Cognitive and Perceptual Disorders

Sarah Williams BSN, RN
BHSLR
Med Surge

Central Nervous System

- Brain
- Spinal Cord
- Major functional divisions
  - Higher-level brain
  - Lower brain level
  - Bony encasement

Brain: Cerebrum

- Divided into cerebral hemispheres
- Cerebral cortex (neocortex)
  - Frontal lobes
  - Parietal lobe
  - Occipital lobe
  - Temporal lobe
  - Central lobe
Brain: Hippocampus
- Part of the temporal lobe
- Memory function
  - Short term memory
  - Intermediate memory
  - Long-term memory

Brain: Basal Ganglia
- Consists of:
  - Subcortical gray matter
  - Internal capsule
- Controls motor activity

Brain: Composition
- Diencephalon
  - Thalamus and the hypothalamus
- Limbic system
  - Center of feelings and emotional expression
- Brain stem
  - Midbrain, pons, and medulla oblongata
- Reticular formation
  - Skeletal motor functions
Brain: Cerebellum
- Integrates sensory information related to the position of body parts
- Coordinates skeletal muscle movement and regulates muscle tension
- Nerve tracts
  - Afferent
  - Purposeful
  - Efferent pathways

Spinal Cord
- Protective and nutritional structures
  - Cranium and vertebral column
  - Meninges
  - Cerebrospinal fluid and ventricular system
  - Blood-brain barrier
  - Arterial blood supply
  - Venous supply

Cells of the Spinal Cord
- Structure
  - Neuroglia-glial cells
    - Astrocytes
    - Oligodendrocytes
    - Microglia
    - Ependymal
  - Neurons-neurofibrils
    - Unipolar
    - Multipolar
    - Bipolar
Spinal Cord

- Impulse conduction
  - Resting potential
  - Nerve impulses
  - Myelin
  - Receptors

Peripheral Nervous System

- Spinal nerves
  - Doral (sensory) roots
  - Ventral (motor) roots
- Cranial nerves
  - 12 pairs motor/sensory

Autonomic Nervous System

- Sympathetic nervous system
  - Stress
  - Short
- Parasympathetic nervous system
  - Conservation
  - Long
Effects of Injury on the Nervous System

- Regeneration
- Effects of aging on the nervous system

Assessment of the Neurologic System: History

- Biographical and demographic data
  - Personal profile
  - Source of history
  - Client’s mental status
- Chief complaint
- Symptom analysis

Neurologic System: History

- Past health history
  - Childhood and infectious diseases
  - Major illnesses and hospitalizations
  - Medications
  - Growth and development
- Family health history
- Psychosocial history
- Review of systems
Neurologic System: Physical Examination

- Vital signs
- Mental status
  * Level of consciousness
  * Orientation
  * Memory
  * Mood and affect
  * Intellectual performance
  * Judgment and insight
  * Language and communication

Neurologic System: Physical Examination (cont.)

- Head, neck, and back
  * Inspection
  * Palpation
  * Percussion
  * Auscultation

Neurologic System: Physical Examination (cont.)

- Cranial nerves
  * Olfactory nerve (CNI): smell
  * Optic nerve (CNII): vision
  * Oculomotor (CNIII), trochlear (CNIV), abducens (CNVI): eye control
  * Trigeminal nerve (CNV): sensations of the face, movement of the mouth
  * Facial nerve (CNVII): facial muscles
Neurologic System: Physical Examination (cont.)

- Cranial nerves
  * Acoustic nerve (CNVIII): hearing
  * Glossopharyngeal (CNIX), vagus (CNX) nerves: palate, uvula
  * Spinal accessory nerve (CNXI): muscles of the shoulders and neck
  * Hypoglossal nerve (CNXII): tongue

Neurologic System: Physical Examination (cont.)

- Motor system
  * Muscle size
  * Muscle strength
  * Muscle tone
  * Muscle coordination
  * Gait and station
  * Movement
  * Motor testing of unconscious patients

Neurologic System: Physical Examination (cont.)

- Sensory function
  * Superficial sensations
    * Touch and pain
  * Mechanical sensations
    * Vibration
    * Proprioception
  * Discrimination
Neurologic System: Physical Examination (cont.)

• Normal reflexes
  * Superficial (cutaneous) reflexes
  * Abdominal reflex
  * Plantar reflex
  * Corneal reflex
  * Pharyngeal reflex
  * Cremasteric reflex
  * Anal reflex

Neurologic System: Physical Examination (cont.)

• Normal reflexes
  * Deep tendon reflexes
    * Biceps jerk
    * Triceps jerk
    * Brachioradial jerk
    * Knee jerk
    * Ankle jerk

Neurologic System: Physical Examination (cont.)

• Abnormal reflexes
  * Babinski’s reflex
  * Jaw reflex
  * Palm-chin reflex
  * Clonus
  * Snout reflex
  * Rooting reflex
  * Sucking reflex
  * Glabella reflex
  * Grasp reflex
  * Chewing reflex

• Grading reflex activity
Neurologic System: Physical Examination (cont.)

- Autonomic nervous system
  - *Cannot be examined directly
  - *Clinical manifestations
    - *Increase/decrease heart rate
    - *Vasoconstriction/dilatation peripherally
    - *Bronchoconstriction/dilatation
    - *Increase/decrease peristalsis
    - *Pupil constriction/dilation

Neurologic System: Physical Examination (cont.)

- Functional assessment
  - *Note deficits and functional response

- Clinical applications

Neurologic System: Diagnostic Tests

- Noninvasive tests of structure
  - *Skull and spinal x-ray studies
  - *Computed tomography
Neurologic System: Diagnostic Tests (cont.)

- Noninvasive test of function
  * Magnetic resonance spectroscopy
  * Functional magnetic resonance imaging
  * Positron emission tomography
  * Electroencephalogram
  * Evoked potential studies
  * Neuropsychological testing

Neurologic System: Diagnostic Tests (cont.)

- Tests for vascular abnormalities
  * Ophthalmodynamometry
  * Doppler ultrasonography
  * Doppler scanning
  * Quantitative spectral phonoangiography

Neurologic System: Diagnostic Tests (cont.)

- Invasive test of structure
  * Lumbar puncture
  * Myelography
  * Cerebral angiography
  * Interventional angiography
  * Digital venous angiography
  * Cerebral perfusion studies
Neurologic System: Diagnostic Tests (cont.)

- Invasive tests of function
  - Caloric testing
  - Peripheral nerve studies
  - Muscle biopsy
  - Cellular assessment

Management of Comatose or Confused Clients

Definitions

- Consciousness
- Unconsciousness
- Coma
Disorders of Consciousness

- Etiology and risk factors
- Pathophysiology
- Clinical manifestations
- Diagnostic findings
- Laboratory tests
  - Oculocephalic reflex response
  - Oculovestibular reflex response

Disorders of Consciousness (cont.)

- Medical management
  - Determine level of involvement
  - Reverse common causes of coma
  - Prevent complications

Confusional States

- Classifications of confusion
  - Delirium
  - Dementia
- Etiology and risk factors
- Clinical manifestations
- Medical management
Management of Clients with Cerebral Disorders

Seizure Disorders
- Epilepsy
  - Partial seizures with no loss of consciousness
  - Complex partial seizure
  - Generalized seizures
- Status epilepticus

Seizure Disorders: Epilepsy
- Diagnostic tests
  - Electroencephalogram (EEG)
  - Computed tomography (CT)
  - Skull x-ray
  - Magnetic resonance imaging (MRI)
  - Positron emission tomography (PET)
  - Single photon emission computed tomography (SPECT)
Seizure Disorders: Epilepsy (cont.)

- Surgical management
  - Cortical resection of the anterior temporal lobe for complex partial seizures
  - Cortical resection/corpus callosotomy
  - Temporal lobectomy
  - Hemispherectomy
  - Vagal nerve stimulator implantation

Brain Tumors

- Space-occupying lesions
- Increased intracranial pressure
- Intracranial tumors
- Glial tumors
- Oligodendrogliomas
- Pituitary tumors
- Ependymomas

Tumors of Supporting Structures

- Meningiomas
- Acoustic neuromas
- Metastatic brain tumors
Hemorrhagic Cerebrovascular Disorders

- Subarachnoid hemorrhage
  - Intracranial aneurysm
  - Arteriovenous malformation
- Intracerebral hemorrhage

Infections

- Bacterial meningitis
- Bacterial toxins
- Brain abscess
- Viral infections
- Viral meningitis
- Viral encephalitis
- Fungal infections
- Toxoplasmosis

Headaches: Classifications

- Tension headache
- Cluster headache
- Migraine headache
- Lumbar puncture headache
- Postconcussion headache and syndrome
Management of Clients with Stroke

Stroke

- Ischemic
  * Caused by thrombotic or embolic blockage of blood flow to the brain
- Hemorrhagic
  * Caused by bleeding into the brain tissue or the subarachnoid space

Risk Factors: Stroke

- Hypertension
- Cardiovascular disease
- Diabetes
- Cigarette smoking
- Excessive alcohol
- Obesity
### Clinical Manifestations: Stroke
- Hemiparesis (weakness)
- Hemiplegia (paralysis)
- Loss of speech
- Headache
- Vertigo
- Epistaxis
- Retinal hemorrhage

### Deficits Post Stroke
- Hemiparesis
  - Weakness
- Hemiplegia
  - Paralysis
- Aphasia
  - Communication
- Dysarthria
  - Articulation
- Sensory deficits

### Deficits Post Stroke (cont.)
- Dysphagia
  - Swallowing
- Apraxia
  - Motor patterns
- Visual changes
- Depth perception homonymous hemianopia
  - Visual loss
- Behavioral changes
Transient Ischemic Attacks (TIAs)

- Etiology
  - Thromboembolism
- Pathophysiology
  - Transient decrease in blood supply to a focal area of the brain
- Clinical manifestations
  - Rapid onset of weakness, aphasia, and visual field cuts

TIAs (cont.)

- Medical management
  - Prevent the progression
- Surgical management
  - Carotid endarterectomy
- Nursing management
  - Neurologic assessments

Management of Clients with Peripheral Nervous System Disorders
Lower Back Pain

- Etiology
  * Biomechanical origins
  * Destructive origins
- Back strain
  * Acute injury
- Disc herniation
  * Ruptured disc

Lower Back Pain (cont.)

- Lordosis
  * Backward concavity in the lumbar spine
- Spondylolisthesis
  * Forward stripping of one vertebra
- Spondylolysis
  * Structural defect in the neural arch of the spine

Lower Back Pain (cont.)

- Spinal stenosis
  * Ligamentous infolding and hypertrophy of the bone
  * Sciatica: lumbar disc impinges on the sciatic nerve
  * Pain begins in the buttocks and extends down the back of the thigh and leg
Lower Back Pain (cont.)

- Diagnostic findings
  - Magnetic resonance imaging (MRI)
  - Myelography
  - Computed tomography (CT)
- Medical management
  - Goal: reduce pain and spasms
  - Improve mobility and repair problem

Lower Back Pain (cont.)

- Surgical management
  - Chemonucleolysis
  - Percutaneous discectomy
  - Microdiscectomy
  - Decompressive laminectomy
  - Spinal fusion or arthrodesis
  - Spinal fusion with instrumentation

Cervical Disc Disorders

- Discs entrapped in cervical spine
- Medical management
  - Nonsteroidal anti-inflammatory drugs (NSAIDs)
  - Collar
  - Muscle stretching
- Surgical management
  - Cervical fusion
Post-Polio Syndrome

- Syndrome occurs more than 30 years after polio, which caused paralysis from destruction of motor cells in the spinal cord and brain stem.
- Clinical manifestations
  - Fatigue, weakness, temperature intolerance, emotional distress, dysphagia.
- Treatment
  - Pyridostigmine (Mestinon).

Spinal Tumors

- Neurofibromas and meningiomas.
- Clinical manifestations
  - Vary according to location.
- Outcome management
  - Surgery: if compression of the cord is evident.

Vascular Spinal Cord Lesions

- Myelomalacia
  - Softening of the spinal cord from spinal cord occlusion.
- Hematomyelia
  - Hemorrhage into the spinal cord.
- Neurosyphilis
  - Chronic or late stage of syphilis.
Disorders of the Cranial Nerves

- Trigeminal neuralgia
- Bell’s palsy

Disorders of the Peripheral Nerves

- Cumulative trauma disorder (CTD)
- Carpal tunnel syndrome (CTS)
- Ulnar nerve syndrome
- Tarsal tunnel syndrome
- Dupuytren’s contracture
- Ganglion

Management of Clients with Degenerative Neurologic Disorders
Dementia

- Alzheimer’s disease (AD)
  * Preclinical Alzheimer’s disease
  * Mild Alzheimer’s disease
  * Moderate Alzheimer’s disease
  * Severe Alzheimer’s disease
- Multi-infarct dementia (MD)

Parkinson’s Disease

- Classification
- Clinical manifestations
- Management of parkinsonian crisis
- Management of on/off response
- Surgical management

Creutzfeldt-Jakob Disease

- Etiology
  * Subacute central nervous system (CNS) disorder that produces electroencephalogram (EEG) changes and dementia
- Clinical manifestations
  * Vague psychiatric or behavioral changes
  * Weight loss, anorexia, insomnia, malaise, and dizziness
- Outcome management
  * Supportive care only: fatal disease
Huntington’s Disease

- Genetically transmitted degenerative neurologic disease
- Clinical manifestations
  - Abnormal movements
  - Intellectual decline
  - Emotional disturbance
- Outcome management
  - Supportive care: no known treatment

Multiple Sclerosis (MS)

- Etiology: unknown
- Pathophysiology
- Clinical manifestations
- Diagnosis
- Treating acute relapses
- Treating exacerbations
- Symptomatic treatment

Guillain-Barré Syndrome

- Etiology
  - Inflammatory disease involving degeneration of the myelin sheath of peripheral nerves
  - Cause unknown
- Clinical manifestations
  - Ascending weakness
  - Initial, plateau, recovery phase
- Outcome management
  - Supportive care
Myasthenia Gravis

- Etiology
- Clinical manifestations
- Diagnostic findings
- Myasthenic syndrome (Eaton-Lambert syndrome)

Amyotrophic Lateral Sclerosis (ALS)

- Lou Gehrig’s disease
- Clinical manifestations
  - Degeneration of lower and upper motor neuron symptoms
  - Relentlessly progressive
- Outcome management
  - Supportive care

Management of Clients With Neurologic Trauma
Increased Intracranial Pressure
- Etiology
- Risk factors
- Pathophysiology
- Clinical manifestations
  *Related to the location and cause of the increased pressure

Herniation Syndromes
- Transcalvarial: open head injury
- Central transtentorial: injury in cerebral cortex
- Lateral transtentorial: displacement in temporal lobe
- Cingulate: frontal lobes
- Infratentorial: cerebellar herniation

Traumatic Brain Injury
- Mechanisms of injury
- Primary injuries
- Diffuse axonal injury: involves entire brain
- Focal injuries
- Clinical manifestations
- Medical management
- Surgical management
Spinal Cord Injury

- Etiology
- Pathophysiology
- Clinical manifestation
- Syndromes causing partial paralysis
- Diagnosis
- Initial medical care
- Surgical management

Spinal Cord Injury

- Rehabilitation
  - Establish functional goals
  - Promote mobility
  - Reduce spasticity
  - Improve bladder and bowel control
  - Prevent pressure ulcers
  - Reduce respiratory dysfunction
  - Promote expression of sexuality
  - Control pain