	Spiral II
MODULE TITLE	**Neurosciences-II, 2023**
INTRODUCTION	The module is directly linked with the Neurosciences-1 year-2, where there was emphasis on normal structure and functions with clinical relevance. This module comprises of a strong clinical input related to common neurological, neurosurgical, and psychiatric conditions related to adults and children, so that the students get to understand issues from the patient's perspective. It is hoped that this will help them understand many of the covered diseases when they read about them again in Medicine, Surgery and/ or Paediatrics.
RATIONALE	Since many neurological and psychiatric conditions are common in the Pakistani community, it is imperative that attention of the learners is focused to these issues. Conditions like Epilepsy, Hydrocephalus, Meningitis, Depression, Schizophrenia are not unheard of. This module helps the students link the relevant basic sciences with signs and symptoms so that the principles of management can be better understood and applied to improved patient care.
TARGET STUDENTS	Fourth year MBBS, 2023
DURATION	7 weeks, February-March, 2023
MODULE OUTCOMES	By the end of the module, all the students will be able to justify the diagnosis and management plans of various neurologic & psychiatric diseases based on their knowledge of relevant basic sciences.
DEPARTMENTS	1. Community Medicine 2. Neurology 3. Neurosurgery 4. Paediatrics 5. Pathology 6. Pharmacology 7. Psychiatry 8. Radiology
OBJECTIVES	By the end of the module, the students should be able to:

COMMUNITY MEDICINE

1. Poliomyelitis & Prevention

- Describe poliomyelitis and its epidemiology
- Classify different types of poliomyelitis
- Discuss its control & prevention
- Explain Global Polio Eradication Initiative

2. Tetanus & Prevention

- Describe Tetanus & its Epidemiology
- Classify its types
- Explain its control & prevention

3. Leprosy & Prevention

- Describe Leprosy & its Epidemiology
- Classify the different types of Leprosy
- Discuss its control & prevention
- Explain the national Leprosy control Program

4. Stroke & Prevention

- Describe Stroke & its epidemiology
- Explain the risk factors of Stroke
- Discuss its control & prevention

5. Rabies & Prevention

- Describe Rabies & its epidemiology
- Discuss its control & prevention

6. Snake bite & prevention

- Classify Snakes
- Identify the characteristic features of different types of Snake Venom
- Discuss epidemiology of snake bite
- Explain the management of snake bite
- Discuss the preventive measures of snake bite

7. Introduction to mental health

- Describe Mental Health
- List mental health problems
- Discuss recommendations by World Health Report 2001 for Mental Health.
- Explain prevention and control of mental health problems

8. Substance Abuse

- Describe Substance abuse & its epidemiology
- Identify the criteria of drug addiction
- Classify psycho-active drugs
- Describe the phases of Drug addiction
- Explain the control & Prevention of substance abuse

PHARMACOLOGY

1. **Sedatives & hypnotics: Benzodiazepines I&II**
   - Classify the drugs used as Sedatives & Hypnotics
   - Discuss the basic & clinical pharmacology of those Sedatives & Hypnotics drugs
2. **Drug used in migraine**
   - List the drugs used in migraine
   - Discuss the basic & clinical pharmacology of those drugs
3. **Drugs of General anesthetics I&II**
   - List the drugs used as pre anesthetic medications
   - Classify the drugs used as General anesthetics
   - Discuss the basic & clinical pharmacology of those Drugs
4. **Local anesthetics**
   - List the drugs used in local anesthetics
   - Classify the drugs used as local anesthetics
   - Discuss the basic & clinical pharmacology of those Drugs and their differences
5. **Anti-epileptic drugs**
   - Classify the drugs used in epilepsy
   - Discuss the basic & clinical pharmacology of those drugs
6. **Anti-psychotic drugs I &II**
   - Classify antipsychotic drugs according to different aspect
   - Discuss the basic & clinical pharmacology of those drugs
7. **Antidepressant drugs**
   - Classify the Antidepressant Drugs
   - Discuss the basic & clinical pharmacology of those drugs
8. **CNS Stimulants and Hallucinogens**
   - List different classes of CNS stimulants and hallucinogens
   - Discuss the basic & clinical pharmacology of those drugs
9. **Anti-Parkinson drugs**
   - Classify the Anti-Parkinson Drugs
   - Discuss the basic & clinical pharmacology of those drugs
10. **Drugs of Abuse & Alcohols**
    - List the drugs of Abuse
    - Discuss the basic and clinical pharmacology of those drugs and Alcohols

PATHOLOGY AND MICROBIOLOGY

1. Patterns of nerve injury, Cerebral Edema & Raised ICP

- Discuss the pathophysiology of reactions of Neurons, Glial tissue, Astrocytes, and Microglia to injury
- Define cerebral edema; discuss its types and etiological factors
- Discuss the pathogenesis, morphology and clinical presentation of cerebral edema, hydrocephalus and raised intracranial pressure
- List and discuss the pathogenesis and morphology of different types of brain herniation

2. Traumatic injuries to CNS

- Define traumatic vascular injury
- Discuss the patterns of vascular injury in the CNS
- Define epidural and subdural hematoma
- Discuss the etiology, pathogenesis, and clinical presentation of epidural and subdural hematoma

3. Cerebrovascular Diseases: (Hypoxia, Ischemia, Infarction)

- Define cerebrovascular diseases
- Classify types of ischemic and vascular injury to brain
- Discuss the risk factors, pathogenesis, localization, morphology and clinical course of global and focal cerebral ischemia
- Discuss the pathogenesis and morphology of various infarcts in the brain and spinal cord

4. Hypertensive Cerebrovascular disease (CVD), intracranial hemorrhage and malformations

- Discuss effects of hypertension on CNS, types of CVD associated with hypertension, and hypertensive intra-parenchymal hemorrhage
- Discuss the etiology, pathogenesis, morphology and clinical course of intracranial hemorrhages
- Discuss hypertensive cerebrovascular disease & hypertensive encephalopathy
- Discuss intracranial hemorrhage including intraparenchymal hemorrhage, Cerebral amyloid angiopathy, Subarachnoid Hemorrhage and Ruptured Saccular Aneurysms
- Discuss vascular malformation including arteriovenous malformations, Cavernou malformations and Capillary telangiectasias

5. Meningitis & Brain Abscess

- Define meningitis and brain abscess.
- Discuss common Central Nervous System infections including acute (pyogenic) bacterial infections, acute aseptic viral infections, chronic bacterial meningitis, and fungal meningitis
- List pathogens of meningitis and brain abscess.
- Discuss in detail the transmission, pathogenesis, clinical features & laboratory diagnosis of Neisseria meningitides, Mycobacterium tuberculosis, Toxoplasma, Naegleria, Listeria & Cryptococcus

6. Encephalitis

- Define encephalitis
- List pathogens of encephalitis
- Discuss in detail the transmission, pathogenesis, clinical features & laboratory diagnosis of Herpes, Varicella, Rabies & Polio virus

7. Neurodegenerative Diseases

- Define neurodegenerative diseases
- List the important neurodegenerative diseases
- Discuss relationship between proteins and neurodegenerative diseases
- Discuss the molecular genetics and pathogenesis of Alzheimer disease
- Discuss important morphologic features, clinical presentation and diagnostic criteria of Alzheimer disease
- Discuss the molecular genetics and pathogenesis of Parkinson disease
- Discuss important morphologic features and clinical presentation and diagnostic criteria of Parkinson disease

8. Brain tumors

- Classify CNS tumors according to WHO classification
- List genetic mutations, pathogenesis, morphology and clinical features of brain tumors including all types of Glioma, Ependymoma, Medulloblastoma and Meningioma
- Discuss the metastatic tumors to brain

9. Diseases of skeletal muscles-I

- Discuss diseases of neuromuscular junction with special reference to pathophysiology and clinical features of Myasthenia gravis, Lambert-Eaton Myasthenic Syndrome & Botulism
- Define Skeletal Muscle Atrophy
- Discuss important features of Type I & II muscle fiber types
- Discuss the pathogenesis and diagnostic profile of inflammatory neuropathies including dermatomyositis and Polymyositis
- Discuss inherited diseases of skeletal muscle including X- linked muscular dystrophy with dystrophic mutation/ Duchenne and Becker Muscular Dystrophy

10. Diseases of skeletal muscles-II

- Discuss pathophysiology and clinical features of Inflammatory Neuropathy i.e. Guillain-Barré Syndrome (Acute Inflammatory Demyelinating Polyneuropathy)
- Discuss pathophysiology and clinical features of Poliomyelitis
- Discuss pathophysiology and morphology of Prion diseases

NEUROLOGY

1. Investigation of neurological disorders

- List various neuro-imaging techniques
- Enumerate uses of various neurophysiological investigations [Electromyelogram (EMG), Nerve Conduction Study (NCS), and Electroencephalogram (EEG)]
- Discuss the indications, contraindications and process for lumbar puncture
- Interpret CSF reports of common conditions

2. Lesion localization

- Localize the likely site/s of a lesion in the nervous system based on patient's symptoms and signs
- List the differential diagnosis based on detailed history, clinical presentation and complete examination findings

3. Lesions of cranial nerve

- List the causes of cranial nerve pathologies
- Diagnose common cranial nerve lesions that would explain loss of nerve function
- Relate cranial nerve deficits to damage of adjacent unrelated structures

4. Approach to coma

- Discuss pathophysiology of coma & altered mental status
- Assign Glasgow Coma Scale (GCS) score to a given case scenario
- Discuss assessment findings associated with coma & altered mental status
- Discuss management of coma & altered mental status

5. Approach to headache & Primary headaches (Trigeminal autonomic cephalalgias, Migraine, Tension type headache, cluster headache)

- Classify headaches
- Define primary headache
- Differentiate among different patterns of headache
- Describe the process of history taking of a patient with headache

6. Secondary headaches

- Discuss differential diagnosis and appropriate diagnostic evaluation for common causes of secondary headaches
- List the red flag signs of secondary headache
- Discuss the classic presentations of Trigeminal neuralgia
- Differentiate between common clinical findings seen in Trigeminal neuralgia and other facial pain syndromes

7. Epilepsy and status epilepticus

- Define epilepsy & status epileptics
- Discuss pathophysiology of seizures
- Classify epilepsy
- Classify types of seizures clinically
- List most common causes of seizures
- Discuss pharmacological treatment of epilepsy and the management of status epilepticus

8. Cerebrovascular Accidents (Stroke) - I

- Define the terms stroke, Cerebrovascular Accidents (CVA) & Transient Ischemic Attack (TIA)
- Discuss causes of stroke
- Distinguish between ischemic stroke (cerebral infarct) from hemorrhagic stroke (intracerebral hemorrhage) on the basis of etiology and pathology
- Discuss assessment findings associated with stroke of different arterial territories (anterior and posterior circulation)
- List the signs & symptoms related to TIA

9. Cerebrovascular Accidents (Stroke) – II

- List the investigation related to the Cerebrovascular Accidents
- Discuss the management plan of Cerebrovascular Accidents (acute treatment and secondary prevention)
- Discuss the complications of Cerebrovascular Accidents

10. Acute CNS infections

- Discuss the clinical features & investigations of acute CNS infections
- List their causative organisms
- Interpret the CSF studies in a patient with acute CNS infection
- Discuss the possible complications of acute CNS infection if left untreated
- Discuss the treatment plan for acute CNS infections
- Differentiate b/w acute and chronic CNS infections based on data provided

11. Chronic CNS infections

- List the common chronic CNS infections
- Discuss clinical presentation of CNS TB and CNS fungal infections
- Discuss the management & complications of Chronic CNS infection
- Interpret the CSF studies in a patient with chronic CNS infection

12. Approaches to movement disorders

- Discuss the presentation of patients with movement disorders
- Discuss the pathogenesis of Parkinson's disease (PD)
- List the clinical features of Parkinson's disease (PD)
- Discuss approach to a patient with PD
- Summarize the differential diagnosis of Parkinson’s disease
- Discuss the principles of drug management of Parkinson’s disease
- Discuss the clinical presentation and treatment of Wilson’s disease

13. Multiple sclerosis (MS) and other demyelinating diseases

- List the common CNS and PNS demyelinating diseases
- Discuss common anatomical locations of MS plaques, and parts of the CNS that are particularly prone to developing lesions
- Discuss the epidemiology and pathogenesis of MS
- Discuss the clinical presentation, workup, differential diagnosis and management of MS

14. Approach to neuropathies and Guillain-Barre syndrome (GBS)

- Name the laboratory studies that are useful in the diagnosis of peripheral neuropathy (at least two)
- List the most common inherited neuropathies
- Differentiate between axonal and de-myelinated neuropathy
- State the most common cause of neuropathy
- Diagnose hereditary peripheral neuropathies based on pathological findings
- Formulate an approach to the evaluation and differential diagnosis of a patient with peripheral neuropathy
- Describe the clinical presentation and pathological findings of the GBS
- Discuss its pathogenesis
- Describe two of its key laboratory abnormalities
- Interpret the CSF analysis in GBS
- Discuss the management and complications of GBS

15. Myasthenia Gravis

- Describe the pathophysiology of Myasthenia gravis
- Explain its clinical presentation & investigations
- Discuss its long-term management
- Discuss the management of Myasthenia Crisis

NEUROSURGERY

1. Hydrocephalus

- Define Hydrocephalus
- List common symptoms and signs of acute hydrocephalus in children
- List common symptoms and signs of normal pressure hydrocephalus in adults
- Define communicating and non-communicating hydrocephalus
- Describe the difference in the treatments of these conditions

2. Traumatic spinal cord injury

- Discuss the initial management of spinal injury

3. Traumatic brain injury

- Describe the initial assessment of a patient with head injury

4. Raised Intracranial Pressure (ICP)

- Identify the symptoms and signs of raised ICP
- Describe the evaluation of a patient with raised ICP with reference to Space Occupying Lesion (SOL)

5. Brain tumors

- Define brain tumors
- Classify brain tumors
- List their causes & clinical features
- Name the investigations related to brain tumors
- Discuss the management plan and complications of brain tumors

6. Spinal tumors

- Define spinal tumors
- Classify spinal tumors
- List the causes & clinical features of spinal tumors
- Name the investigations related to spinal tumors
- Discuss the management plan of spinal tumors

7. Compressive myelopathy

- Define compressive myelopathy
- List the causes of compressive myelopathy
- Discuss its clinical features
- State the investigations for this condition
- Discuss its management

RADIOLOGY

1. CT Scan Brain

- Describe the role of radiographic imaging studies in diagnosis and management of stroke patients
- Identify the following on a CT film:
  i. Normal cranial and neurological anatomy
  ii. Skull fracture
  iii. Extra-cerebral blood
  iv. Intracranial blood
  v. Appearance of both hemorrhagic and ischemic strokes

2. MRI Brain

- Discuss the radiological features of normal and diseased MRI Brain
- List the indications and contraindications of MRI Brain

PSYCHIATRY

1. Introduction to Mental Health, and Biopsychosocial model & Non-pharmacological intervention

- Define the concept of health and mental health
- Describe positive mental health
- Differentiate between Psychiatry and Psychology
- Define the role of biological, psychological and social factors in custom continuation and healing of illness
- Discuss the management of illness
- Describe the role of personality, attitudes, attributes, impact of family society, social factors and cultures on the etiology, presentation and the management of illness

2. Counseling & Psychotherapy

- Define counseling
- Discuss attending and listening, verbal techniques and role of empathy in healing of illness
- Discuss the role of counseling, informational care and handling difficult patients and their families
- Differentiate among counseling, psychotherapy and active listening
- Differentiate among various types of psychotherapies/counseling
- Differentiate among empathy, sympathy and apathy
- Describe the prerequisites of counseling/ psychotherapy
- Differentiate between boundary and barrier
- Describe the basic rules of counseling
- Explain rules and boundaries setting of counseling
- Enumerate some basics dos and don’ts of counseling

3. Breaking bad news

- List the application of biopsychosocial model in communicating with patient & his family
- Discuss the methods to address the concerns and emotional reactions of patients
- Discuss disclosure models of breaking bad news and management of the related issues

4. Anxiety disorders- I; Introduction, types & etiology

- Define normal and abnormal anxiety
- Describe the presentation of anxiety disorders
- Discuss their etiological theories
- Distinguish the essential features of generalized anxiety disorder (GAD), panic attacks and panic disorder, phobias (Specific, Agoraphobia and Social Phobia), Obsessive compulsive disorder (OCD), Acute stress reaction and post-traumatic stress disorder (PTSD)

5. Anxiety disorders- II; differentiating points, diagnosis & management

- Discuss the clinical features and etiology of PTSD and Acute stress reaction
- Explain the causes of PTSD, Acute Stress Disorder and Obsessive Compulsive Disorder
- Describe the management of these disorders

6. Depressive disorders

- Describe the diagnostic criteria for mood disorders (Depressive disorder)
- List the common risk factors for mood disorders
- Discuss their management
- List the risk factors of depressive disorder

7. Self-harm, and Suicide

- Define self-harm and suicide
- List the risk factor of self-harm and suicide
- Name the common causes of self-harm and suicide
- Discuss suicide risk assessment
- Discuss the important outline management plan
- Discuss the prevention

8. Bipolar Affective disorder

- Describe the diagnostic criteria and types of bipolar affective disorder
- List the common risk factors and co-morbids for bipolar affective disorder
- Discuss the management of bipolar affective disorder

9. Somatic and Medically Unexplained Symptoms

- Discuss the assessment of medically unexplained symptoms according to their severity
- Explain the approach for establishing an appropriate diagnosis
- State the management of these condition including a stepped approach
- Describe the diagnostic approach for patients with fits/attack (Epilepsy vs Convulsion disorder)

10.Schizophrenia and related disorders

- Explain the concept of Psychosis and its presentation, and prevalence of various psychotic disorders
- Diagnose Acute Psychotic disorders, schizophrenia, and Delusional disorders based on given criteria
- Discuss the principles of treatment of schizophrenia and other psychotic disorders
- Describe their etiological factors and prevalence

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13. Disorders of Addictive Behaviour / Alcohol & Other Substance use

- Define Addiction
- Discuss the behavioral issues related to addiction
- Differentiate among tolerance, excessive use, abuse/misuse, dependence, withdrawal and intoxication
- Classify drugs of addiction
- Discuss briefly the effects of alcohol and other illicit drugs on the body (cannabis, opioids, cocaine, amphetamines and LSD)
- Describe the modes of action of alcohol and other illicit drugs
- Explain the psychological, emotional, physical and social insults of these drugs
- Describe delirium tremens
- Describe the impact of suddenly stopping the use of addictive drugs
- Discuss the difference of harm minimization and drug eradication

14. Psychosexual disorders

- Discuss different types of psychosexual disorders
- Describe their characteristic features, etiology and prevalence
- Explain principles of management of these conditions

15. Introduction to childhood psychiatric disorders

- Discuss the presentation of various childhood psychiatric disorders, i.e. Attention deficit hyperactive disorder (ADHD), Autism Spectrum Disorder, Depressive disorder and Mental Retardation
- Categorize mental health disorders (such as emotional disorders, behavior disorders) in children and adolescents
- Discuss the factors impacting childhood mental and emotional health
- Describe the use of multimodal treatment

16. Introduction to old age psychiatric disorders, Delirium and Dementia

- Describe the variations in presenting psychiatric symptoms in this age group
- Explain the high likelihood of co-morbidity in this age group
- Diagnose common psychiatric illnesses in the geriatric group
- Describe the use of multimodal treatment in old age patients
- Name standardized assessment tools and their use in measuring cognitive impairment
- Formulate the differential diagnosis of a patient presenting with cognitive impairment suggestive of dementia
- Compare features of dementia versus delirium
- Formulate the clinical assessment and differential diagnosis of an elderly patient with delirium
- Explain the salient features of delirium and dementia

PAEDIATRICS

1. Cerebral Palsy and mental retardation

- Define cerebral palsy
- List causes of cerebral palsy
- Classify cerebral palsy
- List the causes of cerebral palsy
- Explain the management of cerebral palsy

2. Common CNS infections in children

- List the common pathogens of CNS infections in various ages
- Name the common signs and symptoms of CNS infections
- Interpret the CSF reports of cases with CNS infections
- Discuss the management of CNS infections and their complications

3. Upper and lower motor neuron lesions with Acute flaccid Paralysis (AFP)

- Define Upper and lower motor neuron lesions
- Name the Differentiating symptoms and signs of upper and lower motor neuron lesions
- Discuss the common conditions associated with Acute flaccid paralysis (AFP) [Polio ,GBS ,transverse myelitis and traumatic neuritis]
- List the common conditions associated with upper motor neuron lesions
- Discuss the importance of Polio eradication program in Pakistan

4. Seizures in Children

- Define seizures
- Classify seizures
- List causes of seizures in children
- Name the complications of seizures
- Define febrile seizures & childhood epilepsy
- Discuss management of acute seizures

TUTORIALS

PATHOLOGY

1. **Infection of Brain & Meninges & CSF interpretation**
- List the most common organisms that cause CNS infection in different age groups
- Discuss CSF findings of bacterial meningitis, tuberculous meningitis, viral and fungal meningencephalitis

2. **Brain Tumors**
- Discuss morphological and molecular aspects of various brain tumors.

PHARMACOLOGY

Interactive tutorials will be conducted for the following lecture topics:

1. **Sedatives & Hypnotics: Benzodiazepines**
- Classify Sedatives & Hypnotics drugs.
- Discuss basic & clinical pharmacology of Sedatives & Hypnotics drugs.

2. **Drugs used for Migraine Treatment**
- Discuss basic & clinical pharmacology of those drugs used in migraine.

3. **Drugs of General anesthetics & Local anesthetics**
- Discuss basic & clinical pharmacology of general and local anesthetic and their clinical role.

4. **Drugs used in Epilepsy Treatment**
- Classify anti-epileptics drugs
- Discuss basic & clinical pharmacology of anti-epileptics drugs.

5. **Drugs used in Psychosis Treatment**
- Classify antipsychotic drugs.
- Discuss the basic & clinical pharmacology of those drugs.

6. **Drugs used in Depression Treatment**
- Classify antidepressant drugs.
- Discuss the basic & clinical pharmacology of those drugs.

7. **CNS Stimulants & Hallucinogens drugs**
- Discuss the clinical importance of CNS stimulant and hallucinogens with their clinical and basic pharmacology.

8. **Drugs used in Parkinson Treatment**
- Classify anti-Parkinson drugs and discuss the basic & clinical pharmacology of those drugs.

SKILLS

1. History taking in CNS
2. Assessment of higher mental functions: level of consciousness, behavior, speech & memory
3. Perform lumbar puncture on a mannequin.
4. CNS Examination including:
   i. Cranial nerves
   ii. Motor system (power, tone, fasciculations, reflexes, plantars)
   iii. Sensory system – crude touch, pain, temperature, fine touch, pressure, vibration, joint position, cortical sensations, two point localization, two point discrimination
   iv. Cerebellar functions
   v. Signs of meningeal irritation
5. Interpretation of related radiological and laboratory investigations (CT, MRI, CSF analysis)

INTERNAL ASSESSMENT	• Internal assessment will be according to JSMU policy. The details of internal assessment will be determined by the respective institutions. • Internal assessment carries 20% weightage in the final, end-of-year examination
FINAL EXAMINATION	MCQs and OSCE/OSPE (observed + un observed)
COURSE EVALUATION	Course will be evaluated through a feedback form which will be posted on the JSMU website

Reference Books

Following books can be referred for further reading:

- Shorter Oxford Textbook of Psychiatry
- Davidson's Principles and Practices of Medicine
- Kaplan Series, Behavioural Sciences, Psychiatry
- Handbook of Behavioural Sciences, by Mowadat H. Rana
- Drugs used in Psychiatry, by Prof. Muhammad Iqbal Afridi