

PHYSIOTHERAPY IN NEUROLOGICAL SCIENCES- LESSON PLAN (REVISED 2023)

MODULE 1

NEUROANATOMY & NEUROPHYSIOLOGY

- Introduction of nervous system, classification – C.N.S., P.N.S. & A.N.S.
- Synapse-structure, properties, & transmission;
- Reflexes-classification & properties;
- Receptor physiology: classification, properties.
- Physiology of Touch, Pain, Temperature & Proprioception;
- Sensory and motor tracts: effect of transaction (complete and incomplete) at various levels
- Physiology of Muscle Tone (muscle spindle); Stretch reflex
- Connection & function of Basal ganglia, Thalamus, Hypothalamus, Sensory and Motor cortex, Cerebellum, Limbic system, Vestibular Apparatus
- Autonomic nervous system: Structure, functions of the sympathetic, and the parasympathetic nervous system.
- Physiology of Voluntary movement

ANATOMY

- Development of nervous system
- Coverings of the brain
- Structural and function classification of the brain
- Vascular system of the brain
- Ventricular system of the brain
- Cross section of the spinal cord.
- Brachial plexus, lumbosacral plexus
- Peripheral nerve course- Facial, Radial, Ulnar, Median, Axillary, Sciatic, Common peroneal, Tibial, Femoral.

MODULE 2

ASSESSMENT OF MOVEMENT DYSFUNCTION- NORMAL AND PATHOLOGICAL

1. Higher functions
2. Screening for integrity of Cranial nerves
3. Sensations, sensory organization & body image
4. Joint mobility
5. Tone
6. Reflexes-Superficial & Deep
7. Voluntary control
8. Muscle Strength and trick movements
9. Co-ordination
10. Balance
11. Endurance
12. Limb Length
13. Posture deviations
14. Gait deviations due to neurological dysfunction

MODULE 3- INVESTIGATIONS & I.C.F.

Interpretation of Electro diagnostic findings, routine Biochemical investigations

- Physiology of resting membrane potential, action potential, Propagation of Action Potential
- Physiology of muscle contraction
- Motor unit & Recruitment pattern of motor unit – Size principle
- Electro diagnosis.
 - Electrophysiology of muscle & nerve
 - Faradic Galvanic Test, Strength Duration Curve-tests should Be carried out on relevant patients,
 - Test for Sensory & Pain Threshold/ Pain Tolerance – technique only
- Electromyography
 - Normal & Abnormal E.M.G. pattern
 - at rest
 - on minimal contraction
 - on maximal contraction
- Nerve Conduction Studies
 - Principles & Technique
 - F wave
 - H reflex

MODULE 4

- i. Functional Diagnosis using I.C.F. and clinical reasoning
- ii. Goal setting
- iii. Red Flags

MODULE 5

- Plasticity of the intact brain
 - i. motor learning
 - ii. training
 - iii. plasticity
- Plasticity following brain lesion-nature of spontaneous recovery; effect of environment behavior and recovery; adaptation of motor performance; muscle adaptation
- Strength training and physical conditioning in neuro rehabilitation to optimize functional performance
- Manifestation of movement dysfunction following disease or trauma of the central or peripheral nervous system. Normal and abnormal kinematics of the following-
 1. Bed mobility
 2. lying to sitting
 3. standing up and sitting down
 4. walking
 5. balance
 6. reaching
 7. manipulation

- Tools and adaptive equipments used for neuro-rehabilitation like Vestibular balls Tilt boards, Bolsters, Wedges, Graded Benches, Therapeutic mats etc.
- Application of transfer and functional re-education exercise, postural exercise and gait training.
- Bladder and bowel training
- Hand function training.
- Neurotherapeutic approaches
 1. MRP
 2. CIMT
 3. Task – oriented approach & BWSTT
 4. Funcional ElectricalStimulation
 5. Virtual reality, Robotics, Motor imagery
 6. NDT
 7. Brunnstrom
 8. Rood’s
 9. PNF

MODULE 6- system specific – Peripheral Nervous System

- Neuroanatomy and physiology of Peripheral Nervous System (assignment)
- Evaluation and Management of the following conditions
 - Peripheral neuropathies – traumatic & non traumatic - upper limb & lower limb - brachial plexus - nerve root lesions - metabolic & endocrine
 - Anterior Horn Cell diseases – heredity and acquired e.g. M.N.D., P.M.A., S.M.A., Poliomyelitis
 - Myopathies
 - NMJ disorders-Myasthenia gravis, Eaton- Lambert syndrome, Botulism
- Outcome measures specific to PNS
- ICF in Peripheral nervous system disorders
- Management specific to conditions.

MODULE 7- system specific- Spinal cord and ANS

- Neuroanatomy and neurophysiology of spinal cord and A.N.S (assignment)
- Evaluation and Management of the following conditions-
 - Traumatic Spinal cord injury
 - Inflammatory spinal cord conditions-transverse myelitis, multiple sclerosis, myelopathy.
 - Infective Spinal cord condition
 - Vascular spinal injury
 - Spinal tumours’
 - Hereditary- degenerative and Nutritional disorders of spine
- Outcome measures specific to SCI- ASIA, SCIM, Braden scale, SCIPUS, SCI-QoL.
- ICF and goal setting ; Red flags
- Management specific to above conditions

MODULE 8 – system specific- CNS

- Neuroanatomy and neurophysiology of C.N.S (assignment)
- Evaluation and Management of the following conditions-

- Stroke
- TBI
- Brain tumours
- Cerebellar diseases and Ataxia
- Extrapyrarnidal diseases- emphasis on Parkinson's disease
- Outcome Measures specific to stroke, TBI,
- ICF and goal setting; Red Flags
- Management of specific to above conditions

MODULE 9- System specific- Vestibular system

- Neuroanatomy and neurophysiology of Vestibular system
- Evaluation and management of the following conditions
 - BPPV
 - Meniere's Disease
- Outcome measures in vestibular system
- Management and treatment techniques in vestibular system

MODULE 10- Balance and Gait

- Integration of all the systems of balance and gait
- Clinical reasoning in balance and gait disorders
- Outcomes in balance and gait disorders
- Management strategies of balance and gait disorders in neurological dysfunctions.

Reference Books

Bickerstaff's Neurological Examination in clinical practice