsic cerebellar tumours and metastases
9. Topic: Cerebellopontine angle tumours
Objective: To achieve competence in the management of patients with cerebellopontine angle tumours
Knowledge: Relative indications for surgery, radiosurgery and conservative management. Principles of intra-operative management of patients undergoing resection of CP angle tumours including vestibular schwannomas and meningomas Principles and application of cranial nerve and brainstem monitoring Applied microsurgical anatomy of the CP angle, brainstem and lower cranial nerves Relative indications for retrosigmoid, middle fossa, and translabyrinthine approaches with respect to hearing preservation, tumour size and position
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with CP angle tumours. Interpretation of CT and MR scans
Technical Skills and Procedures: Retrosigmoid approach. Subarachnoid dissection and exposure of the tumour and lower cranial nerves. Subtotal microsurgical resection of acoustic neuroma
10. Topic: Intracerebral abscess and subdural empyema
Objective: To achieve competence in the management of patients with CNS infections including ventriculitis, cerebral abscess and subdural empyema
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with intracranial sepsis. Interpretation of CT and MRI scans. Management of antimicrobial therapy
Technical Skills and Procedures: Burr hole drainage of intracerebral abscess Ventricular drainage. Craniotomy for subdural empyema, including frontal and parietal parafalcine approaches. Craniotomy and resection of frontal, temporal and cerebellar abscess. Anterior and middle fossa extradural and subdural duroplasty
11. Topic: Intracranial aneurysms
Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of ruptured and unruptured intracranial aneurysms
Knowledge: Aetiology, epidemiology and natural history of unruptured and ruptured intracranial aneurysms Pathophysiology and general management of subarachnoid haemorrhage Angiographic and microsurgical anatomy of the cerebral circulation Indications for surgical management of intracranial aneurysms by clipping, trapping, microsurgical reconstruction and microvascular bypass
Complications of surgery and their management
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with ruptured and unruptured aneurysms. Interpretation of CT, MR and catheter angiography
Clipping of anterior circulation aneurysm
12. Topic: Intracranial vascular malformations
Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of intracranial vascular malformations
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with vascular malformations. Interpretation of CT, MR and catheter angiography
Technical Skills and Procedures:
Image-guided craniotomy and exposure of supratentorial AVM
Microsurgical resection of superficial gyral or sulcal AVM
13. Topic: Occlusive cerebrovascular disease
Objective: To achieve competence in the clinical management of occlusive cerebrovascular disease
Knowledge: The epidemiology, natural history and pathophysiology of extra- and intracranial atherosclerotic occlusive disease. The epidemiology, natural history and pathophysiology of non-atherosclerotic occlusive diseases. Optimal medical management of occlusive and thrombo-embolic cerebrovascular disease
Imaging of the acutely ischaemic brain using CT and MRI
Principles of non-invasive and invasive imaging of the extra and intracranial vasculature using CT, MRI and catheter angiography
Principles of regional cerebral blood flow and metabolism measurement and imaging using CT and MRI perfusion techniques; SPECT and PET scanning
Indications for carotid endarterectomy
Indications for endovascular intervention including intra-arterial thrombolysis; carotid angioplasty and stenting; intracranial angioplasty
Principles of cerebral revascularisation by indirect synangiosis, low-flow EC-IC anastomosis and high flow EC-IC bypass grafting
Clinical Skills: The assessment, counselling and pre-operative preparation of patients undergoing surgery for occlusive cerebrovascular disease with ruptured and unruptured aneurysms. Interpretation of CT, MR and catheter angiography
Technical Skills and Procedures: None
14. Topic: Chronic pain
Objective: To understand the management of patients with chronic pain syndromes
Knowledge: The aetiology and pathophysiology of chronic pain syndromes. Complications of surgery and their management
Clinical Skills: Surgical aspects of the multi-disciplinary assessment of chronic pain patients. Pre-operative counselling and preparation
Technical Skills and Procedures: None
15. Topic: Trigeminal neuralgia
Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of patients with trigeminal neuralgia
Knowledge: Aetiology, epidemiology and natural history of trigeminal neuralgia
Differential diagnosis and management of related cranio-facial pain syndromes
Medical management of cranio-facial pain. Surface anatomy of the trigeminal nerve and microsurgical anatomy of the CP angle
Indications for surgical management of trigeminal neuralgia by peripheral neurectomy, percutaneous rhizotomy, radiofrequency rhizotomy, microvascular decompression. Complications of surgery and their management
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with trigeminal neuralgia. Interpretation of posterior fossa CT and MRI scans
Technical Skills and Procedures: Retrosigmoid microsurgical approach to the CP angle and trigeminal nerve. Trigeminal microvascular decompression. Percutaneous trigeminal rhizotomy
16. Topic: Epilepsy
Objective: To understand the management of patients with idiopathic and lesional epilepsy
Knowledge: The aetiology and pathophysiology of idiopathic and lesional epilepsy
Indications for medical and surgical management
Clinical Skills: Surgical aspects of the multi-disciplinary assessment of epilepsy patients. Interpretation of CT, MRI and SPECT scans. Pre-operative counselling and preparation.
Technical Skills and Procedures: Image-guided resection of cortical lesions (optional) Vagal nerve stimulation (optional)
17. Topic: Cervical spine fracture-subluxation
Objective: To achieve competence in the general management of fracture-subluxations of the cervical spine
Knowledge: Pathophysiology of spinal cord injury. Classification of cervical spinal fracture dislocations. Biomechanics of spinal instability. Indications for halo traction and external stabilisation. Indications for and principles of open reduction and stabilisation
Clinical Skills: Clinical assessment of the spinal injury patient. Management of spinal shock. Interpretation of plain radiology, CT and MRI scans. Liaison with spinal injury units. Counselling and pre-operative preparation of spinal injury patients
Technical Skills and Procedures: Application of cranial-cervical traction
18. Topic: Thoraco-lumbar fractures
Objective: To achieve competence in the general management of thoracolumbar fractures
Knowledge: Pathophysiology of spinal cord injury. Classification of thoracolumbar fracture dislocations. Biomechanics of spinal instability. Indications for open reduction and stabilisation
Clinical Skills: Clinical assessment of the spinal injury patient. Management of spinal shock. Interpretation of plain radiology, CT and MRI scans. Liaison with spinal injury units. Counselling and pre-operative preparation of spinal injury patients
Technical Skills and Procedures: Posterior reduction of thoracolumbar fractures by pedicle screw instrumentation and ligamentotaxis
19. Topic: Intradural extramedullary tumours
Objective: To achieve competence in the management of patients with intradural extramedullary tumours including schwannomas, neurofibromas and meningiomas

Clinical Skills: Assessment, counselling and pre-operative preparation of patients with intradural spinal tumours. Interpretation of spinal MRI scans.


20. Topic: Intramedullary spinal cord tumours

Objective: To achieve competence in the management of patients with intramedullary spinal cord tumours.


Clinical Skills: Assessment, counselling and pre-operative preparation of patients with intramedullary spinal cord tumours. Interpretation of spinal MRI scans.


21. Topic: Malignant spinal cord compression

Objective: To achieve competence in the management of patients with malignant secondary spinal cord compression.

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

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


22. Topic: Lumbar radiculopathies

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


Complications of surgery.

Clinical Skills: The assessment, counselling and pre-operative preparation of patients with lumbar radiculopathies. Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms.
Technical Skills and Procedures: Lumbar microdiscectomy. Microsurgical lateral recess decompression. Posterior decompression (laminotomy, hemilaminectomy etc) Revisional lumbar microsurgical discectomy with and without decompression Microsurgical lumbar discectomy for central disc protrusion with cauda equina compression

23. Topic: Cervical myeloradiculopathy
Objective: To achieve competence in the management of cervical radiculopathy
Knowledge: Indications for operative management of cervical radiculopathies
Applied surgical anatomy of the cervical spinal column, spinal cord, nerve roots and vertebral arteries. Selection of surgical approaches. Principles of peri-operative care
Complications of surgery
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with cervical myeloradiculopathies
Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms

Technical Skills and Procedures:
Single and multi-level anterior cervical discectomy with and without fusion
Anterior cervical plating. Posterior cervical microforaminotomy and microdiscectomy
Posterior cervical decompression (laminotomy, hemilaminectomy etc)

24. Topic: Craniovertebral Anomaly (CVA). Rheumatoid disease
Objective: To understand the management of CVA and rheumatoid patients with atlanto-axial subluxation, cranial settling and related disorders
Knowledge: The pathology and natural history of CVA and rheumatoid spondylodiscopathy
Indications for operative management of atlanto-axial subluxation, cranial settling and related disorders. Applied surgical anatomy of the craniovertebral junction
Selection of surgical approaches. Principles of peri-operative care
Complications of surgery
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with CVA and cervical myeloradiculopathies. Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms and 3D spinal reconstructions


25. Topic: Hindbrain herniation
Objective: To achieve competence in the management of craniocervical stenosis and hindbrain herniation
Knowledge: The pathogenesis and natural history of hindbrain herniation, craniovertebral stenosis, syringomyelia and syringobulbia. Indications for foramen magnum decompression. Applied surgical anatomy of the craniovertebral junction
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with hind brain anomalies. Interpretation of plain radiographs, CT scan, MRI scans and CT myelograms and 3D spinal reconstructions

Technical Skills and Procedures: Foramen magnum decompression

26. Topic: Spinal epidural abscess
Objective: To achieve competence in the operative management of spinal epidural abscess
Knowledge: The aetiology and pathophysiology of spinal sepsis. Indications for drainage of spinal epidural abscess by laminectomy and multiple laminotomies.
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with spinal sepsis. Interpretation of spinal CT and MRI scans. Management of antimicrobial therapy.
Technical Skills and Procedures: Drainage of spinal epidural abscess by laminectomy and/or multiple laminotomies

27. Topic: Vertebral osteomyelitis and discitis
Objective: To achieve competence in the operative management of vertebral osteomyelitis and discitis
Knowledge: The aetiology and pathophysiology of vertebral osteomyelitis and discitis, including pyogenic, tuberculous and atypical infections
Indications for percutaneous and open biopsy. Indications for spinal stabilisation
Principles of peri-operative care. Surgical complications and their management
Clinical Skills: The assessment, counselling and pre-operative preparation of patients with spinal sepsis. Interpretation of spinal CT and MRI scans. Management of antimicrobial therapy
Technical Skills and Procedures: Transpedicular and open vertebral and disc biopsy

28. Topic: Carpal tunnel compression
Objective: To achieve competence in carpal tunnel decompression
Knowledge: Presentation, differential diagnosis and management of carpal tunnel syndrome. Interpretation of nerve conduction studies. Indications for surgery
Applied surgical anatomy
Clinical Skills: Assessment and counselling of patients with carpal tunnel syndrome
Technical Skills and Procedures: Carpal tunnel decompression

29. Topic: Ulnar neuropathy
Objective: To achieve competence in the management of ulnar neuropathy
Knowledge: Presentation, differential diagnosis and management of ulnar neuropathies. Interpretation of nerve conduction studies. Indications for surgery
Applied surgical anatomy.
Clinical Skills: Assessment and counselling of patients with an ulnar neuropathy
Technical Skills and Procedures: Cubital ulnar nerve decompression with and without transposition

30. Topic: Peripheral nerve sheath tumours
Objective: To achieve competence in the resection of major and minor peripheral nerve tumours
Knowledge: Pathology of peripheral nerve sheath tumours. Indications for complete and subtotal resection of tumours. Applied surgical anatomy of the major peripheral nerves
Clinical Skills: Assessment and counselling of patients with peripheral nerve sheath tumours
Technical Skills and Procedures: Microsurgical excision of peripheral nerve sheath tumour

31. Topic: Paediatric head and spinal injury
Objective: To achieve competence the management of accidental and non-accidental paediatric head and spinal injuries.

Clinical Skills: Assessment and clinical management of children with head and spinal injuries.


32. Topic: Paediatric hydrocephalus

Objective: To achieve competence in the management of paediatric hydrocephalus


Clinical Skills: Assessment of the ill child with hydrocephalus, impaired consciousness and sepsis. Differential diagnosis of shunt malfunction. Interpretation of CT scans in shunted children

Technical Skills and Procedures: Insertion, tapping and draining from a CSF reservoir

External ventricular drainage including externalisation of VP shunts

Ventriculo-peritoneal shunting

33. Topic: Paediatric Intracranial vascular disorders

Objective: To achieve competence in the emergency neurosurgical management of children presenting with intracranial vascular disorders

Knowledge: 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, moyo-moya disease and venous sinus thrombosis

Surgical and endovascular strategies for the management of acute intracranial vascular disorders in children

Clinical Skills: The assessment and clinical management of children presenting with spontaneous intracranial haemorrhage and acute cerebral ischaemia

Technical Skills and Procedures: Emergency operative management of spontaneous intracerebral hemorrhage

34. Topic: Paediatric neurooncology

Objective: To achieve competence in the surgical aspects of the multi-disciplinary management of children with tumours of the brain and spinal cord

Knowledge: Epidemiology, natural history and pathology of tumours of the central nervous system in children including medulloblastoma, pilocytic astrocytoma, high grade gliomas, supratentorial PNET, pineal region tumours, brain stem tumours and intramedullary spinal cord tumours

Imaging of paediatric CNS tumours

Radiological and biochemical staging of tumours

Indications for surgery, radiotherapy, primary and adjuvant chemotherapy

Goals of surgery

Long-term effects of treatment on cognition, hypothalamic-pituitary function and quality of life
Availability of clinical (CCLG) trials
Management of delayed spinal deformity associated with treatment of spinal cord tumours
Clinical Skills: Assessment and clinical management of children with tumours of the central nervous system
Multidisciplinary approach to treating patients with paediatric brain tumours
Technical Skills and Procedures: Emergency operative management of a deteriorating child with an intracranial haemorrhage and/or hydrocephalus secondary to tumour
Use of CT, MRI, electromagnetic and ultrasound guided localisation of tumours of the brain and spine
Stereotactic, image-guided and endoscopic biopsy of intracranial tumours
Supratentorial craniotomy for hemispheric tumour
Approaches to the suprasellar region: pterional, orbitozygomatic and subfrontal
Approaches to the third ventricle: transcortical-transventricular, transcallosal
Approaches to the pineal region: endoscopic, supracerebellar, suboccipital
Transtentorial Midline posterior fossa craniotomy for tumour
Retrosigmoid approach to tumour presenting in the CP angle
Laminoplasty approach to spine cord tumours.
35. Topic: Congenital spinal disorders
Objective: To achieve competence in all aspects of the management (operative and nonoperative) of children with congenital spinal disorders
Knowledge: Embryogenesis of craniospinal dysraphism. Pathophysiology of CSF circulation associated with hindbrain hernia, syringobulbia and syringomyelia
Epidemiology, natural history and clinical features of congenital spinal disorders including dysraphism, tethered cord syndrome, diastematomyelia, Chiari malformations, Klippel-Feil syndrome, achondroplasia, Downs syndrome etc
Imaging of the neonatal and growing paediatric spine of children with congenital Disorders. Antenatal diagnosis of dysraphism and its implications.
Clinical Skills: Assessment and clinical management of children presenting with open or closed dysraphic spines and other congenital spinal abnormalities.
Untethering of thickened filum. Excision of simple dermal sinus tract
Untethering and resection of bony spur in diastematomyelia
Untethering of lipomyelomingocoele. Instrumented stabilization and fusion in the treatment of congenital spinal disorders
36. Topic: Craniofacial disorders
Objective: To achieve competence in all aspects of the management (operative and nonoperative) of children with simple craniosynostosis and cranial deformity after trauma or tumour. To understand the management of children with syndromic craniosynostosis and encephalocoeles
Knowledge: Advances in the genetic understanding of craniofacial conditions
Epidemiology, natural history and clinical features of simple and syndromic craniosynostosis including cosmetic, cognitive and ophthalmological complications
Imaging of simple and syndromic craniosynostosis
Indication for and timing of surgical interventions
Understanding of causes and management of positional plagiocephaly
Epidemiology, natural history, and clinical features of common skull vault conditions including eosinophilic granuloma, fibrous dysplasia etc
Clinical Skills: Management of ophthalmic and airway emergencies in syndromic craniosynostosis, Neurosurgical contribution to the multi-disciplinary management of children with craniofacial abnormalities
Technical Skills and Procedures: Cranioplasty using autologous, titanium or acrylic implants. Surgical management of non-syndromic single suture synostosis (in the context of a multidisciplinary team)
REGISTRAR EVALUATION FORM

Registrar
Year of Training
Period of Evaluation

<table>
<thead>
<tr>
<th>ASSESSMENT</th>
<th>1 (Poor)</th>
<th>2 (Below Average)</th>
<th>3 (Average)</th>
<th>4 (Above Average)</th>
<th>5 (Excellent)</th>
<th>Score</th>
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<td>A. ABILITY/PATIENT CARE</td>
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<td>ii. Problem Evaluation and Judgement</td>
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<td>iii. Technical Skills</td>
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<td>B. PERFORMANCE</td>
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<tr>
<td>i. Punctuality</td>
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<tr>
<td>ii. Initiative</td>
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<td>iii. Responsibility</td>
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<tr>
<td>iv. Verbal presentation</td>
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<tr>
<td>i. Enthusiasm</td>
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<tr>
<td>ii. Attendance at Meetings</td>
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<tr>
<td>iii. Interest in Meetings</td>
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<td>D. PERSONAL</td>
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<tr>
<td>i. Appearance</td>
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<tr>
<td>ii. Emotional maturity</td>
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<td>iii. Patient Rapport and Empathy</td>
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Remarks by Supervising Consultant

Signature
# RESIDENT ROTATIONS
2011-2012

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<tr>
<th>LEVEL</th>
<th>OCTOBER-DECEMBER</th>
<th>JANUARY-MARCH</th>
<th>APRIL-JUNE</th>
<th>JULY-SEPTEMBER</th>
<th>RESIDENT</th>
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<td>Chiromo Anatomy/Physiology/Neurosurgery KNH/A&amp;E THEATRE</td>
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