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NCLEX Notes Week 12: Neurological System

Cerebrum

- The cerebrum consists of the left and right hemispheres
- Each hemisphere receives sensory information from the opposite side of the body and controls the skeletal muscles on the opposite side
- The cerebrum governs sensory and motor activity and thought and learning

Basal Ganglia

- Cell bodies in white matter that help the cerebral cortex to produce smooth voluntary movements

Hypothalamus

- Regulates autonomic responses of the sympathetic and parasympathetic nervous system
- Regulates the stress response, sleep, appetite, body temperature, fluid balance, and emotions
- Responsible for the production of hormones secreted by the pituitary gland and the hypothalamus

Brain Stem

- Midbrain
    - Responsible for the motor coordination and contains the visual reflex and auditory relay centers
- Pons
    - Contains the respiratory centers and regulates breathing
- Medulla Oblongata
    - Contains all afferent and efferent tracks in cardiac, respiratory, vomiting, and vasomotor centers
    - Controls heart rate, respiration, blood vessel diameter, sneezing, swallowing, vomiting, and coughing

Cerebellum

- Coordinates muscle movement, posture, equilibrium, and muscle tone

Cerebral spinal fluid

- Secreted in the ventricles, circulates in the subarachnoid space and through the ventricles to the subarachnoid space of the meninges, where it is reabsorbed
- Acts as a cushion an AIDS in exchange of nutrients and wastes

Neurons

- A neuron consists of the cell body, axon, and dendrites
- Neurons carrying impulses from the peripheral nervous system to the central nervous system are called *sensory neurons*
- Neurons carry impulses away from the CNS are called *motor neurons*
- *Synapse* is the chemical transmission of impulses from one neuron to another

Spinal Nerves

- There are 31 spinal nerves
- Mixed nerve fibers are formed by joining the anterior motor and posterior sensory roots

Autonomic Nervous System

- Sympathetic fibers dilate pupils, increase heart rate and rhythm, contract blood vessels, and relax smooth muscles of the bronchi
- Parasympathetic does the opposite

Diagnostic Studies

Computed tomography (CT)

- A type of brain scanning that may or may not require the injection of dye
- Is usually used to detect intracranial bleeding, space occupying lesion, cerebral edema, and functions, hydrocephalus, cerebral atrophy, and shifts of brain structures
    - Interventions
        - Assess the patient for allergy to the dye
        - Inform the client there may be a hot, flushed sensation and metallic taste in the mouth when the dye is injected
        - Supply replacement fluids to diurese the dye

Magnetic Resonance Imaging

- A non-invasive procedure that identifies tissues, tumors, and Vascular abnormalities
    - Interventions
        - Remove all metal objects from the client
        - Determine whether the client has a pacemaker, implanted defibrillator, or other metal implants
        - Assess if the patient has claustrophobia
        - Instruct the patient that he or she will need to remain still during the procedure

Lumbar Puncture

- Insertion of a spinal needle through the L-3 to l-4 interstitial space into the lumbar subarachnoid space to obtain cerebrospinal fluid, measure cerebrospinal fluid, or pressure, or in still air, die, or medications
    - Interventions
        - Have patient empty their bladder
        - Position the patient in lateral recumbent position and have the client draw the knees to the abdomen and chin onto the chest
        - Monitor vital signs and neurological signs to check for the presence of leakage of cerebrospinal fluid and also monitor the client for signs of a headache

Neurological Assessment

- Assessment of risks
    - Trauma
    - Hemorrhage
    - Tumors
    - Infection
    - Toxicity
    - Metabolic disorders
    - Hypertension
    - Cigarette smoking
    - Aging process
    - Stress

Assess for posturing

- Decorticate posturing
    - client flexes one or both arms on the chest in may extend the legs
    - indicates a non-functioning cortex
- Decerebrate posturing
    - clients typically extends ones are both arms and possibly the leg
    - extend indicates a brain stem lesion

Assessment of the Autonomic System

- Sympathetic function
    - Increased pulse and blood pressure
    - Dilated pupils
    - Decreased peristalsis

- Parasympathetic function
    - Decreased pulse and blood pressure
    - Constricted pupils
    - Increased salivation
    - Increase peristalsis
    - Dilated blood vessels
    - Bladder contractions

Cranial nerves

Increased intracranial pressure

- May be caused by trauma, hemorrhage, growths, tumors, hydrocephalus, edema, or inflammation
    - Assessment
        - Altered level of consciousness which is the most sensitive and earliest indication of increased intracranial pressure
        - Headache
        - Abnormal respirations
        - Rise in blood pressure with widening pulse pressure
        - Elevated temperature
    - Interventions
        - Monitor respiratory status and prevent hypoxia
        - Maintain body temperature
        - Prevent shivering which can increase intracranial pressure
        - Decrease environmental stimuli
        - Monitor electrolyte levels and acid-base balance

Spinal Cord Injury

- Trauma to the spinal cord causes partial or complete disruption of the nerve tracts in neurons
- Injury can be caused by a contusion, laceration, or compression of the cord
- Loss of motor function, sensation, reflex activity, and bowel and bladder control may result
- Most frequently involved vertebrae
    - Assessment
        - Dependent on level of cord injury
        - Motor and sensory changes below the level of the injury
        - Loss of reflexes below the level of the injury
        - Loss of bladder and bowel control
    - Interventions
        - Assess the respiratory pattern and maintain patent Airway
        - Prevent head flexion, rotation, or extension
        - Frequently assess neurological status
        - Assess motor and sensory scientist to determine the level of the injury
        - Monitor bowel sounds and assess for paralytic Ileus
        - Turn the client every two hours

Spinal Shock

- Complete but temporary loss of motor, sensory, reflex, and autonomic function that occurs immediately after injury as the chords response to the injury

Neurogenic Shock

- Occurs most common in patients with injuries above T6 and usually is experienced soon after the injury
- Massive vasodilation occurs, leading to pooling of the blood and blood vessels, tissue hypoperfusion, and impaired cellular metabolism

Autonomic Dysreflexia

- Commonly caused by visceral distension from a distended bladder or impacted rectum
    - Assessment
        - Sudden onset of severe throbbing headache
        - Severe hypertension and bradycardia
        - Nasal stuffiness
        - Dilated pupils or blurred vision
        - Flushing above the level of the injury
        - Pale extremities below the level of the injury

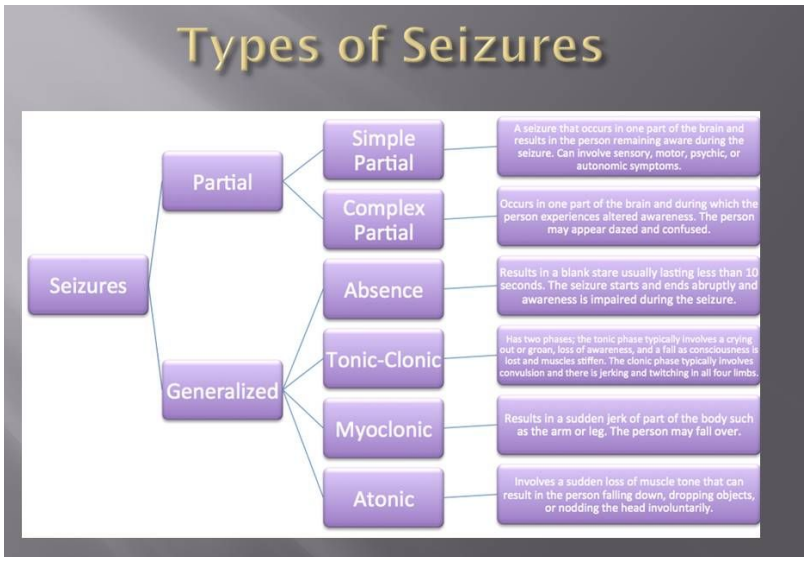
Cerebral Aneurysm

- Dilation of the walls of a weekend cerebral artery
    - Assessment
        - Headache and pain
        - Irritability
        - Visual changes
        - Tinnitus
        - Hemiparesis
    - Interventions
        - Maintain a patient airway
        - Administer oxygen as prescribed
        - Monitor vital signs and four signs of hypertension or dysrhythmias

Seizures

- abnormal, sudden, excessive discharge of electrical activity within the brain
    - Assessment
        - type of seizure
        - occurrence before, during, and after the seizure
        - *Aura:* Sensation that warns the client of an impending seizure

- Interventions
  - Note the time and duration of the seizure
  - Administer oxygen
  - Turn the client onto their side to allow secretions to drain while maintaining the airway
  - Loosen restrictive clothing
  - Do not restrain the client



Stroke

- manifests as a sudden or focal neurological deficit and is caused by cerebrovascular disease
  - Causes
    - Throat from
    - Embolism
    - Hemorrhage
  - Risk factor
    - Atherosclerosis
    - Hypertension
    - Diabetes
    - Stress
    - Obesity
  - Assessment
    - Cheyne-stokes respirations
    - Headache
    - Nausea
    - Ataxia

        - Dysphasia
        - Speech changes
        - Paralysis

Multiple Sclerosis

- a chronic, progressive degenerative disease of the central nervous system characterized by demyelination of the neurons
    - Assessment
        - Fatigue
        - Ataxia
        - Tremor
        - Paresthesias
        - Nystagmus
        - Abnormal reflexes
    - Intervention
        - Promote elimination by bladder and bowel training
        - Encouraged independence
        - Initiate physical and speech therapy

Myasthenia Gravis

- A neuromuscular disease characterized by considerable weakness and abnormal fatigue of the voluntary muscles
    - Assessment
        - Weakness
        - Difficult
        - Dysphasia
        - Ptosis
        - Diplopia

        - Difficulty breathing
    - Interventions
        - Monitor respiratory status
        - Monitor vital signs
        - Monitor speech and swallowing abilities
        - Mssess muscle status

Parkinson's disease

- A degenerative disease caused by the depletion of dopamine, which interferes with the inhibition of excitatory impulses, resulting in the dysfunction of the extrapyramidal system
    - Assessment
        - Bradykinesia
        - Akinesia
        - Tremors in hands and fingers
        - Rigidity with jerky movements
        - Difficulty swallowing and speaking
    - Interventions
        - Assess neurological status
        - Assess ability to swallow
        - Increase fluid intake to 2,000 ml a day
        - Monitor for constipation
        - Promote independence

Guillain-Barre syndrome

- an acute infectious parotitis of the cranial and peripheral nerves
- nervous system overreacts to the infection and is destroys the myelin sheath
    - Assessment
        - Paresthesias
        - Pain
        - Cerebrospinal fluid that reveals an elevated protein level cardiac dysrhythmias
    - Interventions
        - Care is directed towards the treatment of the symptoms including respiratory management
        - Monitor respiratory status
        - Monitor cardiac status
        - Provide medications

Important Medications

Dopaminergic medications

- Stimulate the dopamine receptors and increase the amount of dopamine
    - Side effects
        - Involuntary body movements
        - Chest pain
        - Nausea
        - Vomit
        - Constipation

Anticholinergic Medications

- Block the cholinergic receptors in the CNS
- Reduce hand tremors and drooling
    - Side effects
        - Blurred vision
        - Constipation
        - Urinary retention
        - Confusion
        - Photophobia