Medical Expert

Neuromuscular

1. To acquire knowledge of the basic science and clinical diagnosis and management of the following neuromuscular disorders:
   a. Anterior horn cell and cranial motor neuron diseases
   b. Disorders of peripheral nerves and spinal nerve roots
      i. Hereditary
      ii. Acquired - non-traumatic, and traumatic
   c. Disorders of neuromuscular junction
   d. Muscle diseases
      i. Dystrophies
      ii. Structural myopathies
      iii. Inflammatory, metabolic, endocrine and toxic myopathies
   e. Mitochondrial diseases
   f. Channelopathies
   g. Floppy infant
2. To understand and use appropriately equipment for EMG and nerve conduction
3. To gain experience in the observation of EMG and nerve conduction evaluations

Neurosurgery

1. The resident should gain an understanding of:
   a. Anatomy of the cranial vault and spinal column and have an understanding of the pathological processes that can affect their morphological development
b. Cerebrospinal fluid physiology and an understanding of how various congenital, infectious, traumatic, and neoplastic processes can affect its circulation

c. Spinal stability and the variations in anatomy and development that make spinal injury assessment different in children than in adults

d. Spinal cord tethering, and recognize the congenital abnormalities that can lead to this condition in children

e. The various clinical presentations of increased intracranial pressure in different age groups and different clinical scenarios

f. Fluid administration and drug dosage on the basis of weight, and be able to quickly calculate fluid and electrolyte requirements using standard formulae

g. The risk of apnea post anesthesia and post narcotic administration in small infants

h. Pediatric trauma principles in the initial resuscitation and management of traumatized children

i. The indications for operative and non-operative management of the head/spine injured child

j. The indications for monitoring intracranial pressure

k. The indications and procedure for performing subdural taps (including shunt taps)

2. By completion of the training period, the resident should:

   a. Understand the indications for trans-fontanelle subdural taps and be able to perform the taps if necessary

   b. Be familiar with techniques of CSF diversion in infants and children, as well as being cognizant of approaches to diagnosing shunt malfunction

Neurology

1. All residents are expected to develop an approach to the investigation and therapy of common presenting neurologic conditions in pediatrics including:

   a. Seizures, including:

      i. Types of epileptic seizures

      ii. Disorders which can mimic epilepsy

      iii. Approach to provoked seizures (eg. febrile seizures)
iv. Approach to first unprovoked seizure

v. Diagnosis and treatment of epilepsy
   1. When to start medication
   2. Risks and benefits of treatment (including drug toxicities and how to monitor them)
   3. Choice of medication by seizure type
   4. When to stop medication (duration of prophylactic treatment)
   5. Safety counseling for patients with epilepsy

vi. Treatment of status epilepticus

vii. Utility of EEG

b. Headache / migraine, including:
   i. red flags to indicate need for neuroimaging
   ii. therapeutic strategies for migraine (non-pharmacological, abortive, prophylactic)
   iii. possible social contributors

c. Developmental delay, including:
   i. Understand normal child development, including specific familiarity with the major milestones in gross motor, fine motor, language and social/adaptive development through infancy and early childhood.
   ii. Review the normal anatomy, embryology and physiology of the developing nervous system.
   iii. Develop an appreciation for the impact of the child’s environment on his/her development, including the effects of nutritional and social/emotional deprivation.
   iv. Become familiar with commonly seen abnormalities in anatomic development of the central nervous system including: hydrocephalus, anencephaly, disorders of neuronal migration (cortical dysgeneses), neural tube defects, Chiari malformations.
   v. Develop an approach to the investigation and therapy of commonly seen specific patterns of early childhood developmental delay (isolated speech / language delay, isolated gross / fine motor delay, or combined delays in all spheres).

d. Cerebral palsy, including:
   i. pathophysiology of the different types of CP
ii. management of spasticity

2. When possible, depending on case exposure, residents should attempt to develop an approach to the investigation and therapy of neurologic conditions in pediatrics including:
   a. Demyelination
   b. Encephalitis/Meningitis
   c. Coma
   d. Diagnosis of brain death
   e. Stroke
   f. Acute flaccid paralysis
   g. Head trauma
   h. Increased intracranial pressure
   i. Developmental regression (vs. pseudo-regression)
   j. Mental retardation
   k. Microcephaly / macrocephaly
   l. Ataxia (acute / chronic)
   m. Tic disorders
   n. Neonatal neurologic disorders, including
      i. Neonatal seizures
      ii. Perinatal asphyxia / hypoxic-ischemic encephalopathy
      iii. Intraventricular hemorrhage
      iv. Periventricular leukomalacia

**Overall**

1. Be able to elicit and present a medical history in an organized fashion. This includes proper succinct summarization of some aspects of the history, as well as expansion of detail in others.

2. Demonstrate competence and fluency with the individual maneuvers of the neurologic examination.

3. Be able to select, guided by clinical knowledge and judgement, which specific aspects of the physical and neurologic examinations are particularly relevant to the clinical scenario at hand (this implies the conscious use of the neurologic examination as a tool to test a clinical hypothesis).
4. Demonstrate the ability to anatomically localize focal neurologic processes.

5. Be able to describe a clinical condition in terms of its chronicity (static / pseudo-static / paroxysmal / pseudo-progressive / progressive).

6. Be able to formulate a diagnostic hypothesis making use of anatomic localization, temporal patterns of symptom evolution, clinical knowledge base and judgement.

7. Demonstrate a comprehensive understanding of the utility, risks, and limits of diagnostic investigations including:
   a. neuroimaging (CT, MRI, angiography)
   b. neurophysiologic testing (EEG, evoked potentials, EMG/NCS)
   c. neurogenetic (cytogenetic and DNA)
   d. neurometabolics
   e. neuropathology (muscle biopsy)

8. Knowledgeably generate a differential diagnosis and an appropriate plan of diagnostic investigation for various common presenting neurologic problems in infancy and childhood.

9. Develop an appreciation for the roles that the various forms of therapy play in the overall treatment of neurodevelopmental disorders, including education and anticipatory counseling, psychotherapy, physical therapy, occupational therapy, speech therapy, nutritional therapy, pharmacologic treatment, surgery, orthotics and mobility aids, technological assistance, and financial/societal support.

10. Become familiar with appropriate situations for neurologic referral.

11. Procedural / technical skills:
   a. Proficiency in conducting neurologic examination in children of various ages (neonatal through to teenage).
   b. Proficiency in performing lumbar punctures, including manometry.
   c. Proficiency in interpreting neuroimaging studies (CT/MRI).

**Communicator**

1. Demonstrate the ability to establish a therapeutic relationship with patients and families.

2. Be able to listen effectively to patients and caregivers.

3. Provide education and counseling to families while avoiding excessive use of jargon.
4. Appreciate the importance of communication with referring physicians.

5. Appreciate that coordination and cooperation among the entire health care team – physicians, nurses, therapists, dietitians, technologists – is dependent on clear and inclusive communication.

6. Demonstrate the ability to orally present case histories in an organized, concise and accurate manner.

7. Generate written / dictated notes which are clear, concise and informative.

**Collaborator**

1. Demonstrate the ability to interact effectively with a team of health professionals by recognizing and acknowledging their roles and expertise.

2. Show an awareness of the value that their contributions have in the diagnosis, investigation and management of children under their care, and accordingly participate fully in all relevant discussions and deliberations.

**Manager**

1. Demonstrate the ability to prioritize and address competing clinical demands.

2. Be able to effectively delegate tasks to junior residents and students, and where needed provide supervision in the completion of such tasks.

3. Show an awareness of the possible roles of electronic personal data management devices (‘personal digital assistants’) in assisting health professionals to more efficiently manage and track clinical, academic and personal data.

4. Be able to effectively make use of regional and internet-based databases to access patient information and to search medical literature successfully.

5. Demonstrate an awareness of cost-benefit considerations in patient-care decisions.

**Health Advocate**

1. Demonstrate an awareness of the impact that society can have on the ultimate outcome of children with neurodevelopmental handicaps.
2. Recognize that provision of appropriate school settings, therapy, recreation and transportation are all essential elements of the care of children with neurodevelopmental handicaps.

3. Develop an understanding of the specialist’s role to intervene on behalf of patients with respect to the social, educational and economic factors that may adversely impact on their health.

4. Appreciate even further the particular need for advocacy on behalf of developmentally handicapped children, whose needs are significant and whose families are often ill-equipped to advocate knowledgeably on their behalf.

5. Recognize the importance of empowering caregivers to become involved in health-related quality of life decision making for the child.

6. Understand that developmentally delayed and special-needs children are, as a group, at greater risk of abuse and neglect, and accordingly develop an appreciation of the circumstances which would mandate that the specialist intervene for the purpose of child protection.

**Scholar**

1. Demonstrate the ability to accurately assess one’s own personal learning needs.

2. Demonstrate a commitment to continuously improving one’s knowledge, as evidenced by ongoing pursuit of unprompted self-directed learning.

3. Be able to critically appraise information from medical literature, both in terms of the methods used in obtaining and analyzing the data, and in the applicability of the data to clinical practice.

4. Facilitate the ongoing education of colleagues by taking advantage of opportunities to teach more junior team members.

5. Demonstrate the ability to present, in a comprehensive and authoritative manner, a topic or issue relevant to pediatric neurology to an audience of one’s peers.

**Professional**

1. Demonstrate honesty, courtesy and responsibility in interactions with patients and peers.

2. Demonstrate appropriate empathy and compassion in patient encounters.
3. Demonstrate respect for diversity.

4. Demonstrate an awareness of one’s own limits and an ongoing pursuit of self-improvement.

5. Demonstrate an awareness of the principles of medical ethics and their application to clinical practice.

6. Recognize that the need to act as an advocate for one’s patient may supersede the directives of one’s supervisor(s), and that the resident should not participate in, or through omission of action allow to occur, an action which is detrimental to a patient’s best interests.

7. Recognize that residency training offers the opportunity to emulate the role of the consultant under direct supervision, and as such demonstrate a willingness to undertake the responsibilities of the consultant role (integration of information, generation of hypotheses, planning of investigation and management, provision of counselling) to the extent that one’s acquired knowledge and abilities permit.