



الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Pediatric Neurology



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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IMPORTANT ABBREVIATIONS

SCFHS: Saudi Commission for Health Specialties

SBPN: Saudi Board of Pediatric Neurology

PN: Pediatric neurology

- **PN1:** Pediatric neurology resident first year, similarly PN25

SBPN-SC: Scientific Committee of the Saudi Board of Pediatric Neurology, in the SCHS

EEG: Electroencephalogram

EMG: Electromyogram

LP: Lumbar puncture for spinal fluid tap

ITER: Pediatric Neurology In-Training Evaluation Report



ACKNOWLEDGEMENTS

The pediatric neurology core curriculum team appreciates the valuable contributions and feedback from all members of the supervisory committee during the construction of this manual: This work could not have been accomplished without their support. We would also like to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and many of the descriptions and pediatric neurology competencies have been acquired from their resources.

Also we thank the authors of the following resources, which were used for development of this document:

- Curriculum for pediatric training: Pediatric Neurology, Sept 2010, McMaster University,. with permission.
- SCHS Emergency Medicine Residency Training Manual, 2014.
- SCHS Pediatric Neurology Residency Training Manual, 2013.
- SCHS Pediatric Curriculum, full version, Riyadh, Saudi Arabia, 2014

INTRODUCTION

Definition

Pediatric neurology (PN) is the branch of medicine related to nervous system health and disease among individuals with ages ranging from the fetal stage to adolescence. The pediatric neurologist is an expert in the prevention, diagnosis, and management of children with nervous system diseases.

Vision

We aim to be a premier training program in the PN field. Our goal is to inspire residents to positively impact patient lives, the organizations to which they belong, residential communities, and beyond.

Mission

Our mission is to train residents to practice top-tier pediatric neurology in a supportive, yet instructive and structured environment, using frontiers in evidence-based principles, while maintaining the highest standards of ethical, humanistic, and professional behavior.

The PN Residency Program under the Saudi Commission for Health Specialties is a comprehensive five-year training program designed to allow each resident to demonstrate sufficient professional aptitude to practice PN competently and independently.



During the five-year post-graduate training period, the resident should progressively master the core competencies in PN practice. PN residents will progressively acquire clinical skills and abilities to allow them to make sound clinical decisions and provide appropriate patient care. Trainees will also learn career-development skills through scholarly activity, research, and the lifelong study of evidence-based medicine. Upon completion, each graduate will be able to provide complete, effective, and compassionate PN care to all types of patients requiring PN service. This training will allow them to become clinical and academic leaders at local, regional, national, and international levels.

Goals

Each resident must acquire a working knowledge of the theoretical bases of the specialty, including its foundations in basic medical sciences and research.

Residents must demonstrate the requisite knowledge, skills, and attitudes for effective patient-centered care and service to a unique group of patients spanning fetal, neonatal, childhood and adolescent developmental stages. As part of the PN Residency Program, residents must participate in a wide range of clinical experiences involving the care of inpatients and outpatients with acute and chronic neurological disorders, and the prevention and rehabilitation of these disorders.

Residents must follow a program of formal educational activities and exposure to current research activities. The detailed objectives below describe the standards required to achieve competence, and in no way exclude the need to obtain additional knowledge, skills, or aptitudes necessary for the most effective diagnosis and management of patients with nervous system disorders.

APPLICATION AND ADMISSION

Requirements

Application and admission to the Saudi Board of Pediatric Neurology (SBPN) Residency Program

In accordance with and without contradiction to the SCFHS training rules and regulations, the following requirements must be fulfilled by any candidate accepted into the training program:

- All candidates must hold a medical degree such as an M.B.B.S. or its equivalent from a university recognized by the commission.
- All candidates must have completed a 12-month rotating internship.
- All candidates must have passed the Saudi Medical Licensing Exam (SMLE).
- All candidates must provide a comprehensive CV with references from two (2) consultants, preferably from the field of pediatric neurology, who should provide recommendation letters stating the suitability of the candidate for training in pediatric neurology.
- All candidates must provide a letter from a sponsoring organization, approving and pledging support for the candidate's total period of training i.e., 5 years, and for sponsored positions.
- All candidates must be registered as training pediatric neurology at the Saudi Commission for Health Specialties (SCHS).
- All candidates must have basic life support certification and malpractice insurance.



Important

To begin training, the candidate should receive preliminary acceptance from the SCHS and final acceptance from an accredited SBPN training institution. An updated list of accredited sites can be obtained from the SCHS website. The applicant should apply to PN training as per SCHS matching system. PN training slots are limited; thus, admission to this unique and immensely needed specialty program is expected to be highly competitive.

Please ensure that the application guidelines and deadlines set by the SCHS are followed.

General Regulations

- Trainees shall abide by the training regulations and obligations determined by the SCHS.
- Training is a full-time commitment. Residents shall be enrolled full-time, and participate in continuous training for the whole duration of the program.
- Training is to be conducted in institutions accredited by the SBPN.
- Trainees should fulfill all curriculum requirements, meet the minimum number of acceptable assessment goals, and complete the necessary documentation required for graduation.
- Trainees shall be actively involved in patient care, with gradual progression of responsibility.

SBPN ADMINISTRATIVE, GOVERNING, AND SUPPORTIVE BODIES

The SBPN residency program is supervised, governed, and audited by the SCHS Scientific Committee, in accordance with Commission policies and procedures. As a multicenter program, each center has training bodies that all work to provide the best conditions for PN mentorship and instruction. Responsible authorities include:

- Your individual training site Program Director, who reports to the on-site Training Affairs Department.
- The academic and training department in your training site, which is responsible for ensuring quality, compliance, and record keeping of all training-related activities.
- The SBPN Program SCHS Scientific Committee. This Committee supervises and acts as the governing body under the auspices of the SCHS.



SUMMARY OF SBPN PROGRAM STRUCTURE

The SBPN is a five-year training program. The PN resident spends one year (PN1) in general pediatrics, and four years (PN 2- 5) in PN training.

The first year is spent in a SCHS-accredited general pediatrics residency program. During this segment, the Pediatric Residency Program Director will be responsible for ensuring training quality and compliance with SBPN requirements. Rotation details are explained below.

First Part Examination: The resident is required to successfully complete the rotation requirements and pass the first part of SCHS Pediatric Neurology written examination to be promoted to fourth-year PN residency (PN4). The resident can sit for the examination at the end of PN2 or PN3 level

The PN segment of the program is divided into 13 blocks per year, each of 4-week duration. Rotations details are described below.

Each resident is entitled to ONE block of leave per year during the training period. Annual leave must be coordinated within the program, and is NOT allowed during essential rotations. Decisions to grant leave will be made by the training director. SCHS rules and regulations will be applied to all decisions regarding annual leave.

SBPN Pediatric Segment Summary (PN1-2)

Training year (PN)	Training Module	Number of Blocks	Comments
PN1	All general pediatrics first year program modules	12	
	Leave	1	
PN2	Pediatric intensive care	1	
	Adult Neurology	2	
	Genetics/metabolism	1	
	Neuroradiology	1	
	Research (Should do research course)	1	
	Physiatry and rehabilitation	1	
	Clinical Pediatric Neurology	5	
	Leave	1	
PN3	Clinical Pediatric Neurology	5	



Training year (PN)	Training Module	Number of Blocks	Comments
	Pediatric Neurology (Exchange rotation)	2	
	Neurosurgery/Neuro-oncology (Outpatient	1	
	Neuroradiology	1	
	Research	1	
	Child psychiatry/Behavioral Pediatrics	2	
	Leave	1	
PN4	Clinical Pediatric Neurology	4	
	Pediatric Neurology (Exchange rotation)	2	
	EEG	3	
	Neuroradiology	1	Elective (Research and clinical pediatric neurology is not allowed)
	Research	1	
	Elective	1	
	Leave	1	
PN5	Clinical Pediatric Neurology	4	

Training year (PN)	Training Module	Number of Blocks	Comments
	Pediatric Neurology (Exchange rotation)	1	
	Epilepsy	1	
	Neuromuscular/EMG	1	
	Neuro-ophthalmology/Neuropathology	1	Two weeks each one
	Neuroradiology	1	
	Research	1	
	Elective	2	Elective (Research and clinical pediatric neurology is not allowed)
	Leave	1	

Pediatric training (PN1) module (block) goals and objectives are detailed in the general pediatric residency training manual. Each resident is required to complete each rotation successfully. The first one year (PN1) have been designed to provide core general pediatric practice training together with rotations in selected specialized fields.

Exchange Rotation: Residents will have exchange rotations, which are mandatory for combined programs and preferred in the case of independent centers where they prefer to spend time in one of the participating training sites. The program directors provide the rotation sequence and annual rotation schedule. If approved by the training director, an acceptable degree of flexibility in the rotation sequence is allowed.

Research requirement

Each resident is required to complete a research project prior to graduation. This is an admission requirement for the final SBPN board examination. Detailed Research requirement is attached (please attach the regulation of research requirement)

Resident portfolio and logbook

Each resident is required to provide a completed logbook prior to admission to the final SBPN board examination. (Please attach the logbook requirements)

Educational Modules

Each resident is required to attend or complete certain mandatory educational modules, as assigned by the Program schedule. The details are shown below.

Training Promotion

To be promoted to the next training level, the resident must satisfactorily complete the assigned rotations for a given year and pass an end-of-year-evaluation examination (the Unified Pediatric Neurology Promotion Examination), as per regulation of the assessment

Each resident is required to take promotion examinations during (PN2-4). PN5 residents will only be required to take the final SBPN board certification examination.

First Part Examination: The resident is required to successfully complete the rotation requirements and pass the first part of SCHS Pediatric Neurology written examination to be promoted to fourth-year PN residency (PN4). The resident can sit for the examination at the end of PN2 or PN3 level

Training Completion

After successful completion of all training rotations, the resident will be issued a certificate of training completion.

Admission to Final SBPN Board Examination

Each resident will be permitted to take the final SBPN board examination after fulfilling

ALL the following requirements:

- Successful completion of all training rotations and educational modules required during the five-year program.
- Submission and approval of the Final In-Training Evaluation Report (FITER). This report is prepared and submitted by the site Program Director to the SCHS.
- Submission and approval of the procedure logbook. Each resident is required to perform a set number of procedures, as explained below. Performance must be documented in the logbook, which should be submitted prior to the final board examination admission.
- Submission and approval of a research project to the research committee (Which was formed by the scientific council).

SBPN Board Certification

Upon successful completion of the Final SBPN Certification Exam, each candidate will receive the Saudi Commission Specialty Certification in Pediatric Neurology.



PEDIATRIC NEUROLOGY COMPETENCIES

At training completion, the PN resident will have acquired the following competencies and will function effectively, as per the CanMED framework of competencies:

- Medical Expert
- Communicator
- Collaborator
- Manager
- Health Advocate
- Scholar
- Professional

General Competency Goals

The following are required competency goals that will be applicable to multiple (primarily clinically oriented) rotations, and will be referred to as general core-competency goals. The expert competency goal will largely be rotation-specific, and will therefore be explained separately along with each rotation. Each resident will demonstrate competency in the roles described below.

Communicator

- Develop rapport, trust, and ethical professional relationships with patients and families.

- Accurately elicit and synthesize relevant information and perspectives from patients and families, colleagues and other professionals.
- Accurately convey relevant information and explanations to patients and their families, colleagues, and other professionals.
- Develop a common understanding on issues, problems, and plans with patients and their families, colleagues, and other professionals to create a collaborative plan of care.
- Convey effective oral and written information describing a medical visit.

Collaborator

- Participate effectively and appropriately in an inter-professional healthcare team.
- Effectively work with other healthcare professionals to prevent, negotiate, and resolve inter-professional conflict.

Manager

- Manage day-to-day clinical activities in an efficient and organized manner. Effectively balance personal and professional activities.
- Develop an approach to resource management both in clinical settings and on a provincial and national level.
- Serve in administrative and leadership roles.

Health Advocate

- Respond to individual patient healthcare needs and issues as part the care process.
- Respond to community health needs.
- Identify population determinants of health.
- Promote the health of individual patients, communities, and populations.

Scholar

- Develop life-long learning skills that will maintain and enhance professional activities.
- Effectively and efficiently evaluate medical literature and apply this knowledge to patient care.



- Develop the skills necessary to effectively teach students, peers, other health professionals, and the public.
- Develop an understanding of research practice and contribute to the dissemination, application, and translation of new medical knowledge and practices.

Professional

- Display professionalism in the context of clinical care, including:
 - Ethical behavior
 - Professional behavior with patients, families and colleagues
 - Completion of all duties in a timely manner
- Display professionalism as a trainee.
 - Appropriate and timely responses
 - Fulfillment of all program expectations
 - Participation in program activities
- Responsiveness to Education Committee mandates.
 - Active participation in evaluation
 - Active self-assessment
 - Demonstrate a commitment to physician health and stress management
- Awareness of the medical profession.
 - Understanding of the medical-legal aspects of medicine
 - Knowledge of the principles and practice of medical bioethics
 - Awareness of provincial and national medical organizations
 - Awareness of the responsibilities of a self-regulated profession

The following section defines additional rotation-specific competency goals that must be met during the rotation. It should be noted that some competencies are also reflected in the logbook documentation of certain procedures.

Clinical PN Rotation

This is the foundation PN-training rotation. Each resident will master the various core competencies and skills in different clinical settings, including inpatient primary and consultation service, emergency consultations, outpatient clinical encounters, and on-call responsibilities. During this rotation, in addition to the clinical responsibilities, the resident will participate in academic teaching and learning activities. The clinical responsibilities and expectations differ depending on the clinical setting. Many other rotations share some learning objectives and opportunities with this rotation. Residents should learn proactively. For example,

the resident may learn some neuroradiological or neuropathological aspects of certain diseases; however, such objectives are typically covered in neuroradiology and neuropathology rotations, respectively. Therefore, all rotations will complement each other. Competency goals are described below.

Medical Expert

By the end of this rotation, the resident will:

- Master the skill and art of obtaining and reporting a relevant history from a child or the child's parent or caregiver when the patients with neurological symptoms.



- Be able to perform a thorough neurologic examination of children of all ages, including behaviorally, developmentally, and cognitively challenged patients.
- Be able to perform a developmental assessment of a child presenting with neurological symptoms.
- Formulate a diagnostic and therapeutic intervention patient-management plan based on patient information and preferences, up-to-date scientific evidence, and clinical judgment, until such time that further follow-up is not required, as deemed by the attending pediatric neurologist.
- Take a personal initiative in self-education (including perusing recent literature) and demonstrate an investigatory and analytic approach to clinical situations. This encompasses reading textbooks and reviews of recent scientific literature.
- Develop evidence-based approaches to the evaluation and management of children presenting with:
 - Headache: both acute and chronic
 - Altered consciousness level
 - Paroxysmal disorders, including seizures and mimicking symptoms
 - Developmental disorders, including delay and regression
 - Infant hypotonia
 - Ataxia: both acute and chronic
 - Hemiplegia, monoplegia, paraplegia, and quadriplegia
 - Child movement disorders
 - Disorders of vision and ocular motility
 - Sensory and autonomic disturbances
 - Lower brainstem and cranial nerve dysfunction
 - Neuromuscular weakness
 - Develop evidence-based diagnostic and management strategies for common PN diseases, including:
 - Epilepsy
 - Childhood stroke
 - Hydrocephalus
 - Metabolic nervous system disorders
 - Neuromuscular diseases such as Duchene and other muscular dystrophies, myopathies, and myasthenic disorders
 - Pediatric headache
 - Tourette's syndrome and other childhood movement disorders.

- Neurocutaneous syndromes
- Meningitis, encephalitis, and other CNS infections
- Inherited neuropathies
- Be able to appropriately interpret neurological test and examination findings for children of different ages, including (but not limited to) observed variances in cerebrospinal fluid (CSF), EEG, and physical examination results.
- Be able to describe the principles of rehabilitation for management of a brain-injured child.
- Be able to identify important differences in child pharmacotherapy versus that of adults presenting with neurological diseases.
- Be able to describe gross and microscopic nervous system anatomy, including structural recognition in both anatomical and neuro-imaging formats (when technically feasible).
- Know the anatomical and physiological bases of consciousness, sleep, and wakefulness.
- Be able to describe the anatomical and physiological bases of speech, memory, learning, and behavior in children.



- Be able to describe the anatomical and physiological bases of the following systems: sensory, motor, autonomic, limbic, the special senses, and the reticular activating system.
- Be able to describe the physiology of the following major CNS subdivisions: the major cortical regions, basal ganglia, thalamus, cerebellum, reticular activating system, respiratory centers, and limbic system.
- Be able to describe the anatomical and physiological bases underlying normal neurological examinations.
- Be able to describe the pathophysiology of neurological symptoms and signs in the major primary and secondary neurological disorders (including, for example, seizures, spasticity, tremor, and aphasia)
- Be able to describe the basic principles underlying interpretation of major clinical tests, such as nerve conduction studies, electromyography, electroencephalography, evoked potentials, perimetry, electronystagmography, audiometry, psychometry, and CSF analysis. Interpretations should include the indications for, potential value of, limitations of, and contraindications for these tests in any clinical situation where they may be applied.
- Discuss the indications, mechanism(s) of action, side effects, and dosages of the major neurological therapeutic drugs.
- Discuss the mechanism(s) of action of apheresis, including the rationale for its therapeutic efficacy in specific neurological diseases, and the indications and contraindications for use.
- Discuss the role of surgery in neurological disorder therapies, including indications and contraindications for its use.
- Discuss the basic procedures used in nervous system disorder clinical epidemiology.

- Discuss neurological complications of the following systemic diseases and conditions: chemotherapy, organ transplantation, rheumatologic conditions, endocrine disorders, and renal disorders.
- Understand the different types of developmental nervous system disorders and their clinical implications.
- Learn about common local and nationwide inherited and acquired neurological disorders affecting children and young adults.

Communicator

By the end of this rotation, each resident will:

Achieve general communicator core-competency goals.

Communicate effectively and regularly, responding to questions in a considerate, sympathetic, and professional manner, when interacting with children and their families in clinical or inpatient settings.

Anticipate problems in interpretation or expression by patients or their families.

Clearly explain the performance of all diagnostic procedures, their rationales, their risks, their complications, potential benefits, and the likely outcome(s) of the anticipated results.

Explain the reason for consulting other physicians or members of the healthcare team.

Address patient prognosis honestly and sensitively when possible.

Communicate effectively with all medical colleagues, including referring physicians in all settings (in person, by telephone, by electronic media, and through clinic or inpatient records, letters, or discharge summaries).



Ensure that consultation requests provide sufficient information for the physician to understand why the patient is being seen.

Collaborator

During this rotation, each resident will master the following:

- General collaborator competency goals.
- Recognize and respect the roles of multidisciplinary team members who provide PN care, including physicians, nursing staff, clinical nurse specialists, physiotherapists, occupational therapists, social workers, psychologists, pharmacists, and support staff.
- Consult appropriately with other physicians and healthcare professionals.
- Contribute effectively to interdisciplinary team activities, providing leadership where appropriate.

Manager

During this rotation, each resident will master the following:

- Exhibit proficiency in general manager competency goals.
- Take responsibility for initiating and sequencing care activities for each patient, including interpretation of outcomes, and clearly outlining the medical-care plan to all healthcare team members.
- Utilize personal time and energy effectively to balance patient-care responsibilities, learning needs, and personal needs.
- Set priorities for the timing of requested consultation assessments based upon the acuity of the presenting problem.

- Demonstrate an appreciation of the cost-benefit relationships of various interventions, and develop strategies for efficient use of finite healthcare resources in PN settings.
- Use information technology to optimize patient care and life-long learning opportunities.

Health Advocate

By the end of this rotation, each resident will master the following:

- General health advocate competency goals.
- Counsel patients and families on neurological disorder prevention, including risk- factor modification.
- Provide genetic counseling regarding inherited neurological diseases.
- Recognize the roles of organizations and community services in providing support for children with neurological diseases, and make appropriate referrals to these facilities.
- Identify opportunities to contribute, as a neurologist, to improving the health of patients and communities.
- Advocate effectively for timely access to patient investigations, consultations, and treatment interventions based upon the urgency of the presenting problem.

Scholar

By the end of this rotation, the resident will:

- Develop effective teaching skills by instructing other physicians (including medical students and house officers), healthcare personnel, and patients.
- Develop a strategy for maintaining professional competence by various continuing medical education methods.



- Critically assess neurological literature as it relates to patient diagnosis, investigation, and treatment.

Professional

Each resident must learn and master the following:

- General professional core-competency goals.
- Demonstrate personal and professional attitudes, including integrity, honesty, and compassion, which are consistent with development as a consulting physician.
- Include the patient in discussions and decisions concerning appropriate diagnostic and management procedures.
- Show appropriate consideration of the opinions of other healthcare team members, including fellow trainees, in patient problem management, and demonstrate the capacity to effectively discuss and resolve opinion differences.
- Recognize the ethical principles that are especially relevant when providing care to children, including those of treatment consent in the pediatric population.
- Demonstrate self-awareness, including recognition of personal and professional limitations.
 - Medical Genetics Rotation:

- The rotation consists of one block during PN2 level. Its aim is to provide an opportunity to learn about treatable inborn errors of metabolism. To learn the basics of genetic testing and the appropriate testing based on clinical evaluation of the patients. To learn the common emergency problem related to inborn error of metabolism. To know how the basics of family counseling in multiple genetic causes. Master the skill and art of obtaining and reporting a relevant history from a child presents with genetic disorders. To master the skill and art of obtaining and reporting a relevant history from a child presents with suspected metabolic disorders.

Medical Expert

- Demonstrate a comprehensive understanding of metabolic and genetic disorders that affect the nervous system in pediatric patients.
- Assess and interpret laboratory and genetic tests relevant to pediatric neurology, including metabolic panels and genetic sequencing.

Communicator

- Effectively communicate complex genetic and metabolic concepts to patients and their families, ensuring they understand diagnoses and treatment options.
- Document patient histories and findings clearly and concisely, facilitating effective communication within the healthcare team.

Collaborator

- Work collaboratively with geneticists, dietitians, and other specialists to develop comprehensive management plans for patients with metabolic and genetic disorders.



- Participate in multidisciplinary rounds, contributing insights from a pediatric neurology perspective.

Leader

- Lead case discussions on metabolic and genetic conditions during team meetings, fostering a collaborative learning environment.
- Advocate for appropriate resources and referrals for patients with complex metabolic and genetic disorders.

Health Advocate

- Identify and address social, economic, and cultural factors that impact patient care and access to treatment for metabolic and genetic conditions.
- Promote awareness of genetic and metabolic disorders within the community and among healthcare professionals.

Scholar

- Engage in research or quality improvement projects related to metabolic and genetic disorders, contributing to evidence-based practice.
- Critically evaluate current literature on metabolic, and genetic disorders to inform clinical practice.

Professional

- Demonstrate ethical practice in the management of genetic information, including informed consent and confidentiality.
- Reflect on personal learning and professional growth throughout the rotation, identifying areas for improvement.

- Physiatry and Rehabilitation: The rotation consists of one block during PN2 level.

Medical Expert

- Acquire knowledge of common pediatric neuromuscular and musculoskeletal disorders and their impact on functional ability.
- Develop skills in conducting comprehensive physical examinations and assessments relevant to rehabilitation needs in pediatric patients.

Communicator

- Effectively communicate rehabilitation goals and plans to patients and their families, ensuring understanding and engagement in the care process.
- Document assessments, interventions, and progress notes clearly, facilitating communication among the multidisciplinary team.

Collaborator

- Work closely with physiatrists, physical and occupational therapists, and other healthcare professionals to create and implement individualized rehabilitation plans.
- Participate actively in interdisciplinary team meetings, contributing insights from a pediatric neurology perspective.

Leader

- Lead discussions on rehabilitation approaches for pediatric patients with neurological conditions during team rounds or case presentations.
- Advocate for resources and services that enhance rehabilitation outcomes for pediatric patients.

Health Advocate

- Identify barriers to accessing rehabilitation services for pediatric patients and propose solutions to improve access and quality of care.
- Promote awareness of the importance of early intervention and rehabilitation among families and community stakeholders.



Scholar

- Engage in reviewing current literature on pediatric rehabilitation techniques and outcomes, applying findings to clinical practice.
- Participate in quality improvement projects or research related to rehabilitation for children with neurological conditions.

Professional

- Demonstrate ethical practice in the delivery of rehabilitation services, including informed consent and respect for patient autonomy.
- Reflect on personal and professional development throughout the rotation, identifying strengths and areas for growth in rehabilitation practices.

Adult Neurology Rotation

Adult neurology rotation consists of two blocks. Its aim is to provide an opportunity to learn about nervous system injury or disease localization, and about neurological examination techniques and common nervous system diseases that either resemble or differ from those encountered in older children or adolescents. This rotation serves as an effective introduction to different symptoms and signs observed in neurological practice, including movement disorders, ataxia, and neuromuscular disorders. Since adult patients are more cooperative, and can better describe various neurological disorder symptoms and signs, this rotation provides an excellent opportunity to learn neuroanatomy and localization in neurology. Competency goals are described below.

Medical Expert

The resident is expected to:

- Master obtaining a complete general & neurological history from adult patients, and performing a comprehensive general and neurological examination, including examination of mental status.
- Recognize differences between organic and psychological disorders. In patients with an organic disorder, the resident must appropriately localize the lesion(s).
- Exhibit appropriate clinical judgment in outlining a differential diagnosis and investigative and therapeutic plan, taking into account multiple factors including the following: the patient's age, general health, risk and cost of investigative procedures, risk and cost of therapeutic interventions, and disease epidemiology.
- Learn the clinical features, assessment, and principles of management of common adult neurological disorders, especially that of sclerosis, stroke, tremor, and common movement disorders.



- Be able to describe the anatomical and physiological bases of consciousness, sleep, and wakefulness.
- Be able to describe the physiology of the following major CNS subdivisions: the major cortical regions, basal ganglia, thalamus, cerebellum, reticular activating system, respiratory center, and limbic system, as encountered in a clinical setting.
- Be able to describe the pathophysiology of neurological symptoms and signs in major primary and secondary neurological disorders (including, for example, seizures, spasticity, tremor, and aphasia).
- Learn the indications and mechanism(s) of action, side effects, and dosages of the major neurological therapeutic drugs pertaining to clinical encounters in adult neurology.
- Be able to discuss the therapeutic role of surgery in neurological disorders, including indications and contraindications for use.
- Be able to discuss the role of rehabilitative medicine in the treatment of neurological disorders such as stroke.
- Learn the roles of the nervous system in systemic diseases encountered in adult and elderly patients, including systemic lupus erythematosus, vasculitis, endocrine disorders, and renal disorders.
- Learn about the neurologic presentations of primary and metastatic tumors in adults, with associated radiological and clinical characteristics.

Communicator

The resident is expected to achieve general core-competency as a communicator.

Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals. Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident must achieve general professional core-competency goals.

Neuroradiology Rotation

The goal of the neuroradiology rotation is to provide a more focused opportunity for the resident to learn the principles and imaging characteristics of the nervous system in health and disease. As an essential component, special attention will be paid to learning computed tomography (CT) and magnetic resonance imaging (MRI) of the brain, as well as other imaging modalities used to diagnose commonly encountered diseases. This rotation serves also to solidify what residents encounter during other clinical rotations in terms of disease-related imaging findings. Each resident will spend two blocks in neuroradiology. Competency goals are described below.

Medical Expert

- Learn the normal appearance and anatomy of the brain and spinal cord, as visualized by CT, MRI, Magnetic resonance angiography, conventional angiography, and brain ultrasound.
- Learn to visualize normal and abnormal brain myelination and developmental disorders by brain imaging.
- Acquisition of a basic understanding of neuroimaging technology, including artifacts and normal variants.
- Learn the indications, contraindications, and complications of the various neuroimaging procedures.
- Learn the imaging characteristics of common disorders encountered in child neurology. Examples include stroke, intracranial hemorrhage, brain tumors, CNS infections, autoimmune and vascular disorders, metabolic disorders, and other acquired and inherited disorders.
- Learn how to appropriately read and interpret brain and spine CT and MRI images and sequences for various conditions.
- Understand the risks and benefits of various imaging techniques, including radiation- and sedation-related hazards.

Communicator

- Demonstrate mastery of general communicator competency goals.



- Learn how to report imaging results to other members of the healthcare team.

Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals.

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

- Achieve general professional core competency goals.
- Maintain patient privacy when presenting and discussing imaging findings.

Epilepsy Rotation

This rotation provides focused experience in pediatric and adult inpatient and outpatient epilepsy presentation, evaluation, and treatment. The resident will learn seizure semiology and the basics of EEG interpretation. Additionally, residents will participate in multidisciplinary team assessments and pre-surgical evaluations of patients with intractable epilepsy. During the rotation, the resident will attend epilepsy outpatient clinics, review EEGs, and provide care to patients admitted to the epilepsy- monitoring unit. The resident will also participate in educational and epilepsy management meetings. This is a one-block rotation, which shares some competency goals with the clinical PN and neurophysiology rotations. Competency goals are described below.

Medical Expert

The resident is expected to demonstrate medical knowledge and expertise in the following areas:

- Basic physiological mechanisms underlying EEG waves in different states and developmental ages, including normal and abnormal features. This item consolidates a similar objective in the neurophysiology rotation.
- Nervous system neurophysiology, including action potentials, ion channels,

neurotransmitters, and epileptogenesis.

- Classification of epileptic seizures and syndromes in neonates, infants, children, and adolescents.
- Epidemiology, genetics, clinical manifestations, treatment, and prognosis of epileptic seizures and syndromes in adults and children.
- Pharmacological principles, complications, and teratogenic effects of anti-epileptic drug administration.
- Non-pharmacological treatment of epilepsy, including ketogenic diet, surgery, and vagal nerve stimulation.
 - Effects of pregnancy on epilepsy and its management. Diagnosis and management of status epilepticus.
- Diagnosis and differential diagnoses of non-epileptic seizures.
- Understand the presentation, evaluation, and management of sleep disorders encountered in children.

Communicator

The resident is expected to achieve general core competency as a communicator.

Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals.

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident must achieve general professional core competency goals.

Neurosurgery Rotation: The rotation consists of two weeks during PN3 level

Medical Expert

- Understand the indications, risks, and benefits of common neurosurgical procedures in pediatric patients, including those for congenital and acquired neurological conditions.
- Develop skills in conducting preoperative assessments and postoperative care for children undergoing neurosurgery.

Communicator

- Communicate effectively with patients and families about neurosurgical procedures, including informed consent and postoperative expectations.
- Maintain clear and comprehensive documentation of clinical findings, surgical interventions, and follow-up care.

Collaborator

- Collaborate with neurosurgeons, anesthesiologists, and nursing staff to develop comprehensive perioperative care plans for pediatric patients.
- Participate in multidisciplinary rounds, sharing insights on the neurological aspects of care and rehabilitation.

Leader

- Lead discussions on the management of complex pediatric neurosurgical cases during team meetings or case presentations.
- Advocate for patient-centered care approaches, ensuring that the unique needs of pediatric patients are prioritized.

Health Advocate

- Identify and address barriers to neurosurgical care for pediatric patients, including socioeconomic factors that may affect access to services.
- Promote education on neurological conditions and the role of surgery in treatment to families and community groups.

Scholar

- Engage in critical review of current literature related to pediatric neurosurgery, applying evidence-based practices to clinical scenarios.
- Participate in research projects or quality improvement initiatives focusing

on outcomes in pediatric neurosurgical patients.

Professional

- Demonstrate professionalism and ethical practice in interactions with patients, families, and the healthcare team, particularly in high-stress surgical settings.
- Reflect on personal experiences and professional growth throughout the rotation, identifying lessons learned and areas for improvement in neurosurgical practice.

Neuro-oncology rotation:

The rotation consists of two weeks during PN3 level.

Medical Expert

- Understand the pathophysiology, presentation, and management of common pediatric brain tumors, including gliomas, medulloblastomas, and ependymomas.
- Develop skills in interpreting neuroimaging studies and laboratory results relevant to pediatric neuro-oncology.

Communicator

- Communicate effectively with patients and their families about diagnoses, treatment options, and potential side effects related to neurooncological care.
- Document clinical findings, treatment plans, and progress notes clearly and thoroughly to ensure continuity of care.

Collaborator

- Collaborate with oncologists, neurosurgeons, radiation therapists, and other specialists to develop comprehensive treatment plans for pediatric patients with brain tumors.
- Participate in tumor board meetings, contributing insights from a pediatric neurology perspective to optimize patient management.

Leader

- Lead discussions on complex neurooncological cases during team



meetings, highlighting multidisciplinary approaches to patient care.

- Advocate for comprehensive supportive care services, including palliative care and rehabilitation, for children with brain tumors.

Health Advocate

- Identify and address barriers to care for pediatric neurooncology patients, including access to treatment and psychosocial support.
- Promote awareness of pediatric brain tumors and their impact on children and families within the community.

Scholar

- Engage in the critical appraisal of current research and clinical guidelines related to pediatric neurooncology, applying evidence-based practices in patient care.
- Participate in research projects or quality improvement initiatives focused on outcomes in pediatric neurooncology.

Professional

- Demonstrate ethical practice in the management of neurooncology patients, including issues related to informed consent and end-of-life care.
- Reflect on personal experiences and professional development throughout the rotation, identifying strengths and areas for growth in neurooncological practice.



Neurophysiology Rotation

The neurophysiology rotation consists of three blocks, primarily focusing on performing EEG and its evaluation. The resident is expected to be in the EEG lab and epilepsy- monitoring unit daily, and to participate in epilepsy conferences and related educational activities. This rotation is the prime time opportunity for the resident to master the skill and art of reading and reporting EEGs. Competency goals are described below.

Medical Expert

- Understand the basic principles of electroencephalography, including the differences in montages, the basic technical aspects of EEGs, and the ability to apply the International 10-20 system.
- Recognize normal EEG waveforms and normal waveform variants in neonates, children, adolescents, and adults.
- Recognize different abnormal epileptic discharges observed in neonates, children, adolescents, and adults.
- Recognize both with partial- and generalized-onset seizure patterns by EEG.
- Recognize periodic EEG patterns associated with encephalopathy, including periodic lateralized epileptiform discharges and triphasic waves, with associated implications and prognoses.
- Recognize EEG features of common epilepsies encountered in children and adolescents (e.g., Rolandic epilepsy, absence epilepsy, myoclonic epilepsy, infantile spasms, Lennox-Gastaut syndrome, Landau-Kleffner syndrome, epilepsy with suppression-burst, temporal lobe epilepsy, and benign epilepsy with occipital paroxysm).

- Recognize the EEG techniques, features, and caveats when performed on brain- dead patients of different ages.
- The advantages and disadvantages of video telemetry, ambulatory EEG, and continuous ICU monitoring.
- Recognize common EEG artifacts and the caveats of routine EEG recordings.
- Recognize normal and abnormal EEG findings during activation or special procedures performed during recording (e.g., photic stimulation, hyperventilation, eye closure, and pain stimulation).
- Recognize normal and abnormal sleep patterns.
- Understand special electrographic techniques used in patients with epilepsy, including functional mapping, electrocorticography, and use of subdural grids.
- Independently report findings of outpatient EEGs under the supervision of neurophysiology mentors.

Communicator

The resident is expected to:

- Develop rapport, trust, and ethical therapeutic relationships with patients and families.
- Accurately elicit and synthesize relevant information and perspectives from patients and families, colleagues, and other professionals.
- Accurately convey relevant information and explanations to patients and families, colleagues, and other professionals.
- Develop a common understanding on issues, problems, and plans with patients and their families, colleagues, and other professionals to create a collaborative care plan.
- Convey effective oral and written information about a medical visit.

Scholar

The resident is expected to:

- Develop life-long learning skills that will maintain and enhance professional activities.
- Effectively and efficiently evaluate medical literature and apply this knowledge to patient care.



- Develop the skills necessary to effectively teach students, peers, other health professionals, and the public.
- Develop an understanding of research practice and contribute to the dissemination, application, and translation of new medical knowledge and practices.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals.

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident is expected to achieve general professional core-competency goals.

Neuropathology Rotation

The neuropathology rotation offers the opportunity to acquire more in-depth exposure to the field, including review of gross and microscopic neuropathology of common CNS and peripheral nervous system (PNS) diseases. Residents will become acquainted with the role of the neuropathologist in the evaluation and treatment of neurological diseases. This is a one-block rotation. However, block goals are also achieved through interaction with the neuropathologist during the clinical PN, adult neurology, and epilepsy rotations. Competency goals are described below.

Medical Expert

- Demonstrate a thorough knowledge of normal brain, spinal cord, nerve, and muscle-tissue neuroanatomy and histology.
- Learn the different stains used to study brain, nerve, and muscle tissues.
- Discuss the general pathophysiological manifestations of common neurological diseases, including the following: neoplasia, cerebrovascular disease, muscle and nerve disorders, metabolic disorders, traumatic nerve injury, and infections.
- Recognize the neuropathological features of the brain- and spinal-cord-tissue observed in autoimmune and inflammatory disorders, such as Rasmussen encephalitis, vasculitis, multiple sclerosis, and inflammatory myopathy.
- Recognize pathological characteristics of different nerve and muscle disorders encountered during PN practice (inherited and acquired neuropathies, congenital myopathies, congenital muscular dystrophies, limb girdle muscular dystrophies, inflammatory myopathies, and metabolic myopathies).
- Demonstrate knowledge of the diagnostic criteria and interpretation of smear cytology.
- Learn the features visible by light and electron microscopy in certain metabolic disorders (e.g., neuronal ceroid lipofuscinosis, and lysosomal storage disorders).
- Discuss the major cellular, genetic, molecular, biological processes important for understanding neurological and neuromuscular diseases.
- Understand the basics of frozen sections and smears.



Communicator

The resident is expected to master general communicator competency goals as stated above.

Scholar

The resident is expected to master general scholar competency goals.

Collaborator

The resident is expected to master general collaborator competency goals.

Manager

The resident is expected to master general manager competency goals.

- Health Advocate: The resident is expected to achieve general health advocate competency goals.
- Professional: The resident is expected to achieve general professional core competency goals.

Neuro-ophthalmology Rotation

The aim of this rotation is to teach skills to examine and localize ocular lesions and motor disorders. The residents will be provided an opportunity to study the role of the eye in various neurological disorders. They will learn skills to assess, diagnose, and treat various neuro-ophthalmological presentations. During this rotation, residents will spend time with multiple clinicians who have backgrounds and expertise in neuro- ophthalmology and general ophthalmology. Competency goals are described below.

Medical Expert

- Be able to obtain relevant patient histories in common ophthalmological presentations and correctly perform retinal examinations.
- Learn to assess visual functions (e.g., visual acuity, visual fields, and color vision).
- Be able to perform inspections for prescription glasses (e.g., conduct evaluations, identify problem sources, and take appropriate ophthalmological measurements including sphere/cylinder/reading)
- Accurately measure vertices and pupil distance.
- Learn the indications and techniques to perform the slit-lamp examination.
- Master the techniques of direct and indirect ophthalmoscopy.
- Learn the clinical approach to examine patients with diplopia, nystagmus, ocular motor apraxia, and visual loss.
- Understand the pathophysiology and clinical presentations of common pediatric neurology diseases with ocular involvement.
- Recognize common retinal and lens pathologies including optic atrophy, papilledema, drusen, retinitis pigmentosa, cherry-red spots, and lens dislocation.
- Learn common abnormalities detected on an electroretinogram and visual evoked responses.
- Understand the pharmacology of certain agents used in pediatric ophthalmology, such as papillary dilators.

Communicator

The resident is expected to achieve general communicator competency goals.



Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals.

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident is expected to achieve general professional core-competency goals.

Child Psychiatry/ Behavioral Pediatrics Rotation

The goal of the child psychiatry rotations is to provide an organized clinical experience, supervised by qualified child psychiatrists, to evaluate, diagnose, and treat children and adolescents, presenting with behavioral and mental health problems. The resident will learn to effectively link neurological disorders to mental health. The resident should utilize the rotation to review psychiatric disorders that are likely to present to a neurologist. This is a one-block rotation, with competency goals described below.

Medical Expert

The resident is expected to:

- Gain knowledge of the epidemiology, natural history, neurobiology, psychology, and systemic aspects of major psychiatric disorders in children and adolescents.
- Conduct psychiatric interviews with parents and other caregivers, and perform appropriate psychiatric exams, including the mental status exam.
- Formulate a working diagnosis, including a differential and an appropriate problem list, and competently recommend appropriate treatments under the guidance of the child psychiatrist.
- Be able to recognize and manage psychiatric diseases that have neurological

manifestations.

- Gain knowledge about psychopharmacological agents, indications, side effects, and interactions.
- Gain knowledge about psychotherapies, indications, and potential caveats.
- Participate in treatment decisions and monitor the impact of all interventions.

Communicator

The resident is expected to achieve general communicator competency goals.

Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals.

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident is expected to achieve general professional core-competency goals.

Neuromuscular Rotation

This rotation provides a more in-depth setting for the resident to study electrophysiology and master the clinical skills and theoretical knowledge necessary to understand different pediatric neuromuscular disorders. This is a one-block rotation. The resident will attend clinics and EMG laboratory sessions with different mentors. Residents will learn to obtain a thorough neuromuscular history, conduct examinations, and observe and interpret EMGs performed on the same patient. Competency goals are described below.

Medical Expert

The resident should:

- Master the acquisition of relevant neuromuscular history and the performance



of complete neuromuscular examinations. Examinations should assess the sensory, motor, and coordination systems.

- Be able to understand PNS anatomy and physiology.
- Master the clinical differentiation between disorders at different PNS levels (including those of the anterior horn-to-peripheral nerve and neuromuscular junction-to-muscle).
- Differentiate between the clinical presentations of upper and lower motor neuron disorders.
- Recognize and understand the clinical presentation, etiology, and management of motor neuron disorders encountered in the PN setting.
- Recognize and understand the clinical presentation, etiology, and management of inherited and acquired peripheral nerve disorders encountered in the PN setting. Recognize and understand the clinical presentation, etiology, and management of inherited and acquired neuromuscular junction disorders encountered in the PN setting.
- Recognize and understand the clinical presentation, etiology, and management of PN-related primary muscle disorders, including congenital myopathies, muscular dystrophies, metabolic myopathies, myotonic disorders, and periodic paralysis.
- Learn normal and abnormal peripheral-nerve histology and anatomy, including muscle innervation and sensory dermatomes.
- Describe the physiology of axons and peripheral nerves and their reactions to injury.
- Recognize and understand the clinical presentation and management of neuromuscular presentations associated with chronic illness (e.g., critical-illness neuromuscular disorders).
- Understand the clinical approach to and evaluation of neonates and children with traumatic-nerve or plexus injury.
- Learn basics of performing and interpreting EMGs. The resident should participate in EMG-test interpretation.

Communicator

The resident is expected to achieve general core competency as a communicator.

Scholar

The resident is expected to achieve general scholar competency goals.

Collaborator

The resident is expected to achieve general collaborator competency goals.

Manager

The resident is expected to achieve general manager competency goals

Health Advocate

The resident is expected to achieve general health advocate competency goals.

Professional

The resident is expected to achieve general professional core-competency goals.

Research Rotation

- PN residents are required to undertake a four -block research rotation. The purpose of this rotation is to expand the research knowledge base and skills, and to promote their understanding of epidemiology and the utilization and interpretation of statistical data. During this rotation, each resident should be able to generate and initiate a few research ideas to pursue as research projects during their training years. The research blocks are taken during the PN25 years of the program with a manadtotorr research course in PN2. Competency goals are described below.

Medical Expert

The resident should be able to:

- Generate patient-centered clinical questions to drive knowledge acquisition when designing a research study.
- Identify personal knowledge deficiencies and develop a system to generate and answer clinical questions based on patient cases
- Use a standard format to phrase clinical questions (e.g., patient/problem, intervention, comparison intervention, outcome [PICO]), to help perform an efficient literature search to assess what has already been studied
- Assess the type of question being asked, in order to identify study design that would best answer the question
- Identify and efficiently locate the best available information resources to address research-project questions.
- Conduct a database-oriented literature search using Medline, PubMed, or an equivalent method

- Use methodological filters to limit searches to articles dealing with therapy, diagnosis, or prognosis
- Use secondary sources (e.g., Cochrane, Coding Analysis Toolkit, databases, ACP, Journal Club, etc.) to efficiently obtain evidence.
- Use practice guidelines to identify and review recommended care plans for a variety of common problems encountered in PN
- Select the appropriate study design to answer research questions.
- Know the indications for Institutional Review Board (IRB) approval, including studies using patients, patient medical records, and other patient-specific data that can compromise confidentiality.

Communicator

The resident should be able to:

- Present one's project in a grand-rounds, academic, or research-day format at its conclusion.
- Write a scientific abstract for potential submission to a regional or national research meeting (i.e., the SCFHS, the Saudi Pediatric Neurology Society meeting, or resident research days).
- Strive to write one's project into a scientific paper at the conclusion of the project.
- Complete final IRB reporting.

Collaborator

The resident should be able to:

Discuss their project with an advisor and appropriate consultants, including statisticians and other specialists, for research design, or for scientific knowledge.

Health Advocate

The resident should be able to:

- Consider healthcare delivery, specific disease management, disease screening, or other aspects of health care, as an area to study.
- Advocate research to promote understanding of various disease processes or ways to deliver care.



- Understand when research is appropriate and when it is not by considering factors such as patient health status, or their understanding of the project.

Manager

The resident should be able to:

- Recognize the costs of research.
- Determine the best methods of performing research within the constraints of residency and the medical system.

Scholar

The resident should be able to:

- Compare one's data to that previously collected and determine the differences.
- Read current literature to substantiate one's findings.
- Determine relevant study applications to patient care and describe how it can be changed accordingly.

Professional

The resident should:

- Respect medical-information privacy of patients while performing research.
- Understand the function of an institutional review board (IRB) and how it serves to protect patients.
- Be able to discuss the ethics of research, including subject recruitment, informed consent, patient privacy, and the role of IRBs.
- Respect the privacy of patients and their families when performing research that involves seeking patient-specific information.
- Be honest in reporting of data.
- Present data in an aggregate manner to eliminate specific-patient identification in one's report.
- Be able to submit a proposal to the IRB.
- Complete the IRB Ethics in Research test.

STRUCTURED LEARNING AND TEACHING

The SBPN program includes multiple learning opportunities for trainees. The bulk of learning and teaching lies in clinical experience through hands-on mentoring in various clinical settings and academic activities. Teaching opportunities are arranged through academic activities in each training site, where the resident will be providing formal, informal, or bedside teaching to junior or general pediatric residents. These teaching activities should be documented in the annual academic-performance report, which is part of resident's portfolio.

In addition to these responsibilities, the resident is required to complete certain structured educational modules and activities; this aspect of the learning process is covered in the following section.

Part I: Universal Topics

These are high-value, interdisciplinary topics of the utmost importance to the trainee. The topics are delivered to ensure that every trainee develops essential core knowledge in medicine practice. These topics are common to all specialties.

Topics included here fall in one or more of the following classes:

- Impactful: Topics that are commonly-encountered or relevant to life-threatening situations.
- Interdisciplinary: Topics that are difficult to teach in a single discipline.
- Orphan: Topics that are poorly represented in the undergraduate curriculum.
- Practical: Topics that trainee will encounter during hospital practice.

Development and Delivery

Core topics for postgraduate curriculum will be developed and delivered by the SCHS through an e-learning platform. A set of preliminary learning outcomes for each topic are under development.

The topics will be didactic in nature, with particular focus on the practical aspects of care. These topics will have more content compared with workshops and other



face-to- face interactive sessions planned. The suggested duration of each topic is 1.50 hours. The topics will be delivered in a modular fashion. At the end of each Learning Unit, there will be an on-line formative assessment. These topics can be assessed in a summative manner along with specialty examinations.

Year of training	Number	Universal topic
1 st year (PN1)	1	Safety in drug prescription
	2	Hospital-acquired infections (HAI)
	3	Occupational hazards of healthcare workers (HCW)
2 nd year (PN2)	1	Side effects of chemotherapy and radiation
	2	Therapy
		Pre-operative assessment
3 rd year (PN3)	1	Management of altered sensorium
	2	Mini-mental state examination
	3	Acute pain management
4 th year (PN4)	1	Chronic pain management
	2	Patient advocacy
	3	Ethical issues transplantation and organ harvesting; withdrawal of care
5 th year (PN5)	1	Ethical issues: treatment refusal; patient autonomy
		Role of doctors in death and dying
	2	



1. Safety in drug prescription: At the end of the Learning Unit, the resident should be able to:
 - A. Recognize the importance of drug prescription safety in healthcare.
 - B. Describe various adverse drug reactions, with examples of commonly prescribed drugs that can cause such reactions.
 - C. Apply principles of drug-drug interactions, drug-disease interactions, and drug-food interactions in common situations.
 - D. Apply principles of drug prescription in special situations, such as renal and liver failure.
 - E. Apply principles of drug prescription in elderly and pediatric patients, and in those who are pregnant or lactating.
 - F. Promote evidence-based cost-effective prescriptions.
 - G. Discuss the ethical and legal framework governing safety in drug prescription in Saudi Arabia.
2. Hospital-acquired infections (HAIs): At the end of the Learning Unit, you should be able to:
 - A. Discuss the epidemiology of HAIs, with special reference to such in the population of Saudi Arabia
 - B. Recognize HAI as a major emerging threat in healthcare
 - C. Identify the common sources of HAI
 - D. Describe the risk factors of common HAIs such as ventilator-associated pneumonia, Methicillin-resistant Staphylococcus aureus ,Central line-associated bloodstream infection, and vancomycin-resistant enterococcus (VRE)
 - E. Identify the role of healthcare workers in HAI prevention

- F. Determine the appropriate pharmacological (e.g., selected antibiotics) and non-pharmacological (e.g., removal of an in-dwelling catheter) measures in HAI treatment
 - G. Propose a plan to prevent HAI in the workplace
3. Side effects of chemotherapy and radiation therapy: At the end of the Learning Unit, you should be able to:
- A. Describe the important side effects (e.g., those that are frequent, life-threatening or organ-threatening) of common chemotherapy drugs
 - B. Explain principles of side-effect monitoring in a patient undergoing chemotherapy
 - C. Describe measures (pharmacological and non-pharmacological) available to ameliorate the side effects of commonly-prescribed chemotherapy drugs
 - D. Describe the important (e.g., common and life-threatening) side effects of radiation therapy
 - E. Describe the measures (pharmacological and non-pharmacological) available to ameliorate the side effects of radiotherapy
4. Pre-operative assessment: At the end of the Learning Unit, you should be able to:
- A. Describe the basic principles of pre-operative assessment
 - B. Perform pre-operative assessment in an uncomplicated patient, with special emphasis on:
 - i. General health assessment
 - ii. Cardiorespiratory assessment
 - iii. Medications and medical-device assessment
 - iv. Drug allergies
 - v. Pain-relief needs
 - C. Categorize patients according to risks
5. Management of altered sensorium: At the end of the Learning Unit, you should be able to:
- A. Triage and categorize patients
 - B. Identify patients who need prompt medical or surgical attention
 - C. Generate preliminary diagnoses based on histories and physical examinations
 - D. Order and interpret urgent investigations
 - E. Provide appropriate immediate management to patients
 - F. Refer the patients to next level of care, if needed



6. Mini-mental state examination (MSE): At the end of the Learning Unit, you should be able to:
- A. Review the appropriate usages, advantages, and potential pitfalls of Mini- MSE
 - B. Identify patients suitable for mini-MSE
 - C. Screen patients for cognitive impairment through mini-MSE
7. Acute pain management: At the end of the Learning Unit, you should be able to:
- A. Review the physiological bases of pain perception
 - B. Proactively identify patients who might be in acute pain
 - C. Assess a patient with acute pain
 - D. Apply the various pharmacological and non-pharmacological modalities available for acute-pain management
 - E. Provide adequate pain relief for uncomplicated patients with acute pain
 - F. Identify and refer patients with acute pain who can benefit from specialized pain services

8. Occupational hazards of healthcare workers (HCW): At the end of the Learning Unit, you should be able to:
- A. Recognize the common sources and risk factors of occupational hazards among HCW
 - B. Describe common occupational hazards in the workplace
 - C. Develop familiarity with legal and regulatory frameworks governing occupational hazards among HCW
 - D. Develop a proactive attitude to promote workplace safety
 - E. Protect yourself and colleagues against potential occupational hazards in the workplace
9. Chronic-pain management: At the end of the Learning Unit, you should be able to:
- A. Review biopsychosocial and physiological bases of chronic pain perception
 - B. Discuss various pharmacological and non-pharmacological options available for chronic pain management
 - C. Provide adequate pain relief for uncomplicated patients with chronic pain
 - D. Identify and refer patients with chronic pain who can benefit from specialized pain services
10. Patient advocacy: At the end of the Learning Unit, you should be able to:
- A. Define patient advocacy
 - B. Recognize patient advocacy as a core value governing medical practice
 - C. Describe the role of patient advocates in patient care
 - D. Develop a positive attitude towards patient advocacy
 - E. Be a patient advocate in conflicting situations
 - F. Be familiar with local and national patient-advocacy groups and share in volunteering activities
11. Ethical issues: transplantation and organ harvesting; withdrawal of care: At the end of the Learning Unit, you should be able to:
- A. Apply key ethical and religious principles governing organ transplantation and care withdrawal
 - B. Be familiar with the legal and regulatory guidelines regarding organ transplantation and care withdrawal
 - C. Counsel patients and families, under consideration of applicable ethical and religious principles



- D. Guide patients and families to make informed decisions
12. Ethical issues: treatment refusal; patient autonomy: At the end of the Learning Unit, you should be able to:
- A. Predict situations where a patient or family is likely to decline prescribed treatment
 - Describe the concept of t rational adult in the context of patient autonomy and treatment refusal
 - B. Analyze key ethical, moral, and regulatory dilemmas in treatment refusal
 - C. Recognize the importance of patient autonomy in the decision-making process
 - D. Counsel patients and families declining medical treatment considering the best interest of patients.
13. Role of doctors in death and dying: At the end of the Learning Unit, you should be able to:
- A. Recognize the important role a doctor can play during a dying process
 - B. Provide emotional as well as physical care to a dying patient and family
 - C. Provide appropriate pain management in a dying patient
 - D. Identify suitable patients and refer them to palliative care services

Part II: Core PN Specialty Topics:

1. Paroxysmal disorders

1.1. Epilepsy

1.1.1. Approach to patients with their first unprovoked seizure

1.1.2. Status epilepticus

1.1.3. Seizures Classification and semiology

1.1.4. Epilepsy Classification and terminology

1.1.5. Progressive myoclonic epilepsies-

1.1.6. Febrile seizures

1.1.7. Seizure mimicker

1.1.8. Anti-Seizures Medication

1.1.9. Epilepsy surgery

1.2. Headache

1.2.1. Approach to patients with headache

1.2.2. Headaches and other cranial pain

1.3. Syncope and paroxysmal disorders other than epilepsy

1.4. Sleep disorders

2. Metabolic and genetic disorders

2.1. Approach to patients with suspected metabolic disorders

2.2. Approach to patients with developmental delay

2.3. Approach to a patient presenting with developmental regression

2.4. Approach to a child with dysmorphia

2.5. White-matter disorders

2.6. Mitochondrial diseases

2.7. Inborn errors of urea synthesis

2.8. Diseases associated with primary abnormalities in carbohydrate metabolism

2.9. Glycosylation disorders

2.10. Lysosomal-storage disorders

2.11. Peroxisomal disorders



- 2.12. Channelopathies
- 2.13. Treatable metabolic disorders
- 2.14. Chromosome and chromosomal disorders
- 2.15. Neurocutaneous disorders
- 2.16. Genetic counseling and pedigrees
- 3. Neuromuscular disorders**
 - 3.1. Approach to patients with hypotonia
 - 3.2. Approach to acute weakness
 - 3.3. Disorders of the spinal cord and anterior horn cells
 - 3.4. Peripheral neuropathy
 - 3.5. Inflammatory neuropathies
 - 3.6. Disorders of the neuromuscular junction
 - 3.7. Muscular dystrophies
 - 3.8. Myopathies
- 4. Acquired CNS demyelinating disorders**
- 5. Stroke**
- 6. Congenital structural defects**
 - 6.1. Malformations of the CNS
 - 6.2. Neural tube defects
- 7. Perinatal neurological disorders**
 - 7.1. Hypoxic ischemic encephalopathy (HIE)
 - 7.2. Neonatal seizures
- 8. Neurodevelopmental and psychiatric disorders**
 - 8.1. Autism spectrum disorder
 - 8.2. Attention-deficit hyperactivity disorder
 - 8.3. Language and speech disorders
 - 8.4. Mood disorders
- 9. Disorders of balance and movement**
 - 9.1. Approach to ataxia
 - 9.2. Hereditary cerebellar ataxia

- 9.3. Approach to movements disorders
- 9.4. Cerebral palsy
- 9.5. Management of spasticity
- 10. Neoplasms of the nervous system and related topics**
 - 10.1. Neoplasms of the nervous system
 - 10.2. Paraneoplastic neurological disorders
- 11. Care for patients with neurological disorders**
 - 11.1. Pain management
 - 11.2. Neurological complications of systemic disorders
 - 11.3. Neurological rehabilitation
 - 11.4. Palliative care
- 12. Principles of critical care neurology**
 - 12.1. Approach to patients with altered consciousness levels
 - 12.2. Hydrocephalus
 - 12.3. Traumatic brain injury
 - 12.4. Spinal cord injuries
 - 12.5. Increased intracranial pressure
- 13. Toxic and nutritional disorders of the nervous system**
- 14. Basic neuro-ophthalmology**
- 15. Basic epidemiology and research**



Schedule of Core PN Specialty Topics by Year

PN2- PN3	PN4	PN5
1. Paroxysmal Disorders		
1.1. Epilepsy	1.1. Epilepsy	1.1. Epilepsy
1.1.1. Approach to patients with their first unprovoked seizure	1.1.1. Progressive myoclonic epilepsies	1.1.1. Epilepsy surgery
1.1.2. Status epilepticus	1.1.2. Seizure mimickers	1.1.2. Sleep disorders
1.1.3. Febrile seizures	1.1.3. Antiepileptic medications	
1.1.4. Seizure mimickers	1.2. Headache	
1.1.5. Antiepileptic medications	1.2.1. Headaches and other cranial pain	
1.2. Headache	1.3. Syncope and paroxysmal disorders other than epilepsy	
1.2.1. Approach to patients with headache		
2. Metabolic and genetic disorders		
2.1. Approach to patients with suspected metabolic disorders	2.1.White-matter disorders	2.1.Diseases associated with primary abnormalities in carbohydrate metabolism
2.2. Approach to patients with developmental delay	2.2.Mitochondrial diseases	2.2.Glycosylation disorders
2.3. Approach to a patient presenting with developmental regression	2.3.Inborn errors of urea synthesis	2.3.Lysosomal-storage disorders
2.4. Approach to children with Dysmorphia	2.4.Neurocutaneous disorders	2.4.Peroxisomal Disorders
	2.5.Genetic counseling and pedigrees	2.5.Channelopathies
		2.6.Treatable metabolic disorders
		2.7.Chromosome and chromosomal disorders

Schedule of Core PN Specialty Topics by Year		
PN2- PN3	PN4	PN5
		2.8.Neurocutaneous disorders
3. Neuromuscular disorders		
3.1. Approach to patients with hypotonia	3.1.Disorders of neuromuscular junction	3.1.Peripheral neuropathy
3.2. Approach to acute weakness	3.2.Muscular Dystrophies	3.2.Inflammatory Neuropathies
3.3. Disorders of the spinal cord and Anterior Horn Cells	3.3.Myopathies	
4. Acquired CNS demyelinating disorders		
	4.1 Acquired CNS demyelinating disorders	
5. Stroke		
5.1 Stroke		
6. Congenital Structural Defects		
6.1. Neural tube defects		6.1.Malformations of the CNS
7. Perinatal Neurologic Disorders		
7.1 Hypoxic Ischemic Encephalopathy	7.1 Neonatal Seizures	
8. Neurodevelopmental and psychiatric disorders		
	8.1. Autism spectrum disorder	8.1. Language and speech disorders
	8.2. Attention-deficit hyperactivity disorder	8.2. Mood disorders
9. Disorders of Balance and Movement		
9.1. Approach to ataxia	9.1. Hereditary cerebellar ataxia	9.1 Management of



Schedule of Core PN Specialty Topics by Year		
PN2- PN3	PN4	PN5
9.2. Cerebral palsy	9.2. Approach to movements disorders	spasticity
10. Neoplasms of the nervous system and related topics		
	10.1.Neoplasms of the nervous system	10.2.Paraneoplastic neurological disorders
11. Care for patient with neurologic disorders		
	11.1. Neurological rehabilitation	11.2. Pain management
		11.3. Neurological complications of systemic disorders
		11.4. Palliative care
12. Principles of critical care neurology		
12.1. Approach to patients with altered consciousness levels	12.2. Hydrocephalus	12.5. Increased intracranial pressure
	12.3. Traumatic brain injury	
	12.4. Spinal cord injuries	
13. Toxic and nutritional disorders of the nervous system		
		13.1. Toxic and nutritional disorders
14. Neuro-ophthalmology		
	14.1. Basic neuro- ophthalmology	
15. Epidemiology and research		
15.1 Basic epidemiology and research		

Approach to patients with their first unprovoked seizure

Learning objectives:

- Review the epidemiology of epilepsy.
- Be able to obtain comprehensive patient histories and perform physical examinations to differentiate between epileptic and non-epileptic events
- Evaluate patients presenting with their first unprovoked seizure
- Discuss risk factors for seizure recurrence

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Status epilepticus

Learning objectives:

- Identify patients in convulsive status epilepticus, or non-convulsive status epilepticus, based on medical history.
- Describe the etiologies and risk factors for generalized convulsive status epilepticus and how they are associated with patient prognosis.
- Understand the pathophysiology of status epilepticus and how it relates to treatment responsiveness and patient outcomes.
- Review common medical tests used in the evaluation and diagnosis of status epilepticus.
- Understand the medications used for status epilepticus, with respect to ease of use, side effects, and monitoring parameters.
- Discuss how to design a treatment algorithm and monitoring plan (efficacy and safety) for a patient with status epilepticus.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Progressive myoclonic epilepsies

Learning objectives:

- Define characteristics of progressive myoclonic epilepsies.
- Review different types of progressive myoclonic epilepsies.



- Review genetic aspects of progressive myoclonic epilepsies.
- Discuss how to evaluate patients with suspected progressive myoclonic epilepsies. Review the therapeutic aspects of progressive myoclonic epilepsies.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Febrile seizures

Learning objectives:

- Review the epidemiology of febrile seizures.
- Distinguish between simple and complex febrile seizures.
- Evaluate patients presenting with febrile seizures.
- Review risk factors for seizure recurrence and for developing epilepsy.
- Describe the complications of febrile seizures

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Seizure mimickers

Learning objectives:

- Increase familiarity with pediatric conditions commonly mistaken for seizures.

- Be able to obtain appropriate histories when a patient presents with seizure mimickers.
- Maintain an appropriate suspension index for epileptic activity.
- Use different modalities to diagnose seizure mimickers.
- Be able to counsel families about seizure mimickers.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Antiseizure medications(ASM)

Learning objectives:

- Understand the basic pharmacology of ASM.
- Describe the mechanisms, salient pharmacokinetic factors (that affect dosing), adverse effects, and therapeutic drug monitoring procedures of selected anticonvulsants.
- Discuss the clinical indications of ASM.
- Discuss the challenges in using ASM in patients with chronic illnesses.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 3 hours

Epilepsy surgery

Learning objectives:

- Define epilepsy surgery and review criteria for potential for surgery candidates.
- Discuss the process of the epilepsy surgery evaluation and the latest in imaging advances.
- Discuss the results of the latest epilepsy surgery clinical trials.
- Discuss the technological advances in epilepsy surgery.
- Discuss the various modalities of epilepsy surgery.
- Review common surgery complications and potential patient deficits following surgery.

Presentation format: interactive lectures, case discussions, and quizzes



Duration: 2 hours

Approach to patients with headache

Learning objectives:

- Differentiate between primary and secondary headaches
- Identify and evaluate the causes of dangerous headaches.
- Recognize the most common primary headache types.
- Understand the basic approach to the management of common headache types.
- Understand the pathophysiology of common headache types.
- Develop neurological exam skills relevant to examination of patients with headache.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Headaches and other cranial pain

Learning objectives:

- Be familiar with the cranial structures that are sensitive to pain, and associated with sudden, chronic, and recurring headaches.
- Identify the types of pain indicative of potentially serious intracranial lesions and relevant causes.
- Recognize other neurological syndromes associated with cranial pain.
- Describe the indications for performing neuroimaging procedures in managing headaches in patients.
- Describe management procedures for different types of headache, including acute and chronic.
- Identify headache-related triggers, risk factors, auras, and emergencies.
- Understand the difference between abortive and prophylactic medications.
- Prescribe appropriate medications, including abortive and prophylactic varieties, according to evidence-based guidelines.
- Treat status migrainosus.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Syncope and paroxysmal disorders other than epilepsy

Learning objectives:

- Understand the definition of syncope.
- Review the pathophysiology of syncope.
- Know basic etiologies of syncope.
- Know how to evaluate, treat, and manage high- and low-risk patients.
- Review paroxysmal dyskinesias.
- Review childhood periodic syndromes.
- Discuss other non-epileptic paroxysmal disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Sleep disorders

Learning objectives:

- Understand normal-sleep-cycle physiology
- Integrate screening tools to adequately screen for pediatric sleep disorders.
- Understand the treatment of sleep disorders.
- Recognize when to refer patients to pediatric sleep clinics.
- Improve quality of life in children and families by counseling them on the value of proper sleep and sleep hygiene.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Approach to patients with suspected metabolic disorders

Learning objectives:

- Recognize the signs and symptoms suggestive of an inborn error of metabolism.



- Describe the characteristics of different classes of metabolic syndromes.
- Formulate a logical diagnostic approach to determine which specific condition is present when an inborn error of metabolism is suspected.
- Delineate the value and scope of newborn screening programs.
- Be aware of treatment modalities for inborn errors of metabolism.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Approach to patients with developmental delay

Learning objectives:

- Review normal development and normal variations.
- Define various terms used in developmental delays.
- Identify children with developmental delays.
- Understand the causes and prevalence of developmental delays.
- Utilize the proper approach to treat a child with developmental delay.
- Describe the medical, educational, social, and life-skill needs of a child with developmental delay.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Approach to a patient presenting with developmental regression

Learning objectives:

- Review different diseases that present with developmental regression.
- Create a genetic differential diagnosis for a patient presenting with developmental regression.
- Select appropriate genetic and metabolic tests to evaluate a patient presenting with developmental regression.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Approach to children with dysmorphia

Learning objectives:

- Define terms routinely used to describe birth defects.
- Describe the impact of malformations.
- Identify the difference between major and minor anomalies.
- Describe the therapeutic approach to an individual with dysmorphia: suspicion and analysis, systematic physical examination, and appropriate investigations.

Presentation format: interactive lectures, case discussions, and quizzes



Duration: 2 hours

White matter disorders

Learning objectives:

- Describe the important clinical, biochemical, and pathological features of white-matter disorders in children.
- Develop a framework for appropriately diagnosing white-matter disorders in children.
- Recognize the important features of leukodystrophy visible on MRI in children.
- Distinguish between normal and abnormal findings in white matter visible by MRI in children.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Mitochondrial diseases

Learning objectives:

- Explain the basics of mitochondrial disease.
- Illustrate the symptoms of mitochondrial disease.
- Recognize the red-flag symptoms of mitochondrial disease.
- Demonstrate how to evaluate a mitochondrial disease.
- Review current therapies to treat mitochondrial diseases.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Inborn errors of urea synthesis

Learning objectives:

- Review the urea cycle.
- Understand the clinical descriptions of urea-cycle disorders.
- Review the common clinical presentations of urea-cycle disorders.
- Differential diagnoses of patients presenting with hyperammonemia.

- Evaluation and treatment of urea-cycle disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Diseases associated with primary abnormalities in carbohydrate metabolism

Learning objectives:

- Review carbohydrate metabolism.
- Review abnormalities in galactose metabolism.
- Review abnormalities in fructose metabolism.
- Review glycogen storage diseases
- Describe differential diagnoses of patients presenting with carbohydrate metabolism disorders.
- Evaluation and treatment of carbohydrate metabolism disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Glycosylation disorders

Learning objectives:

- Review the types of glycosylation.
- Review congenital glycosylation disorders
- Know when to suspect and test for congenital glycosylation disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Lysosomal storage disorders

Learning objectives:

- Understand lysosome physiology
- Describe the pathophysiology of lysosomal storage disorders.
- Discuss different types of lysosomal storage disorders.
- Discuss evaluation procedures for lysosomal storage disorders.



- Understand pharmacological and non-pharmacological management strategies for lysosomal storage disorders.
- Understand the roles of umbilical cord blood transplantation, enzyme replacement therapies, and gene therapies in lysosomal storage disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Peroxisomal disorders

Learning objectives:

- Understand Peroxisome structure and function.
- Describe the classification of peroxisomal disorders.
 - Conditions resulting from defective peroxisome biogenesis
 - Conditions resulting from defects in single peroxisomal enzymes
- Discuss the evaluation and management of peroxisomal disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Channelopathies

Learning objectives:

- Describe the physiology of different ion channels.
- Review the common channelopathies encountered in neurology practice.
- Review the classification of channelopathies.
- Review inherited channelopathies.
- Describe autoimmune channelopathies.
- Differentiate between inherited and acquired channelopathies.
- Review management of channelopathies.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Treatable metabolic disorders

Learning objectives:

- Early recognition of signs and symptoms of metabolic disorders.
- Review of different types of treatable metabolic disorders.
- Become aware of the importance of neonatal screening, the scope of the current Saudi Arabia screening program, and the diseases it diagnoses.
- Review available therapeutic modalities.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Chromosome and chromosomal disorders

Learning objectives:

- Learn the components and parts of a chromosome.
- Define the terms karyotype, autosomal chromosomes, and sex chromosomes.
- Review the methods of chromosome analysis.
- Describe the terms used to describe abnormalities in chromosome numbers.
- Describe the terms that describe abnormalities in chromosomal structure.
- Recognize the common autosomal and sex-chromosome disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neuro-cutaneous disorders

Learning objectives:

- Become familiar with the various neuro-cutaneous syndromes and their differentiation.
- Highlight the distinct clinical features of neuro-cutaneous syndromes with various photographs and medical images.
- Overview the genetics and pathophysiology of neuro-cutaneous syndromes.



Presentation format: interactive lectures, case discussions, and quizzes

Duration:

2 hours

Genetic counseling and pedigrees

Learning objectives:

- Analyze a pedigree and determine modes of inheritance.
- Appropriately determine carrier tests to offer based on ethnic risks.
- Explain trinucleotide-repeats as basis for genetic disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Approach to patients with hypotonia

Learning objectives:

- Characterize the distinguishing features of hypotonia and muscle weakness.
- Describe the differences between central and peripheral causes of hypotonia.
- Generate differential diagnoses of hypotonia in infants.
- Discuss the appropriate medical and genetic evaluation procedures for hypotonia in infants.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Clinical approach to acute weakness

Learning objectives:

- Review how to localize lesions at different levels of the nervous system.
- Discuss differential diagnoses of acute weakness.
- Review the diagnostic approach for a patient with acute weakness.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours



Disorders of the spinal cord and anterior horn cells

Learning objectives:

- Review the approach to spinal-cord-lesion localization.
- Describe different types of disorders affecting the spinal cord and anterior horn cells, including:
 - Inherited disorders: metabolic, structural, and degenerative disorders
 - Compressive disorders
 - Non-compressive disorders, including: infectious, vascular, and metabolic disorders
- Discuss how to evaluate patients with spinal cord and anterior horn cell disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Peripheral neuropathy

Learning objectives:

- Recognize the clinical presentation of peripheral neuropathy in children and adolescents.
- Differentiate the causes and presentation of inherited and acquired neuropathies in childhood.
- Review available diagnostic tests used to assess peripheral neuropathies.
- Discuss how to counsel patients regarding vaccine risks and neuropathy.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Inflammatory neuropathies

Learning objectives:

- Review the clinical findings, symptoms, and risk factors associated with Guillain- Barré syndrome (GBS) diagnosis, including the risk related to the seasonal influenza vaccine.
- Discuss differences in the efficacy and tolerability of inflammatory neuropathy treatments; the treatment costs of intravenous immunoglobulin (IVIg) and corticosteroids will also be considered.

- Review the different treatment modalities for GBS.
- Discuss the need for supportive therapies for patients with GBS.
- Review treatment regimens for patients with chronic inflammatory demyelinating polyradiculoneuropathy.
- Discuss the use of IVIG, steroids, and other methods of immune modulation in treating inflammatory neuropathies.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Disorders of the neuromuscular junction

Learning objectives:

- Review the anatomy and physiology of the neuromuscular junction.
- Describe the role of acetylcholinesterase at the neuromuscular junction.

- Describe several diseases that can develop via neuromuscular junction malfunctions, including myasthenia gravis, congenital myasthenia gravis, Lambert Eaton myasthenic syndrome, and toxins affecting the neuromuscular junction.
- Discuss how to evaluate patients with neuromuscular junction disorders.
- Describe effective management of neuromuscular junction disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Muscular dystrophies

Learning objectives:

- Describe different types of muscular dystrophies, including:
 - Progressive muscular dystrophy
 - Duchenne muscular dystrophy (diagnosis and treatment)
 - Becker's muscular dystrophy (diagnosis and treatment)
 - Emery-Dreifuss dystrophy (diagnosis and treatment)
 - Facioscapulohumeral dystrophy
 - Scapuloperoneal syndrome
 - Oculopharyngeal dystrophy
 - Congenital muscular dystrophies
 - Myotonic dystrophy
 - Limb-Girdle muscular dystrophies
- Discuss how to evaluate patients with muscular dystrophy.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Myopathies

Learning objectives:

- Review different types of myopathies, including inflammatory, metabolic, and congenital variants.
- Understand the broad differential diagnoses for myopathies.
- Describe the histological findings of different types of myopathies.
- Review the diagnostic tools and treatments available for myopathies.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Clinical approach to patients with hypotonia

Learning objectives:

- Characterize the distinguishing features of hypotonia and muscle weakness.
- Describe the differences between central and peripheral causes of hypotonia.
- Generate a differential diagnosis of hypotonia in infants.
- Discuss the appropriate medical and genetic evaluation procedures for hypotonia in infants.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours



Disorders of the spinal cord and anterior horn cells

Learning objectives:

- Localization of spinal cord lesions.
- Describe different types of disorders affecting the spinal cord and anterior horn cells, including:
 - Heredodegenerative disorders
 - Compressive disorders
 - Non-compressive disorders, including infectious, vascular, and metabolic disorders
- Describe how to evaluate patients with disorders of the spinal cord and anterior horn cells.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Stroke

Learning objectives:

- Review the clinical presentations of stroke in neonatal and pediatric patients.
- Review stroke pathophysiology.
- Discuss the initial evaluation of patients with stroke to stabilize vital signs, determine the presence of intracranial hemorrhage, and (in patients with ischemic stroke) decide if thrombolytic therapy is warranted.
- Discuss how to develop a hypothesis of stroke etiology based on patient history, physical examination, and initial brain-imaging studies.
- Describe the clinical approach to patients with stroke.
- Discuss stroke prevention.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Acquired CNS demyelinating disorders

Learning objectives:

- Identify the presenting clinical symptoms of acquired CNS demyelinating

disorders in children and adolescents (including acute disseminated encephalomyelitis, clinically isolated syndromes, pediatric multiple sclerosis, transverse myelitis, and neuromyelitis optica).

- Differentiate acquired CNS demyelinating disorders from others that can mimic the same presentations in children and adolescents.
- Discuss appropriate options for treatment of acute clinical demyelinating events, as well as options for pediatric disease-modifying therapies.
- Identify changes visible by neuroimaging that characterize acquired demyelinating disorders in children and adolescents.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Malformations of the CNS

Learning objectives:

- Identify and define the different stages of CNS development.
- Define developmental defects and discuss etiological agents and the pathogenesis of neurological developmental defects.



- Discuss and compare characteristics of the Arnold-Chiari and Dandy-Walker malformations.
- Discuss the pathology, pathogenesis, and clinical sequelae of the following: polymicrogyria, megalencephaly, microcephaly, heterotopias, holoprosencephaly, and agenesis of the corpus callosum.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neural tube defects

Learning objectives:

- Review nervous system development and the organization of the postembryonic nervous system.
- Describe the developmental organization of the nervous system, ranging from neural tube development to that of the longitudinal tracts.
- Identify the disorders that result from neural-tube defects.
- Describe the management and prevention of neural-tube defects.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Hypoxic ischemic encephalopathy (HIE)

Learning objectives:

- Describe the etiology of HIE.
- Describe the criteria used to diagnose HIE.
- Review the clinical-severity grading method for HIE.
- Discuss the pathophysiology of post-hypoxic brain injury.
- Discuss the assessment tools available to evaluate infants with HIE.
- Review the role, indications, and application of hypothermia in HIE.
- Review the latest literature on the use of neuroprotective agents.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neonatal seizures

Learning objectives:

- Define seizures and differentiate between epileptic and non-epileptic forms.
- Review the incidence of neonatal seizures.
- Describe the four types of seizures and their clinical pictures.
- Identify benign movements that are not characterized as seizures.
- Review the causes of neonatal seizures.
- Discuss neonatal seizure evaluation.
- Discuss neonatal seizure treatment.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Autism spectrum disorder (ASD)

Learning objectives:

- Review the neurobiology, clinical features, and epidemiology of ASD. Discuss the diagnostic criteria of ASD.
- Differentiate between autism and other neurobehavioral and neurodevelopmental disorders, such as attention-deficit hyperactivity disorder (ADHD), language delay, and Landau-Kleffner syndrome.
- Discuss the management principles for pediatric patients with ASD. Review clinical and laboratory evaluations of children with ASD.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Attention-deficit hyperactivity disorder (ADHD) Learning objectives:

- Review the diagnostic criteria and epidemiology of ADHD. Review the neurobiology of ADHD.
- Differentiate between common differential ADHD diagnoses.
- Discuss common comorbidities associated with ADHD.
- Discuss principles of management and outcome in ADHD.



Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Language and speech disorders

Learning objectives:

- Describe key milestones in language and speech development.
- List indications for further evaluation of language and speech delays.
- Differentiate between various types of language and speech disorders.
- Generate a differential diagnosis for language and speech delays.
- Discuss language and speech disorder treatment.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Mood disorders Learning objectives:

- Review the epidemiology of mood disorders in children and adolescents. Recognize the signs and symptoms of mood disorders.
- Describe the various types of mood disorders.
- Learn about integrated care for youth with mood disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Clinical approach to ataxia

Learning objectives:

- Identify the different systems that, if affected, may cause ataxia.
- Recognize the role of clinical history and neurological examination in differentiating pediatric ataxia secondary to cerebellar, sensory, or vestibular lesions from functional ataxia.
- Develop a differential diagnosis along with a laboratory and radiological evaluation plan for ataxia.
- Identify common etiologies of the different ataxia types in children, with emphasis of treatable causes.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Hereditary cerebellar ataxia

Learning objectives:

- Review clinical manifestations of cerebellar disorders.
- Review the molecular genetics of hereditary cerebellar ataxia. Generate differential diagnoses of hereditary cerebellar ataxia. Review relevant genotypes and molecular diagnosis.
- Discuss currently available and future treatments.



Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Clinical approach to movement disorders

Learning objectives:

- Review the neuroanatomy of movement.
- Recognize the different types of abnormal movements. Generate an appropriate differential diagnosis.
- Choose and prioritize the most appropriate diagnostic tools to efficiently evaluate and accurately diagnose a patient with a movement disorder.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Cerebral palsy

Learning objectives:

- Review the definition and epidemiology of cerebral palsy. Review common causes of different cerebral palsy types. Differentiate between different cerebral palsy types.
- Describe the factors associated with outcome in cerebral palsy.
- Describe the disabilities that are most likely to be associated with cerebral palsy. Describe a multidisciplinary approach for managing patients with cerebral palsy.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 3 hours

Management of spasticity

Learning objectives:

- Understand the neurophysiology of spasticity.
- Describe the consequences of upper- and lower-extremity spasticity.
- Identify rehabilitation techniques and devices to optimize function and quality of life in patients with spasticity.
- Explain medical and surgical treatment options for spasticity.
- Discuss strategies for combining treatment options to address the individual needs of patients with spasticity.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neoplasms of the nervous system

Learning objectives:

- Discuss the relative incidence and locations of the major types of primary and secondary brain tumors.
- Describe the general clinical presentations of brain and spinal cord tumors.
- List the advantages and limitations of different diagnostic tools used to evaluate brain and spinal cord tumors.
- Describe the surgical indications for the most common benign and malignant tumors.
- Describe the indications for and the differences between radiotherapy and radiosurgery for treating malignant brain tumors.
- Describe the major differences between the diagnosis and management of brain and spinal cord tumors and abscesses.



Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Paraneoplastic neurological disorders

Learning objectives:

- Identify the symptoms of paraneoplastic neurological disorders (PNDs), and, when appropriate, include PNDs in differential diagnoses while evaluating patients with systemic cancers.
- Describe the relationship between paraneoplastic antibodies and specific syndromes (when present) and their role in PND diagnosis.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Pain management

Learning objectives:

- Discriminate between physiological and neuropathic pain categories.
- Describe the four processes involved in nociception, and how pain intervention functions during each process.
- Describe how the physical, mental, spiritual, and social features of pain contribute to related concepts, such as pain tolerance, suffering, and pain behavior.
- Identify, collect, and analyze subjective and objective data when assessing pain. Individualize a pain-treatment plan based on clinical and personal goals.
- Describe the pharmacological interventions for pain.
- Identify the risks and benefits of various analgesic delivery routes and technologies.
- Describe non-pharmacological pain control interventions.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Neurological complications of systemic disorders

Learning objectives:



- Describe, diagnose, and treat the various neuromuscular complications of diabetes mellitus and other endocrine disorders.
- Recognize and address the myriad neurological issues that can arise in a patient with sepsis to best preserve neurological function.
- Identify the various neurological complications of drug abuse.
- Recognize the many neurological complications that can arise from underlying rheumatologic disorders.
- Describe and manage the myriad neurological complications resulting from acute or chronic liver disease.
- Describe and manage the myriad neurological complications resulting from acute or chronic renal disease.
- Recognize the many neurological complications that can arise from underlying neoplastic disorders and describe their treatment.
- Recognize the many neurological complications resulting from immunization.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neurological rehabilitation

Learning objectives:

- Describe the principles, processes, and practice of clinical rehabilitation.
- Describe and apply teamwork principles and concepts in clinical rehabilitation.
- Develop skills to plan, implement, and evaluate rehabilitation plans in patient- centered care of neurological diseases.
- Understand the assessment and management of a variety of neurological conditions in the area of neurological rehabilitation.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Palliative care Learning objectives:

- Describe pediatric palliative care core concepts.
- Recognize, describe, and appropriately utilize the full scope of healthcare systems and professionals available to improve patient quality of life.
- Understand the communicative process at all levels of palliative care, including communication with the patient, family, and interdisciplinary team.
- Understand ethical and cultural considerations in pediatric palliative care.
- Recognize palliative care emergencies and their management.
- Anticipate and approach common clinical challenges at end of life.
- Understand the challenging aspects of grief, loss, and bereavement for children and families.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Approach to patients with altered consciousness levels

Learning objectives:

- Define alterations in consciousness levels.
- Identify the pathophysiology of altered consciousness levels.

- Recognize and assess patients with altered consciousness, and localize potential causes using a brief neurological examination.
- Undertake early management of patients with altered consciousness.
- Manage specific conditions causing altered consciousness.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Hydrocephalus

Learning objectives:

- List common symptoms and signs of acute hydrocephalus in children.
- Define communicating and non-communicating hydrocephalus and describe the differences in their treatments.
- Describe the principles of hydrocephalus management.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 1 hour

Traumatic brain injury

Learning objectives:

- Undertake early head injury management.
- Define and detect secondary brain injury.
- Assess severe head injury.



- Develop a diagnostic approach for patients with acute traumatic brain injury.
- Review different types of traumatic intracranial lesions, and explain the differences between primary and secondary traumatic brain lesions.
- Treat severe head injury.
- Identify severe head injury complications and outcomes.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Spinal cord injuries

Learning objectives:

- Perform a comprehensive musculoskeletal and neurological examination.
- Create differential diagnoses appropriate for the physical findings.
- Diagnose physical, cognitive, and psychosocial impairments in patients with spinal cord injuries.
- Describe current pharmacological treatments for acute spinal cord injury.
- Identify the rationale for surgical treatment of acute spinal injuries.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Increased intracranial pressure (ICP)

Learning objectives:

- Understand the relationship between Intra Cranial Pressure, Blood Pressure, Cerebral Perfusion Pressure, and cerebral blood flow.
- Recognize the clinical signs and symptoms of elevated ICP.

- Describe major types of herniation syndromes and relevant signs and symptoms.
- Describe the major techniques used to reduce elevated ICP and their mechanisms of action.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Toxic and nutritional disorders of the nervous system

Learning objectives:

- Review nutritional deficiencies and their associated effects on the nervous system. Review acquired metabolic disorders and related toxins.
- Review neurotoxic agents.
- Understand drug and substance abuse.
- Evaluate and manage patients presenting with intoxication. Presentation format: interactive lectures, case discussions, and quizzes Duration: 2 hours

Basic neuro-ophthalmology

Learning objectives:

- Review the anatomical structures involved in the visual pathways or eye- movement disorders relevant to the neuro-ophthalmologist.
- Describe a systemic approach to treat patients with common neuro-ophthalmological complaints.
- Discuss the use of appropriate tests and imaging procedures used to diagnose and manage neuro-ophthalmological disorders.
- Review how to assess eye movement disorders in relation to the visual and ocular motor pathways.
- Localize lesions in the visual and ocular motor pathways.
- Describe the association between pupil and eyelid position and ocular motor pathology.
- Review the pathophysiology and management of diplopia and central eye movement disorders.
- Diagnose and manage the evaluation and treatment of common



neuro- ophthalmological disorders.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Basic epidemiology and research

Learning objectives:

- Describe and apply measures of disease incidence, prevalence, and effect.
- Explain the basic principles underlying different study designs, including descriptive, ecological, cross-sectional, cohort, case-control and intervention studies.
- Assess the strengths and limitations of different study designs.
- Identify problems associated with epidemiological data interpretation: chance, bias, confounding variables, and effect modification.
- Assess the strengths and limitations of different epidemiological data sources with respect to health status and health-service utilization.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Part II: Core Specialty Topics Workshops and Simulations

Core Specialty Topic Workshops and Simulations by Year		
PN2-PN3	PN4	PN5
Lumbar puncture and CSF pressure Measurement		Neuroradiology (Part 2)
Basic genetics and interpretations of genetic testing	Neuroradiology (part1)	Principles of nerve conduction studies and electromyogram
Neuroradiology	EEG basics and normal EEGs	Neuropathology of muscles
Developmental Assessment	Abnormal EEGs	Neuropathology of the nervous system
Neurophysiology: Evoked potentials		

Lumbar puncture and CSF pressure measurement

Learning objectives:

- Demonstrate appropriate aseptic technique.
- Demonstrate ways to avoid needle-stick injuries and describe the necessary actions in the event of an injury.
- Communicate with patients in a manner that reduces anxiety, provides necessary information, earns their trust, and ensures safe practice, including cultural considerations.
- Describe the relevant anatomy and physiology of the lumbar spine.
- Competently and confidently perform a lumbar puncture and measure CSF pressure.

- Collect appropriate CSF specimens.
- Describe the rationale for each step in the procedure.
- List potential problems that may be encountered, and how to manage them.
- Document procedural information in a way that ensures patient safety and meets quality standards.

Presentation format: interactive lectures and simulations

Duration: 2 hours

Developmental assessment

Learning objectives:

- Learn normal and abnormal developmental patterns observed in children.
- Recognize available clinical-practice assessment tools and their utility.
- Learn how to administer the Denver Developmental assessment tool (DDST).
- Practice DDST assessment on cases or video simulations.

Format: workshops and simulations

Duration: one-day workshop.

Basic genetics and interpretations of genetic testing

Learning objectives:

- Describe the structure, function, and replication of DNA and RNA. Describe gene structure, expression, and regulation.
- Describe the chromosomal basis of inheritance, and how alterations in chromosome number or structure result in disease.
- Describe Mendelian and non-Mendelian modes of inheritance. Understand of the role of genetic factors in health and disease.
- Explain genetic information in a manner understandable to families.
- Recognize the uses and limitations of genetic testing and the differences between testing and screening.
- Describe different types of genetic testing and how to interpret test results.

Presentation format: interactive lectures and simulations

Duration: 2 hours

Neuroradiology session

Learning objectives:

- Describe the basics of various neuroimaging modalities (CT, MRI, SPECT, etc.) Describe the diagnostic neuroimaging features of:
 - White matter disorders
 - Metabolic disorders
 - Trauma and stroke
 - Oncology
 - Structural malformations
 - Neuroimaging in epilepsy

Presentation format: interactive lectures, case discussions, and quizzes

Duration: multiple sessions

Electroencephalography: Basics and normal EEGs

Learning objectives:

- Review the basic principles of EEG
 - Explain the source of EEG
 - Define the principles of sensitivity, filters, time constants, and machine calibration
 - Discuss the rationale for using montages
 - Use bipolar and referential montages
 - Define the concept of polarity
 - Recognize localization rules
- Demonstrate how to troubleshoot bad EEG recordings Understand normal EEGs
 - Define a normal EEG background
 - Recognize sleep stages
 - Differentiate artifacts, including eye movements
 - Differentiate common benign EEG patterns

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours



Electroencephalography: Abnormal EEGs

Learning objectives:

- Recognize abnormal EEG patterns.
- Distinguish focal abnormalities.
- Differentiate epileptiform discharges.
- Categorize generalized abnormalities.
- Describe the clinical significance of EEG findings.
- Describe the role EEGs in a critical care setting.
- Describe the role of EEGs in assessing brain death criteria.
- Review neonatal EEGs.
- Write an EEG report.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Principles of nerve conduction studies and electromyography

Learning objectives:

- Develop better knowledge of PNS anatomy
- Develop better knowledge of nerve physiology and the compound motor action potential.
- Learn the basics of nerve Conduction Studies.
 - Sensory NCS
- Commit to memory normal adult values and sural, median and ulnar NCS techniques
 - Motor NCS
- Commit to memory normal adult values and median, ulnar, peroneal, and tibial NCS techniques
 - Late Responses
- F wave H wave A wave
- Blink reflex
- Repetitive nerve Stimulation Slow-rate (2 Hz)
- Fast -rate (30 Hz) Learn the basics of EMG.
 - Needle safety and universal precautions
 - Fibrillation potentials
 - Positive sharp wave potentials
 - Fasciculation
 - Normal vs. abnormal motor-unit potential morphology
 - Needle placement and technique
- NCSs and EMG patterns in different diseases.
 - Myopathies
 - Neuromuscular junction disorders
 - Peripheral neuropathies
 - Entrapment neuropathies
 - Plexopathies
- Radiculopathies Anterior horn cell diseases.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours



Neurophysiology: Evoked potentials

Learning objectives:

- Review the basic principles and normal and abnormal finding in the following:
 - Brainstem auditory evoked potentials
 - Visual evoked potentials
 - Somatosensory evoked potentials

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neuropathology of the muscle

Learning objectives:

- Review muscle fiber types and normal histology.
- Differentiate between myopathic and neurogenic processes, as visible by muscle histology.
- Review commonly used histochemical techniques and stains. Describe the pathology of inflammatory myopathies.
- Review the histological appearance of dystrophinopathies and other muscular dystrophies.
- Review the typical pathological features of common congenital myopathies.

- Review the histological features of common metabolic myopathies including glycogen-storage, lipid-storage, mitochondrial, and inclusion-body myopathies.

Presentation format: interactive lectures, case discussions, and quizzes

Duration: 2 hours

Neuropathology of the nervous system

Learning objectives:

- Review gross and microscopic examination procedures for the brain and spinal cord.
- Review common and special stains used in neuropathology.
- Review the pathological features of common brain tumors.
- Review the pathological features of CNS infections.
- Describe the pathological features of certain childhood diseases, including the following: Rasmussen encephalitis, subacute sclerosing panencephalitis, and CNS lupus.
- Review key features of common leukodystrophies encountered in children, such as Canavan disease, Krabbe and metachromatic leukodystrophies, and lysosomal storage diseases.

Presentation format: interactive lectures and case discussion, quizzes

Duration: 2 hours



ASSESSMENT

Purpose

- The purposes of trainee assessments during the residency are to: Support learning.
- Develop professional growth. Monitor progression.
- Judge competency and allow for certification. Evaluate the quality of the training program.

General Principles

- Judgments should be based on holistic profiling of a trainee, rather than individual traits or instruments.
- Assessment should be continuous in nature.
- The trainee and faculty must meet to review portfolios and logbooks once every two months, and at the end of a given rotation.
- Assessments should be strongly linked to PN Program curriculum and content.

Evaluations and assessments throughout the program are conducted in accordance with the Commission's training and examination rules and regulations. The process includes the following steps.

Annual Assessment

Continuous Appraisal

This assessment is conducted toward the end of each training rotation throughout the academic year and at the end of each academic year as a continuous assessment in the form of a formative and summative evaluation.

Formative Continuous Evaluation

To fulfill the CanMEDS competencies based on the end-of-rotation evaluation, the resident's performance will be jointly evaluated by relevant staff for the following competencies:

1. Performance of the trainee during daily work.

2. Performance and participation in academic activities.
 - Performance in a 10- to 20-min direct observational assessment of trainee-patient interactions. Trainers are encouraged to perform at least one assessment per clinical rotation, preferably near the end of the rotation. Trainers should provide timely and specific feedback to the trainee after each assessment of a trainee patient encounter.
3. Performance of diagnostic and therapeutic procedural skills by the trainee. Timely and specific feedback for the trainee after each procedure is mandatory.
4. The CanMEDS-based competencies end-of-rotation evaluation form must be completed within 2 weeks after the end of each rotation (preferably in electronic format) and signed by at least two consultants. The program director will discuss the evaluation with the resident, as necessary. The evaluation form will be submitted to the Regional Training Supervisory Committee of the SCFHS within 4 weeks after the end of the rotation.
5. The assessment tools used, can be in the form of an educational portfolio (i.e., monthly evaluation, rotational Mini-CEX*, long case assessment CBDs, ** DOPS, *** and MSF****).
6. Academic and clinical assignments should be documented on an annual basis using the electronic logbook (when applicable). Evaluations will be based on accomplishment of the minimum requirements for the procedures and clinical skills, as determined by the program.

*Clinical evaluation exercises

**Case-based discussions

***Direct observation of practical skills

****Multisource feedback

Summative Continuous Evaluation

This is a summative continuous evaluation report prepared for each resident at the end of each academic year. The report may also involve the result of clinical examination, oral examination, objective structured practical examination (OSPE), objective structured clinical examination (OSCE), and international in training evaluation exam



End-of-Year Examination

The end-of-year examination will be limited to R1, R2, R3 and R4. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are posted on the commission website: www.scfhs.org.sa

Principles of Pediatric Neurology Examination (Saudi Board Examination: Part I)

This written examination, which is conducted in multiple choice question is held at least once a year. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and Examination details and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)

In addition to approval of the completion of clinical requirements (resident's logbook) by the local supervising committee, FITER is also prepared by program directors for each resident at the end of his or her final year in residency (R5). This report may also involve clinical examinations, oral examinations, or other academic assignments.

Final Pediatric Neurology Board Examination (Saudi Board Examination: Part II)

The final Saudi Board Examination comprises two parts.

Written Examination

This examination assesses the trainee's theoretical knowledge base (including recent advances) and problem-solving capabilities with regard to the specialty of Pediatric Neurology. It is delivered in multiple choice question formats and held at least once a year. The number of exam items, exam format, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

Clinical Examination

This examination assesses a broad range of high-level clinical skills, including data collection, patient management, communication, and counseling skills. The examination is held at least once a year, preferably in an OSCE format in the form of patient management problems (PMPs). The exam eligibility, format, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprints are published on the commission website: www.scfhs.org.sa

Certification

Certificates of training completion will only be issued upon the resident's successful completion of all program requirements. Candidates passing all components of the final specialty examination are awarded the "Saudi Board in Pediatric Neurology" certificate.

Important

Pediatrics Segment of the SBPN Program (PN1)

1st year trainees (PN1)

- Residents in year PN1 will follow the rule and regulations of the Saudi Board General Pediatrics Program.
- Residents must pass the first Part of the Saudi Board Examination in Pediatric Neurology for admittance to PN4 trainee.

Formative Assessment (2024-2025)

Gen./ Sub.	Level	Knowledge					Skills							Attitude
		SOE	EYPT-n't	Academic Activities	CBD	EYPT-Local	OSCE /OSPE	Research	DOPS	Logbook	Volunteering	Other	Mini-CEX	ITERS
Pediatric Neurology	R1	*	*	*	*	*	*	*	*	*	*	*	*	*
	R2	*	*	✓	✓	✓	*	✓	*	✓	✓	*	✓	✓
	R3			✓	✓	✓	✓	✓		✓	✓		✓	✓



	R4			✓	✓	✓	✓			✓	✓		✓	✓
	R5			✓	✓			✓		✓	✓		✓	✓

*R1: trainees are required to fulfil the General Pediatrics criteria of promotion in all assessment tools to be promoted (See Pediatric FA 2024-2025).

SOE: Structured Oral Exam skills

CBD: Case-based Discussion

DOPS: Direct observation of procedural

Mini-CEX: Mini-Clinical Evaluation exercise

EYPT-Local: promotion exam or progress test

EYPT-n't: International Exams

OSCE: Objective Structured Clinical Examination

Description Table of Formative Assessment Tools

Learning Domains	Assessment Tool	Requirements
Knowledge	SOE	Trainees are required to take the SOE. Results are for formative feedback. will be implemented according to EYPT.
	Academic Activities	R1-R5: Trainees are required to attend the academic half day. R1-R5: Educational Activities: • Trainees are required to attend Journal clubs • Trainees are required to take quizzes Attendance should be more than 75%
	CBD	R2-R5: Trainees are required to complete a minimum of six CBD/ Academic year. Results on forms are for formative feedback purposes and improvement in performance
	EYPT- Local	R1: according to General Pediatric program regulations. R2 – R4: Detailed Exam Blueprint and is attached.
Skills	OSCE/OSPE	Trainees are required to take the OSCE. Results are for formative feedback. will be implemented according to EYPT.
	Research	<u>R3-R5: Trainees are required to :</u> R2 – Attendance of research methodology course R3- Proposal writing and IRB approval R4 – Data Collection R5- Writing initial manuscript (preferably published or submitted to journal) and presenting in front of a committee
	Logbook	According to Logbook criteria (see attached)
	Volunteering	10 volunteering hours (certificate should be presented to Program director)
	Mini-CEX	Trainees are required to complete a minimum of six Mini-CEX/ Academic year. Results on forms are for formative feedback purposes and improvement in performance
Attitude	ITER	ITERs must be completed fulfilling its requirements following SCFHS regulations.

Important Notice: The supervisor's evaluation represents the aggregate of four components shown in the tables. The supervisor's evaluation should include all positive and negative remarks regarding the resident's performance that justifies promotion or otherwise.

Evaluation Item	Content
Supervisor Evaluation	- Center academic activities
	- Combined half-day teaching
	- Multisource Evaluation
	- Portfolio and logbook

5th year trainee (PN5)

- PN5 trainees are exempted from the annual promotion examination. However, they will have to complete the following requirements to receive the certificate of SBPN training completion prior to admittance to the final SBPN board examination.
- All of the following requirements must be met:
 - Demonstration of satisfactory achievement on the ITER.
 - Completion of the PN logbook.
 - Submission and approval of a research project to the Research Committee.
- Demonstration of satisfactory FITER form, which is completed by the Program Director.

APPENDIX

ASSESSMENT TOOLS

Pediatric Neurology In-Training Evaluation Report: ITER

- The Rotation Supervisor must complete an ITER for each resident at the end of each rotation.
- The resident must sign each ITER promptly in acknowledgement of the

fact that he/she has reviewed the ITER.

- The resident may insert any comments above his or her signature. Signing the ITER does not indicate agreement with, or acceptance of, ITER content, and has no impact the resident's right to appeal the ITER issued at the end of the rotation.
- Routine mid-point evaluations are strongly encouraged, and are required when a Resident's performance is considered unsatisfactory at the mid-point of a rotation. The Rotation Supervisor must meet with the resident to provide detailed feedback in connection with a mid-point evaluation, including a written summary of the identifies deficiencies in the resident's performance. The resident must acknowledge, on the written summary, or elsewhere in writing, that the deficiencies were discussed.
- At the conclusion of the rotation, the Clinical and/or Rotation Supervisor must meet with the resident to provide detailed feedback in connection with the ITER. In the case of an unsatisfactory and/or Borderline ITER, details of the resident's deficiencies should be expressly noted on the ITER, and discussed with the resident.

Pediatric Neurology In-Training Evaluation Report (ITER)

Name:	Institute:
	Rotation Evaluated:
Level: R1 ☐ R2 ☐ R3 ☐ R4 ☐ R5 ☐	From: ----/----/---- To: ----/----/----

Medical Expert

Skills	Not Evaluated	Unsatisfactory < 5	Below Average 5	Average 6-7		Above Average 8	Excellent 9-10	
		< 5	5	6	7	8	9	10

Possesses advanced basic scientific knowledge relevant to PN (including anatomy, embryology, physiology and pathology).								
Possesses clinical expertise relevant to PN (including normal and abnormal development, diagnosis and treatment of common neurological conditions, and the utility and toxicity of commonly used neuro-pharmacologic agents).								

Skills	Not Evaluated	Unsatisfactory < 5	Below Average 5	Average 6-7	Above Average 8	Excellent 9-10
Is able to elicit and present a medical history in an organized manner (including succinct summarization in some areas and expansion of detail in others, where appropriate).						
Demonstrates expertise with individual procedures of neurological examination in children of different ages.						
Is able to anatomically localize a focal neurological process.						

Demonstrates advanced knowledge in neuroimaging study (CT/MRI) interpretation.								
Demonstrates expertise in performing lumbar puncture with manometry.								

Skills	Not Evaluated	Unsatisfactory < 5	Below Average 5	Average 6-7		Above Average 8	Excellent 9-10	
Displays advanced knowledge of the utility and limits of neurodiagnostic evaluations (including CT, MRI, EEG, EMG, EVP, metabolic, genetic and histopathological studies).								
Generates an extensive differential diagnosis and appropriate plan of investigation for both common and rare presenting pediatric neurological problems.								
Displays an advanced knowledge of the various forms of treatment for pediatric neurological disorders.								

Communicator

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	XCELLENT	
		< 5	5	6	7	8	9	10
Establishes a therapeutic relationship with patients and families. Conveys empathy and/or reassurance when appropriate.								
Communicates collegially and inclusively with other healthcare professionals.								
Is able to provide education and counseling to families while avoiding excessive use of jargon.								
Prepares documentation that is accurate and timely (e.g., written progress notes, dictations, etc.).								



Collaborator

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	EXCELLENT	
		< 5	5	6	7	8	9	10
Interacts effectively with health professionals by recognizing and acknowledging their roles and expertise.								
Participates fully in team discussions, consistently offering his/her experience and insights for the benefit of others.								

Manager

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	EXCELLENT	
		< 5	5	6	7	8	9	10
Makes competent use of information technology.								
Shows an awareness of cost- benefit considerations in patient-care decisions.								
Is able to effectively delegate tasks to junior residents and students, and, where needed, provide supervision in the completion of such tasks.								



Health Advocate

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	EXCELLENT	
		^ 5	5	6	7	8	9	10
Recognizes and responds appropriately to situations that require advocacy on behalf of patients with respect to the social, educational, and economic factors that may adversely affect their health.								

Scholar

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	EXCELLENT	
		^ 5	5	6	7	8	9	10
Demonstrates an understanding of, and a commitment to, the need for continuous learning. Develops and implements an ongoing and effective personal learning strategy.								
Critically appraises medical information. Successfully integrates information from a variety of sources.								
Demonstrates the ability to present a relevant topic in a comprehensive and authoritative manner to one's colleagues.								
Takes advantage of opportunities to teach peers and students.								



Professionalism

Skills	Not Evaluated	Unsatisfactory	Below Average	AVERAGE		Above Average	EXCELLENT	
		< 5	5	6	7	8	9	10
Demonstrates honesty, respect, and compassion.								
Demonstrates an awareness of personal limitations, seeking advice when necessary.								
Actively seeks feedback on personal performance.								
Demonstrates an awareness of the principles of medical ethics and their application to clinical practice.								

Was a Mid-Rotation Assessment done?	YES	NO
Was input sought from other faculty, allied health team members, patients, and families?	YES	NO
IF YES, WHO?		
ROTATION EVALUATION: (70%)		
END OF ROTATION CLINICAL EXAM: (30%)		
(At the end of rotation, the resident should take long- and short-term case exams. The final grade will be out of 30%.)		
TOTAL SCORE: (100%)		
Evaluator(s):	1	
	2	
	3	
Program Director:		
Resident:		
Supervisory Resident Training Program Committee		
Should the resident repeat the rotation?	Y/N	
IF YES TO BE EXPLAINED IN AN ATTACHED SHEET.		



Case-Based Discussion(CBD):

- All residents must complete 6 CBD during the academic year; one of them should be during the exchange rotation.
- Objectives: to assess the to:
 - Conduct a comprehensive history
- Perform a condition neurological relevant the
 - Demonstrate the ability to synthesize an appropriate evaluation and management plan
- Format: the PN resident will be given a case or patient, either in an acute- or ambulatory-care setting. The resident will be supervised by a teaching faculty member during the entire session. The resident may perform as many cases as he or she wishes during an academic year.
- In the event of any difficulties preventing completion, the resident must notify the Program Director. (In case of the exchange rotation, he or she should notify the institutional Program Director).
- A minimum of 6 complete CBD are MANDATORY for promotion to the next training level. Failure to complete this step will prevent residents from entering the promotion exam; thus, they will be required to repeat the year. The resident is encouraged to perform additional long-term case examinations each academic year, but is only required to submit three cases, which should be conducted by different examiners.

Mini-Clinical Evaluation Exercise (MINI-CEX)

- The Mini-CEX is a 1015 minute direct observation assessment () of a particular trainee-patient interaction.
 - All residents must complete 6 MINI-CEX during the academic year
 - Clinical skills evaluated:
 - Medical interviewing
 - Physical examinations
 - Informed decision making and counseling.
 - Clinical judgment and reasoning.
- The Mini-CEX will be graded using the following categories: Satisfactory, Unsatisfactory, or Superior.
- The Mini-CEX should be viewed as an excellent opportunity for trainees to gain structured feedback from their consultants about their progress. Faculty should

provide timely and specific feedback to the trainee after each Mini-CEX.

Multisource Evaluation

- This process provides a full-circle view of resident skills and abilities by gathering information from various perspectives, including the following: the individual and others (peers, supervisors, patients, nurses, and other healthcare team members). This profile provides a more balanced overview than self-evaluation or peer/supervisor review.
- This is a formative evaluation process (one designed to provide feedback for improvement), not a summative one (which is designed for promotion or retention purposes).
- The Evaluation Form is attached below:



COMPETENCE IN INTERPERSONAL/COMMUNICATION SKILLS

Resident or Fellow Evaluated _____

Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and cooperation with patients, their families, and professional associates.

Score the following boxes as shown below to indicate how often you observed the behavior

☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Not Applicable	Rarely demonstrates (<25% of the time)	Sometimes demonstrates (25- 50% of the time)	Demonstrates in most cases (50-75% of the time)	Demonstrates in majority of cases (>75% of time)

Competency: Communicate effectively to create and sustain a therapeutic relationship with patients and families.

Knowledge/Skill/Attitude Benchmarks:					
Obtains historical information from the appropriate individual (i.e., patient, caregiver, etc.)	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Makes appropriate introductions and explains personnel roles	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Respects the privacy of the patient/family by using various facility areas for conversations, exams, etc.	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4

COMPETENCE IN INTERPERSONAL/COMMUNICATION SKILLS

Shows evidence of being able to sustain a continuing relationship with the patient	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Uses appropriate language at the proper developmental/educational level for the patient and/or caregivers/family members	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Uses a variety of techniques to elicit information from the patient	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Uses effective listening skills to elicit information	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Uses correct English in written and verbal communication	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Makes the patient comfortable enough to extract all necessary information when engaging in probing conversations	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Ensures the patient understands instructions	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4



COMPETENCE IN INTERPERSONAL/COMMUNICATION SKILLS

Provides instructions to patients in a variety of ways

☐ NA

☐ 1

☐ 2

☐ 3

☐ 4

Comments section. Please provide comments regarding any scores of 1 or 4.

Competency: Work effectively with others as a member or leader of a healthcare team or other professional group.

Knowledge/Skill/Attitude Benchmarks:					
Takes time to learn the names of other employees	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Shows respect to co-workers and provides information when needed	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Facilitates team communication when in the role of team leader	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Assumes the role of consultant where appropriate	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Provides constructive verbal and written feedback to other members of the health care team	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Medical records are thorough, readable, and done on time	☐ NA	☐ 1	☐ 2	☐ 3	☐ 4
Comments section. Please provide comments regarding any scores of 1 or 4.					



Final in-Training Evaluation Report (FITER)

- The FITER is a summative evaluation of the performance during the 5-year training period to ensure that residents acquire the full range of competencies (including knowledge, skills, and attitudes) required of a specialist for independent practice.
- Residency Training Committee will prepare a FITER for all PN5 residents upon training completion, before the final Board Exam is taken.
- The FITER is not a composite of the regular in-training evaluations; rather, it is a documentation of competency evaluations at the end of a residency education program.
- Residents should pass the FITER to be eligible to take the final board exam. The Report Form is attached below:

FITER

To: Scientific Committee- Riyadh Citywide Program, Saudi Board of Pediatric Neurology

Re: Resident's Name _____

SCFHS ID:

Dr. **(name)** started the SCHS combined pediatric neurology residency training on dd/mm/yyyy at (site name). He/she is expected to complete the training on dd/mm/yyyy.

The candidate successfully completed the following rotations:

_____ blocks of Clinical Child Neurology **(18 months)**

_____ blocks of Clinical Adult Neurology **(3 months)**

_____ blocks of Exchange Rotation **(5 months)**

_____ blocks of Electives **(2 months)**

_____ blocks of Neuropathology **(1 month)**

_____ blocks of Neuro-radiology **(2 months)**

_____ blocks of Neuropsychology/Child Psychiatry Training **(1 month)**

_____ blocks of Ophthalmology/ Neuro-ophthalmology **(1 month)**

_____ blocks of Neurophysiology **(3 months)**

_____ blocks of Epilepsy **(1 month)**

_____ blocks of Neuromuscular Study **(1 month)**

The resident's performance of the required skills throughout the training period is detailed below:

1. Performed supervised LP with ICP measurements _____ times successfully.
2. Completed _____ EEG interpretations (a minimum of 100 EEGs)
3. Performed _____ skin biopsies
4. Observed muscle biopsy procedures _____ times.
5. Attended developmental assessment _____ times with a pediatric neurologist.
6. Successfully completed 3 long-term case clinical exams, as per guidelines.
7. Academic activity attendance was (Acceptable – GOOD - POOR)
8. Candidate actively participated in research, as described below:



FITER

a. Research title:

b. Type of study: (retrospective, prospective, case control, intervention trial).

c. Project status: ongoing/published/analysis phase.

d. Research-related presentations done:

9. The candidate has mastered the interpersonal and professionalism skills required to practice as an independent pediatric neurologist.

Program Director Recommendations:

Strengths of the candidate:

Weaknesses of the candidate:

Program Director recommendations:

This candidate (Name) eligibility status for the Final Board Exam

Fit

☐

Unfit

☐

If unfit, please provide a detailed justification.

FITER	
Program Director	
Sign:	
Date:	
Letter discussed with the candidate;YES on Date:	
NO	
Attachments: (all copies must be signed and stamped as certified copies by the Program Director/site Academic Affairs Department).	
1.Copy of rotation evaluations during the three-year Neurology Training period.	
2.Copy of logbook.	
3.Copies of the 3 long-term case clinical exams.	

PORTFOLIO AND LOGBOOK

Portfolio and Logbook

Portfolio

- A portfolio is a record of growth, achievement, and professional attributes. It illustrates awards competence over time. The portfolio itself is the product of, and cannot be separated from, the reflection and assessment processes required for its production.
- The educational supervisor will be in charge of monitoring and reviewing the portfolio and providing continuous feedback to the trainee.
- The portfolio may include the following:
 - Curriculum vitae

- Professional development plan
- Records of educational training events, grand rounds, lectures, and presentations.
- Logbook
- Reports from the educational supervisors
- Case write-ups, research projects, and abstracts presented
- Written one-page semi-annual self-reflection with an individualized learning plan, including answers to the following three questions:
 - What are your strengths?
 - What are the areas for your development?
 - What are your plans to achieve these goals?
 - Others: patient feedback, clinical audits, etc.

Logbook

- The purposes of the logbook are to:
- s on a continual basis
 - Maintain a record of procedures and technical intervention performed
 - Enable trainees and supervisors to determine any learning gaps
 - Provide a basis of feedback to the trainee
- Logbook will be electronically filled and monitored.
- Residents are required to submit their logbook to take the final Board Exam.

Center Academic Activities

- Each center has regular weekly activities. Trainee attendance and participation is scored on an annual basis. Scores in this component constitute 40% of the annual evaluation report.

Combined Half-Day Teaching

- The SBPN program has a monthly joint teaching activity, covering important PN topics. Residents are given reading material prior to the scheduled sessions. A short pre-test assessment examination, consisting of 510 questions is administered at the beginning of the session followed by a formal presentation and discussion session. The attendance and pre-test marks are collected and scored. This part constitutes 20% of the supervisor's evaluation report.

