

- Overview of Anatomy and Physiology
- Structural divisions
 - Central nervous system (CNS)
 - Brain and spinal cord
 - Peripheral nervous system
 - Somatic nervous system
 - Sends messages from the CNS to the skeletal muscles; voluntary
 - Autonomic nervous system
 - Sends messages from the CNS to the smooth muscle, cardiac muscle, and certain glands; involuntary
- Overview of Anatomy and Physiology
- Cells of the nervous system
 - Neuron
 - Neuromuscular junction
 - Neurotransmitters
 - Acetylcholine; norepinephrine; dopamine; serotonin
 - Neuron coverings
- Figure 54-1
- Overview of Anatomy and Physiology
- Central nervous system
 - Brain
 - Cerebrum
 - Diencephalon
 - Cerebellum
 - Brain stem
 - Midbrain; pons; medulla oblongata; coverings of the brain and spinal cord; ventricles
 - Spinal cord

- Figure 54-2
- Overview of Anatomy and Physiology
- Peripheral nervous system
 - Spinal nerves
 - Cranial nerves
 - Autonomic nervous system
 - Sympathetic nervous system
 - Parasympathetic nervous system
- Figure 54-4
- Overview of Anatomy and Physiology
- Effects of normal aging on the nervous system
 - Loss of brain weight
 - Loss of neurons
 - Reduction in cerebral blood flow
 - Decrease in brain metabolism and oxygen utilization
 - Decreased blood supply to spinal cord causes decreased reflexes
- Overview of Anatomy and Physiology
- Prevention of neurological problems
 - Avoid drug and alcohol use
 - Safe use of motor vehicles
 - Safe swimming practices
 - Safe handling and storage of firearms
 - Use of hardhats in dangerous construction areas
 - Use of protective padding as needed for sports
- Assessment of the Neurological System
- History

- Mental status
- Level of consciousness
 - Glasgow coma scale
- Language and speech
- Cranial nerve function
- Motor function
- Sensory and perceptual status
- Laboratory and Diagnostic Examinations
- Blood and urine
 - Culture
 - Drug screens
 - Arterial blood gases
- Cerebrospinal fluid
- Computed tomography (CT)
- Brain scan
- MRI scan
- PET scan
- Lumbar puncture
- Figure 54-6
- Laboratory and Diagnostic Examinations
- Electroencephalogram
- Myelogram

- Angiogram
- Carotid duplex
- Digital subtraction angiography
- Electromyogram
- Echoencephalogram
- Common Disorders of the Neurological System
- Headaches
 - Etiology/pathophysiology
 - Skull and brain tissues are not able to feel sensory pain
 - Vascular headaches
 - Migraine
 - Cluster
 - Hypertensive
 - Tension headaches
 - Traction-inflammation headaches
- Common Disorders of the Neurological System
- Headaches (*continued*)
 - Clinical manifestations/assessment
 - Head pain
 - Migraine headaches
 - Prodromal (early sign/symptom)
 - Visual field defects, unusual smells or sounds, disorientation, paresthesias
 - During headache
 - Nausea, vomiting, light sensitivity, chilliness, fatigue, irritability, diaphoresis, edema
- Common Disorders of the Neurological System

- Headaches (*continued*)
 - Medical management/nursing interventions
 - Pharmacological management
 - Migraine headaches
 - Aspirin, acetaminophen, ibuprofen
 - Ergotamine tartrate
 - Codeine; Inderal
 - Dietary recommendations
 - Limit MSG, vinegar, chocolate, yogurt, alcohol, fermented or marinated foods, ripened cheese, cured sandwich meat, caffeine, and pork
 - Psychotherapy

- Common Disorders of the Neurological System

- Headaches (*continued*)
 - Medical management/nursing interventions
 - Cluster headaches
 - Narcotic analgesics
 - Tension headaches
 - Non-narcotic analgesics
 - Traction-inflammatory headaches
 - Treat cause
 - Comfort measures
 - Cold packs to forehead or base of skull
 - Pressure to temporal arteries
 - Dark room; limit auditory stimulation

- Common Disorders of the Neurological System

- Neuropathic pain
 - Etiology and pathophysiology
 - May arise from several occurrences
 - The pain transmission is not fully understood
 - Clinical manifestations

- Ranges from mild to excruciating
 - Changes in ability to carry out ADLs
 - Medical management/nursing implications
 - Pharmacological management
 - Anticonvulsants; nonopioid analgesics; antidepressants
 - Comfort measures
- Common Disorders of the Neurological System
- Increased intracranial pressure
 - Etiology/pathophysiology
 - Increase in any content of the cranium
 - Space-occupying lesions, cerebrospinal problems, cerebral edema
 - Clinical manifestations/assessment
 - Diplopia
 - Headache
 - Decreased level of consciousness
 - Pupillary signs
- Common Disorders of the Neurological System
- Increased intracranial pressure (*continued*)
 - Clinical manifestations/assessment (*continued*)
 - Widening pulse pressure
 - Bradycardia
 - Respiratory problems
 - High, uncontrolled temperatures
 - Positive Babinski's reflex
 - Seizures
 - Posturing

- Vomiting
 - Singultus
- Common Disorders of the Neurological System
- Increased intracranial pressure (*continued*)
 - Medical management/nursing interventions
 - Treat cause if possible
 - Pharmacological management
 - Corticosteroids
 - Antacids; histamine-receptor blockers
 - Anticonvulsants
 - Mechanical decompression
 - Craniotomy
 - Craniectomy
 - Internal monitoring devices
- ICP Monitoring:
- Common Disorders of the Neurological System
- Disturbances in muscle tone and motor function
 - Etiology/pathophysiology
 - Damage to the nervous system causes serious problems in mobility
 - Clinical manifestations/assessment
 - Flaccid or hyperreflexic muscle tone
 - Clumsiness or incoordination
 - Abnormal gait
- Common Disorders of the Neurological System
- Disturbances in muscle tone and motor function (*continued*)
 - Medical management/nursing interventions
 - Muscle relaxants

- Protect from falls
 - Assess skin integrity
 - Positioning
 - Sit up and tuck chin when eating
 - Encourage patient to assist with ADLs
 - Emotional support
- Other Disorders of the Neurological System
- Epilepsy or seizures
 - Etiology/pathophysiology
 - Transitory disturbance in consciousness or in motor, sensory, or autonomic function due to sudden, excessive, and disorderly discharges in the neurons of the brain; results in sudden, violent, involuntary contraction of a group of muscles
 - Types: grand mal; petit mal; psychomotor; Jacksonian-focal; myoclonic; akinetic
 - Status epilepticus
- Other Disorders of the Neurological System
- Epilepsy or seizures (*continued*)
 - Clinical manifestations/assessment
 - Depends on type of seizure
 - Aura
 - Postictal period
 - Medical management/nursing interventions
 - During seizure: Protect from aspiration and injury
 - Anticonvulsant medications
 - Surgery
 - Removal of brain tissue where seizure occurs

- Other Disorders of the Neurological System
- Epilepsy or seizures (*continued*)
 - Medical management/nursing interventions (*continued*)
 - Adequate rest
 - Good nutrition
 - Avoid alcohol
 - Avoid driving, operating machinery, and swimming until seizures are controlled
 - Good oral hygiene
 - Medic Alert tag
- Degenerative Diseases
- Multiple sclerosis
 - Etiology/pathophysiology
 - Degenerative neurological disorder with demyelination of the brain stem, spinal cord, optic nerves, and cerebrum
- Figure 54-13
- Demyelination:
- Degenerative Diseases
- Multiple sclerosis (*continued*)
 - Clinical manifestations/assessment
 - Visual problems
 - Urinary incontinence
 - Fatigue
 - Weakness
 - Incoordination
 - Sexual problems

- Swallowing difficulties
- Degenerative Diseases
- Multiple sclerosis (*continued*)
 - Medical management/nursing interventions
 - No specific treatment
 - Pharmacological management
 - Adrenocorticotrophic hormone (ACTH)
 - Steroids
 - Valium
 - Betaseron (interferon beta-1b)
 - Avonex (interferon beta-1a)
 - Pro-banthine; urecholine
 - Bactrim, Septra, and Macroclantin
- Degenerative Diseases
- Multiple sclerosis (*continued*)
 - Medical management/nursing interventions
 - Nutrition
 - Skin care
 - Activity
 - Environmental controls
 - Patient teaching
- Degenerative Diseases
- Parkinson's disease
 - Etiology/pathophysiology
 - Deficiency of dopamine
 - Clinical manifestations/assessment
 - Muscular tremors; bradykinesia
 - Rigidity; propulsive gait
 - Emotional instability

- Heat intolerance
 - Decreased blinking
 - “Pill-rolling” motions of fingers
- Parkinson’s Syndrome
- Figure 54-14
- Degenerative Diseases
- Parkinson’s disease (*continued*)
 - Medical management/nursing interventions
 - Pharmacological management
 - Levodopa
 - Sinemet
 - Artane
 - Cogentin
 - Symmetrol
 - Surgery
 - Activity
 - Nutrition
- Degenerative Diseases
- Alzheimer’s disease
 - Etiology/pathophysiology
 - Impaired intellectual functioning
 - Chronic, progressive degeneration of the cells of the brain
 - Brain changes include plaques in the cortex, neurofibrillary tangles, and the loss of connections between cells and cell death
- Degenerative Diseases
- Alzheimer’s disease (*continued*)
 - Clinical manifestations/assessment

- Early stage
 - Mild memory lapses; decreased attention span
- Second stage
 - Obvious memory lapses
- Third stage
 - Total disorientation to person, place, and time
 - Apraxia; wandering
- Terminal stage
 - Severe mental and physical deterioration

- Degenerative Diseases

- Alzheimer's disease (*continued*)

- Medical management/nursing interventions
 - Pharmacological management
 - Agitation: Lorazepam; Haldol
 - Dementia: Cognex; Aricept
 - Nutrition
 - Finger foods; frequent feedings; encourage fluids
 - Safety
 - Remove burner controls at night
 - Double-lock all doors and windows
 - Constant supervision

- Degenerative Diseases

- Myasthenia gravis

- Etiology/pathophysiology
 - Neuromuscular disorder; nerve impulses fail to pass at the myoneural junction; causes muscular weakness
- Clinical manifestations/assessment
 - Ptosis; diplopia
 - Skeletal weakness; ataxia
 - Dysarthria; dysphagia
 - Bowel and bladder incontinence

- Degenerative Diseases
- Myasthenia gravis (*continued*)
 - Medical management/nursing interventions
 - Pharmacological management
 - Anticholinesterase drugs
 - Prostigmin
 - Mestinon
 - Corticosteroids
 - May require mechanical ventilation
- Degenerative Diseases
- Amyotrophic lateral sclerosis (ALS)
 - Etiology/pathophysiology
 - Motor neurons in the brain stem and spinal cord gradually degenerate
 - Electrical and chemical messages originating in the brain do not reach the muscles to activate them
 - Lou Gehrig's disease
- Degenerative Diseases
- Amyotrophic lateral sclerosis (ALS) (*continued*)
 - Clinical manifestations/assessment
 - Weakness of the upper extremities
 - Dysarthria; dysphagia
 - Muscle wasting
 - Compromised respiratory function
 - Medical management/nursing interventions
 - No cure
 - Rilutec (Riluzole)
 - Multidisciplinary ALS teams; emotional support
- Degenerative Diseases

- Huntington's disease
 - Etiology/pathophysiology
 - Overactivity of the dopamine pathways
 - Genetically transmitted
 - Clinical manifestations/assessment
 - Abnormal and excessive involuntary movements (chorea)
 - Ataxia to immobility
 - Deterioration in mental functions

- Degenerative Diseases

- Huntington's disease (*continued*)
 - Medical management/nursing interventions
 - No cure; palliative treatment
 - Pharmacological management
 - Antipsychotics
 - Antidepressants
 - Antichoreas
 - Safe environment
 - Emotional support
 - High-calorie diet

- Vascular Problems

- Stroke (cerebrovascular accident)
 - Etiology/pathophysiology
 - Abnormal condition of the blood vessels of the brain: thrombosis; embolism; hemorrhage
 - Results in ischemia of the brain tissue
 - Clinical manifestations/assessment
 - Headache
 - Sensory deficit

- Hemiparesis; hemiplegia
 - Dysphasia or aphasia
- Figure 54-17
- Vascular Problems
- Stroke (cerebrovascular accident) (*continued*)
 - Medical management/nursing interventions
 - Thrombosis or embolism
 - Thrombolytics
 - Heparin and Coumadin
 - Decadron
 - Neurological checks
 - Nutritional interventions
 - Physical, occupational, and/or speech therapy
- Cranial and Peripheral Nerve Disorders
- Trigeminal neuralgia
 - Etiology/pathophysiology
 - Degeneration of or pressure on the trigeminal nerve; tic douloureux
 - Clinical manifestations/assessment
 - Excruciating, burning facial pain
 - Medical management/nursing interventions
 - Tegretol
 - Surgical resection of the trigeminal nerve
 - Avoid stimulation of face on affected side
- Cranial and Peripheral Nerve Disorders
- Bell's palsy (peripheral facial paralysis)
 - Etiology/pathophysiology

- Inflammatory process involving the facial nerve
- Clinical manifestations/assessment
 - Facial numbness or stiffness
 - Drawing sensation of the face
 - Unilateral weakness of facial muscles
 - Reduction of saliva
 - Pain behind the ear
 - Ringing in ear or other hearing loss
- Cranial and Peripheral Nerve Disorders
- Bell's palsy (peripheral facial paralysis) (*continued*)
 - Medical management/nursing interventions
 - Pharmacological management
 - Corticosteroids
 - Antiviral medications
 - Electrical stimulation
 - Moist heat
 - Massage of the affected area
 - Facial exercises
- Cranial and Peripheral Nerve Disorders
- Guillain-Barré syndrome
 - Etiology/pathophysiology
 - Inflammation and demyelination of the peripheral nervous system
 - Possibly viral or autoimmune reaction
- Cranial and Peripheral Nerve Disorders
- Guillain-Barré syndrome (*continued*)
 - Clinical manifestations/assessment
 - Symptoms are progressive

- Paralysis usually starts in the lower extremities and moves upward; may stop at any point
- Respiratory failure if intercostal muscles are affected
- May have difficulty swallowing, breathing, and speaking
- Cranial and Peripheral Nerve Disorders
- Guillain-Barré syndrome (*continued*)
 - Medical management/nursing interventions
 - Adrenocortical steroids
 - Apheresis
 - Mechanical ventilation
 - Gastrostomy tube
 - Meticulous skin care
 - Range-of-motion exercises
- Cranial and Peripheral Nerve Disorders
- Meningitis
 - Etiology/pathophysiology
 - Acute infection of the meninges
 - Bacterial or aseptic
 - Increased incidence in winter and fall months
- Cranial and Peripheral Nerve Disorders
- Meningitis (*continued*)
 - Clinical manifestations/assessment
 - Headache; stiff neck
 - Irritability; restlessness
 - Malaise
 - Nausea and vomiting

- Delirium
 - Elevated temperature, pulse, and respirations
 - Kernig's and Brudzinski's signs
- Cranial and Peripheral Nerve Disorders
- Meningitis (*continued*)
 - Medical management/nursing interventions
 - Pharmacological management
 - Antibiotics
 - Massive doses
 - Multiple types
 - IV or intrathecal
 - Corticosteroids
 - Anticonvulsants
 - Antipyretics
 - Dark, quiet room
- Cranial and Peripheral Nerve Disorders
- Encephalitis
 - Etiology and pathophysiology
 - Acute inflammation of the brain caused by a virus
 - Clinical manifestations
 - Headache
 - Fever
 - Seizures
 - Change in LOC
 - Medical management and nursing interventions
 - Primarily supportive
- Cranial and Peripheral Nerve Disorders
- West Nile virus

- Etiology and pathophysiology
 - Principal route of infection through the bite of an infected mosquito
 - Clinical manifestations
 - Fever
 - Headache
 - Back pain
 - Myalgia
 - Prevention
- Cranial and Peripheral Nerve Disorders
- Brain abscess
 - Etiology and pathophysiology
 - Accumulation of pus within the brain tissue
 - Clinical manifestations
 - Headache
 - Fever
 - Drowsiness, changes in LOC
 - Seizures
 - Medical management/nursing interventions
 - Antimicrobial therapy
 - Supportive care
- Cranial and Peripheral Nerve Disorders
- Acquired immunodeficiency syndrome
 - Etiology and pathophysiology
 - Symptoms may develop from the infection with HIV or as a result of an associated infection
 - Clinical manifestations
 - AIDS dementia complex (ADC)
 - Memory loss

- Global cognitive dysfunction
- Medical management/nursing interventions
 - Antiviral, antifungal, antibacterial agents
 - Anticonvulsants
 - Safety
- Cranial and Peripheral Nerve Disorders
- Brain tumors
 - Etiology/pathophysiology
 - Benign or malignant
 - Primary or metastatic
 - May affect any area of the brain
- Cranial and Peripheral Nerve Disorders
- Brain tumors (*continued*)
 - Clinical manifestations/assessment
 - Headache
 - Hearing loss
 - Motor weakness
 - Ataxia
 - Decreased alertness and consciousness
 - Abnormal pupil response and/or unequal size
 - Seizures
 - Speech abnormalities
- Cranial and Peripheral Nerve Disorders
- Brain tumors (*continued*)
 - Medical management/nursing interventions
 - Surgical removal of tumor

- Craniotomy
 - Intracranial endoscopy
 - Radiation
 - Chemotherapy
 - Combination of above
- Trauma
- Craniocerebral trauma
 - Etiology/pathophysiology
 - Motor vehicle and motorcycle accidents, falls, industrial accidents, assaults, and sports trauma
 - Direct trauma: Head is directly injured
 - Indirect trauma: Tension strains and shearing forces
 - Open head injuries
 - Closed head injuries
 - Hematomas
- Trauma
- Craniocerebral trauma
 - Clinical manifestations/assessment
 - Headache
 - Nausea
 - Vomiting
 - Abnormal sensations
 - Loss of consciousness
 - Bleeding from ears or nose
 - Abnormal pupil size and/or reaction
 - Battle's sign
- Trauma

- Craniocerebral trauma (*continued*)
 - Medical management/nursing interventions
 - Maintain airway
 - Oxygen
 - Mannitol and dexamethasone
 - Analgesics
 - Anticonvulsants
- Trauma
- Spinal cord trauma
 - Etiology/pathophysiology
 - Automobile, motorcycle, diving, surfing, other athletic accidents, and gunshot wounds
 - Fracture of vertebra
 - Complete cord injury
 - Incomplete cord injury
- Figure 54-24
- Trauma
- Spinal cord trauma (*continued*)
 - Clinical manifestations/assessment
 - Loss of muscle function depends on level of injury
 - Spinal shock
 - Autonomic dysreflexia
 - Sexual dysfunction
- Trauma
- Spinal cord trauma (*continued*)
 - Medical management/nursing interventions

- Realignment of bony column for fractures or dislocations: Immobilization; skeletal traction
 - Surgery for spinal decompression
- Methylprednisolone
- Mobility: Slowly increase sitting up
- Urinary function: Foley catheter; bladder training
 - Intermittent catheterization
- Bowel program

- Nursing Process

- Nursing diagnoses

- Autonomic dysreflexia
- Communication, impaired
- Coping, compromised family
- Disuse syndrome, risk for
- Grieving
- Infection, risk for
- Knowledge, deficient
- Memory, impaired

- Nursing Process

- Nursing diagnoses (*continued*)

- Mobility, impaired physical
- Nutrition, imbalanced: less than body requirements
- Pain, acute, chronic
- Self-care deficit
- Swallowing, impaired
- Thought process, disturbed
- Tissue perfusion (cerebral), ineffective