

## NEUROLOGICAL DISORDERS

- Diagnostic Tests

### Skull and spinal x-ray

- reveal the size and shape of the skull bones, suture separation in infants, fractures or bony defects, erosion, or calcification
- identify fractures, dislocation, compression, curvature, erosion, narrowed spinal cord, and degenerative processes

### Implementation preprocedure

- immobilization of the neck if a spinal fracture is suspected
- Remove metal items from body parts
- If the client has thick and heavy hair, this should be documented, because it may affect interpretation of the x-ray film

### Computed Tomography (CT) scan

- a type of brain scanning that may or may not require an injection of a dye
- used to detect intracranial bleeding, space-occupying lesions, cerebral edema, infarctions, hydrocephalus, cerebral atrophy, and shifts of brain structures

### Implementation preprocedure

- Obtain a consent if a dye is used
- Assess for allergies to iodine, contrast dyes, or shellfish if a dye is used
- Instruct the client in the need to lie still and flat during the test
- Remove objects from the head, such as wigs, barrettes, earrings, and hairpins
- Assess for claustrophobia

### Implementation preprocedure

- Inform the client if possible mechanical noises as the scanning occurs
- Inform the client that there may be a hot, flushed sensation and a metallic taste in the mouth when the dye is injected
- Note that some clients may be given the dye even if they report an allergy, and are treated with an antihistamine and corticosteroids prior to the injection, to reduce the severity of a reaction

### Implementation postprocedure

- Provide replacement fluids because diuresis from the dye is expected
- Monitor for an allergic reaction to dye

- Assess dye injection site for bleeding or hematoma, and monitor extremity for color, warmth, and the presence of distal pulses

#### Magnetic resonance imaging (MRI)

- a noninvasive procedure that identifies types of tissues, tumors, and vascular abnormalities
- Similar to the CT scan but provides more detailed pictures and does not expose the client to ionizing radiation

#### Implementation preprocedure

- Remove all metal objects from the client
- Determine if the client has a pacemaker, implanted defibrillator, or metal implants such as a hip prosthesis or vascular clips because these clients cannot have this test performed
- Instruct the client that he or she will need to remain still during the procedure

#### Implementation postprocedure

- client may resume normal activities
- expect diuresis if a contrast agent was used

#### Lumbar puncture

- Insertion of a spinal needle through L3-L4 interspace into the lumbar subarachnoid space to obtain cerebrospinal fluid (CSF), measure CSF fluid or pressure, or instill air, dye or medications
- Contraindicated in clients with increased intracranial pressure, because the procedure will cause a rapid decrease in pressure within the CSF around the spinal cord, leading to brain herniation

#### Implementation preprocedure

- obtain a consent
- have the client empty the bladder

#### Implementation during the procedure

- position the client in a lateral recumbent position and have the client draw knees up to the abdomen and chin onto the chest
- Assist with the collection of specimens (label the specimens in sequence)
- Maintain strict asepsis

#### Implementation postprocedure

- Monitor vital signs and neurological signs
- Position the client flat as prescribed
- Force fluids
- Monitor I & O

### Myelogram

- Injection of dye or air into the subarachnoid space to detect abnormalities of the spinal cord and vertebrae

### Implementation preprocedure

- Obtain a consent
- Provide hydration for at least 12 hours before the test
- Assess for allergies to iodine
- Premedicate for sedation as prescribed

### Implementation postprocedure

- if a water-based dye is used, elevate the head 15 to 30 degrees for 8 hours as prescribed
- If an oil-based dye is used, keep the client flat 6 to 8 hours as prescribed
- If air is used, keep the head lower than the trunk as prescribed
- Assess for bladder distention and voiding

### Cerebral angiography

- Injection of contrast through the femoral artery into the carotid arteries to visualize the cerebral arteries and assess for lesions

### Implementation preprocedure

- obtain a consent
- Assess the client for allergies to iodine and shellfish
- Encourage hydration for 2 days before the test
- NPO 4 to 6 hours prior to the test as prescribed
- Mark the peripheral pulses
- Remove metal items from the hair

### Implementation postprocedure

- Monitor for swelling in the neck and for difficulty swallowing and notify the physician if these symptoms occur
- Elevate the head of the bed 15 to 30 degrees only if prescribed
- Keep the bed flat if the femoral artery is used, as prescribed
- Assess peripheral pulses

- Immobilize the puncture site for 12 hours as prescribed
  - Apply sandbags and a pressure dressing to the injection site as prescribed
  - Force fluids
2. Electroencephalography
- A graphic recording of the electrical activity of the superficial layers of the cerebral cortex

#### Implementation preprocedure

- Wash the client's hair
- Inform the client that electrodes are attached to the head and that electricity does not enter the head
- Withhold stimulants, antidepressants, tranquilizers, and anticonvulsants for 24 to 48 hours prior to the test as prescribed

#### Implementation postprocedure

- Wash the client's hair
- Maintain side rails and safety precautions if the client was sedated

#### Caloric Testing (oculovestibular testing)

- Provides information about the function of the vestibular portion of the eighth cranial nerve and aids in the diagnosis of cerebellum and brainstem lesions

#### Procedure

- Patency of the external canal is confirmed
- Cold or warm water is introduced into the external auditory canal
- Stimulation of the auditory canal with warm water produces a horizontal nystagmus toward the side of the irrigated ear when the vestibular eighth cranial nerve is normal
- Stimulation of the auditory canal with cold water produces a horizontal nystagmus away from the side of the irrigated ear if the brainstem is intact

#### The Unconscious Client

- A state of depressed cerebral functioning with unresponsiveness to sensory and motor function
- Some of the cause include head trauma, cerebral toxins, shock, hemorrhage, tumor, and infection

#### Assessment

- Unarousable
- Primitive or no response to painful stimuli

- Altered respirations
- Decreased cranial nerve and reflex activity

#### Implementation

- Assess patency of airway and keep an airway and emergency equipment at the bedside
- Maintain a patent airway and ventilation because a high CO<sub>2</sub> level increases intracranial pressure
- Suction PRN
- Assess neurological status, including LOC, pupillary reactions, motor and sensory function
- Place the client in semi-Fowler's position
- Change the position of the client every 2 hours, avoiding injury when turning

#### Implementation

- Use side rails at all times
- Assess for edema
- Maintain NPO status until consciousness returns
- Check the gag and swallowing reflex before resuming diet, and begin with ice chips and fluids

#### Implementation

- Monitor for constipation, impaction, and paralytic ileus
- maintain urinary output to prevent stasis, infection, and calculus formation
- Remove dentures and contact lenses
- Assume that the unconscious client can hear
- Avoid restraints
- Do not leave the client unattended if unstable
- Initiate seizure precautions if necessary
- Provide range-of-motion exercises to prevent contractures

#### Increased Intracranial Pressure

- An increase in ICP caused by trauma, hemorrhage, growths or tumors, hydrocephalus, edema, or inflammation
- Can impede circulation to the brain, impede the absorption of CSF, affect the functioning of nerve cells, and lead to brainstem compression and death

#### Assessment

- Assess level of consciousness (LOC), which is the most sensitive and earliest indication of increasing intracranial pressure
- Headache

- Abnormal respirations
- Rise in blood pressure with widening pulse pressure
- Vomiting

#### Assessment

- Pupil changes
- Changes in motor function from weakness to hemiplegia, a positive Babinski reflex, decorticate or decerebrate posturing, and seizures
- Late signs of increased ICP include increased systolic blood pressure, widened pulse pressure, and slowed heart rate

#### Implementation

- Elevate the head of the bed 30 to 40 degrees as prescribed
- Avoid Trendelenburg position
- Prevent flexion of the neck and hips
- Monitor respiratory status and prevent hypoxia
- Prevent shivering, which can raise ICP
- Decrease environmental stimuli
- avoid straining activities such as coughing and sneezing
- Instruct the client to avoid Valsalva maneuver

#### Surgical Intervention for ICP

- Ventriculoperitoneal Shunt
- Shunts CSF from ventricles into the peritoneum
- Implementation Postprocedure
- Position the client supine and turn from back to non-operative side
- Monitor for signs of increasing ICP resulting from shunt failure
- Monitor for signs of infection

#### Hyperthermia

- A temperature of 106 degrees F, which increases the cerebral metabolism and increases the risk of hypoxia
- The causes include infection, heat stroke, exposure to high environmental temperatures, and dysfunction of the thermoregulatory center

#### Assessment

- Temperature of 106 degrees F
- Shivering
- Nausea and vomiting

#### Implementation

- Maintain a patent airway
- Initiate seizure precautions
- Monitor lung sounds
- Monitor for dysrhythmias
- Assess peripheral pulses for systemic blood flow
- Induce normothermia with fluids, cool baths, fans, or hypothermia blanket

#### Inducing normothermia

- Prevent shivering, which will increase CSF pressure and oxygen consumption
- Administer medications as prescribed to prevent shivering
- Monitor I & O
- Prevent trauma to the skin and tissues
- Apply lotion to the skin frequently

#### Head Injury

- usually caused by car accidents, falls, assaults
- Types:
  - Concussion
  - Contusion
  - Hemorrhage

#### Concussion

- severe blow to the head jostles brain causing it to strike the skull; results in temporary neural dysfunction

#### Contusion

- results from more severe blow that bruises the brain and disrupts neural function

#### Hemorrhage

- epidural hematoma
- accumulation of blood between the dura mater and skull; commonly results from laceration of middle meningeal artery during skull fracture; blood accumulates rapidly
- subdural hematoma
- accumulation of blood between the dura and arachnoid; venous bleeding that forms slowly; may be acute, subacute, or chronic

#### Hemorrhage

- subarachnoid hematoma
- – bleeding in the subarachnoid space

- intracerebral hematoma
- – accumulation of blood within the cerebrum

#### Assessment findings

- Concussion – headache, transient loss of consciousness, retrograde or posttraumatic amnesia, nausea, dizziness, irritability
- Contusion – neurologic deficits depend on the site and extent of damage; include decreased LOC, aphasia, hemiplegia, sensory deficits

#### Assessment findings

- Hemorrhages
- a. epidural hematoma
- - brief loss of consciousness followed by lucid interval; progresses to severe headache, vomiting, rapidly deteriorating LOC, possible seizure, ipsilateral papillary dilation

#### Assessment findings

- b. subdural hematoma
- - alterations in LOC, headache, focal neurologic deficits, personality changes, ipsilateral papillary dilation
- c. intracerebral hematoma
- - headache, decreased LOC, hemiplegia, ipsilateral papillary dilation

#### Nursing Interventions

- Maintain a patent airway and adequate ventilation
- Observe for CSF leakage
- a. bloody spot encircled by watery, pale ring on pillowcase or sheet
- b. never attempt to clean the ears or nose of a head-injured client or use nasal suction unless cleared by physician

#### Nursing Interventions

- 4. If a CSF leak is present
- a. instruct client not to blow nose
- b. elevate head of bed 30 degrees as ordered
- d. place a cottonball in the ear to absorb otorrhea; replace frequently

#### Spinal Cord Injuries

- - occurs most commonly in young adults male between ages 15 and 25
- -causes – motor vehicle accidents, diving in shallow water, falls, industrial accidents, sports injuries, gunshot or stab wounds



- - nontraumatic causes – tumors, hematomas, aneurysms, congenital defects (spina bifida)

### Pathophysiology

- Hemorrhage and edema cause ischemia, leading to necrosis and destruction of the cord

### Medical Management

- 1. Horizontal turning frames
- 2. Skeletal traction:
  - a. Cervical tongs
    - – inserted through burr holes; traction is provided by a rope extended from the center of tongs over a pulley with weights attached at the end

### Cervical tongs

### Medical Management

- b. Halo traction
  - 1) stainless steel halo ring fits around the head and is attached to the skull with four pins; halo is attached to plastic body cast or plastic vest
  - 2) permits early mobilization, decreased period of hospitalization and reduces complications of immobility

### Assessment findings

- 1. Spinal shock
  - characterized by absence of reflexes below the level of the lesion, flaccid paralysis, lack of temperature control in affected parts, hypotension with bradycardia, retention of urine and feces
  - quadriplegia – cervical injuries (C1-C8) cause paralysis of all four extremities; respiratory paralysis occurs in lesions above C4 due to lack of innervation to the diaphragm
  - paraplegia – thoraco/lumbar injuries (T1-L4) cause paralysis of the lower half of the body involving both legs

### Assessment findings

- 1) complete cord transection
  - a) loss of all voluntary movement and sensation below the level of the injury; reflex activity below the level of the lesion may return after spinal shock resolves
  - b) lesions in the conus medullaris or cauda equine result in permanent flaccid paralysis and areflexia

- 2) incomplete lesions – varying degrees of motor or sensory loss below the level of the lesion depending on which neurologic tracts are damaged and which are spared

#### Nursing Interventions: emergency care

- 1. assess airway, breathing, circulation
  - a. do not move the client during assessment
  - b. if airway obstruction or inadequate ventilation exists: do not hyperextend neck to open airway, use jaw thrust instead
- 2. perform a quick head-to-toe assessment: check for LOC, signs of trauma to the head or neck, leakage of clear liquid from ears or nose, signs of motor or sensory impairment
- 3. immobilize the client in the position found until help arrives

#### Nursing Interventions : acute care

- Maintain optimum respiratory function
- Maintain optimal cardiovascular function
- change position slowly and gradually elevate the head of bed to prevent postural hypotension
- . Maintain immobilization and spinal alignment always
  - a. turn every hour on turning frame
  - b. maintain cervical traction at all times if indicated

#### Nursing Interventions : acute care

- Maintain urinary elimination
- maintain bowel elimination: administer stool softeners and suppositories to prevent impaction as ordered
- Monitor temperature control
- Observe for and prevent infection

#### Nursing Interventions : acute care

- 10. Observe for and prevent stress ulcers
  - a. assess for epigastric or shoulder pain
  - b. if corticosteroids are ordered, give with food or antacids; administer cimetidine (Tagamet) as ordered
  - c. Check nasogastric tube contents and stools for blood

#### Nursing Interventions – chronic care

- 1. Neurogenic bladder

- reflex or upper motor neuron bladder; reflex activity of the bladder may occur after spinal shock resolves; the bladder is unable to store urine very long and empties involuntarily
- nonreflexive or lower motor neuron bladder: reflex arc is disrupted and no reflex activity of the bladder occurs, resulting in urine retention with overflow

#### Nursing Interventions – chronic care

- c. management of reflexive bladder
- intermittent catheterization every 4 hours and gradually progress to every 6 hours
- regulate fluid intake to 1800- 2000 cc/day
- bladder taps or stimulating trigger points to cause reflex emptying of the bladder

#### Nursing Interventions – chronic care

- d. Management of nonreflexive bladder
- intermittent catheterization every 6 hours
- Crede maneuver or rectal stretch
- regulate intake to 1800- 2000 cc/day to prevent overdistention of bladder

#### Nursing Interventions – chronic care

- 2. Spasticity
- drug therapy : baclofen (Lioresal), dantrolene (Dantrium), diazepam (Valium)
- physical therapy – stretching exercises, warm tub baths, whirlpool
- surgery – chordotomy

#### Autonomic dysreflexia

- rise in blood pressure, sometimes to fatal levels
- occurs in clients with cord lesions above T6 and most commonly in clients with cervical injuries
- stimulus may be overdistended bladder or bowel, decubitus ulcer, chilling, pressure from bedclothes

#### Symptoms

- severe headache
- hypertension
- bradycardia, sweating
- goosebumps
- nasal congestion
- blurred vision
- convulsion

#### Interventions

- raise client to sitting position to decrease BP
- check for source of stimulus (bladder, bowel, skin)
- remove offending stimulus (catheterize client, digitally remove impacted feces, reposition client)
- monitor blood pressure

### Intracranial Surgery

- Craniotomy – surgical opening of skull to gain access to intracranial structures; used to remove a tumor, evacuate blood clot, control hemorrhage, relieve increased ICP
- 2. Craniectomy – excision of a portion of the skull; sometimes used for decompression
- 3. Cranioplasty – repair of a cranial defect with a metal or plastic plate

### Craniotomy

#### Nursing Interventions – preoperative

- Routine pre-op care
- Shampoo the scalp and check for signs of infection
- Shave hair
- Evaluate and record baseline vital signs and neuro checks
- Avoid enemas unless directed (straining increase ICP)
- Give pre-op steroids as ordered to decrease brain swelling
- Insert Foley catheter as ordered

#### Nursing Interventions: postoperative

- Supratentorial incision – elevate head of bed 15-45 degrees as ordered; position on back (if intubated or conscious) or on unaffected side; turn every 2 hours to facilitate breathing and venous return
- Infratentorial incision – keep of head flat or elevate 20-30 degrees as ordered; do not flex head on chest; turn side to side every 2 hours using a turning sheet; check respirations closely and report any signs of respiratory distress

#### Nursing Interventions: postoperative

- watch for signs of diabetes insipidus (severe thirst, polyuria, dehydration) and inappropriate ADH secretion (decreased urine output, hunger, thirst, irritability, decreased LOC, muscle weakness)
- For infratentorial surgery – may be NPO for 24 hours due to possible impaired swallowing and gag reflexes

#### Nursing Interventions: postoperative

- check dressings for excessive drainage, CSF, infection, displacement, and report to physician
- if surgical drain is in place, note color, amount, and odor of drainage
- Administer medications as ordered
  - a. Corticosteroids – to decrease cerebral edema
  - b. anticonvulsants – to prevent seizures
  - c. stool softeners – to prevent straining
  - d. mild analgesics
- Apply ice to swollen eyelids; lubricate lids and areas around eyes with petrolatum jelly

### Seizure Disorders

- Seizures – recurrent sudden changes in consciousness, behavior, sensations, and/or muscular activities beyond voluntary control that are produced by excess neuronal discharge
- Epilepsy – chronic recurrent seizures

### Causes

- structural or space-occupying lesion
- metabolic abnormalities
- infection
- encephalopathy
- Degenerative diseases (Tay-Sachs)
- Congenital CNS defects (hydrocephalus)
- Vascular problems (intracranial hemorrhage)

### Pathophysiology

- with seizures, many more neurons than normal fire in a synchronous fashion in a particular area of the brain; the energy generated overcomes the inhibitory feedback mechanism

### Classification

- Generalized – initial onset in both hemispheres, usually involves loss of consciousness and bilateral motor activity

### Classification

- 1. major motor seizures (grand mal)
- Maybe preceded by aura; tonic and clonic phases
- Tonic phase - limbs contract or stiffen; pupils dilate and eyes roll up and to one side; glottis closes, causing noise on exhalation; may be incontinent; occurs at same time as loss of consciousness; lasts 20-40 seconds

- Clonic phase – repetitive movements, increased mucus production; slowly tapers
  - seizure ends with postictal period of confusion, drowsiness

#### Classification

- 2. Absence seizures (petit mal)
  - - usually non-organic brain damage present; must be differentiated from daydreaming
  - - sudden onset, with twitching or rolling of eyes; lasts a few seconds

#### Classification

- 3. Myoclonic seizures
  - – associated with brain damage, may be precipitated by tactile or visual sensations
  - - may be generalized or local
  - - brief flexor muscle spasm; may have arm extension, trunk flexion
  - - single group of muscle affected; involuntary muscle contractions; myoclonic jerks

#### Classification

- 4. Akinetic seizure
  - – related to organic brain damage
  - - sudden brief loss of postural tone, and temporary loss of consciousness

#### Classification

- 5. Febrile seizure
  - - common in 5% of population under 5, familial, nonprogressive; does not generally result in brain damage
  - - seizure occurs only when fever is rising
  - -EEG is normal 2 weeks after seizures

#### 3. Classification

- Partial seizures
  - – begins in focal area of brain and symptoms are appropriate to a dysfunction of that area; may progress into a generalized seizure, further subdivided into simple partial or complex partial

#### Classification

- 1. Psychomotor seizure
  - - may follow trauma, hypoxia, drug use
  - -purposeful but inappropriate, repetitive motor acts
  - - aura present; dreamlike state
- 2. Simple partial seizure
  - - seizure confined to one hemisphere of brain

- - no loss of consciousness
- - may be motor, sensory, or autonomic symptoms

### Classification

- 3. Complex partial seizure
  - - begins in focal area but spreads to both hemispheres
  - - impairs consciousness
  - - may be preceded by an aura
- 4. status epilepticus
  - - seizure is prolonged (or there are repeated seizures without regaining consciousness) and unresponsive to treatment
  - - can result in decreased oxygen supply and possible cardiac arrest

### Medical management

- Phenytoin
  - inhibits spread of electrical discharge
- Phenobarbital
  - – elevates the seizure threshold and inhibits the spread of electrical discharge
- Surgery
  - – to remove the tumor, hematoma, or epileptic focus

### Assessment findings

- blood studies to rule out lead poisoning, hypoglycemia, infection, or electrolyte imbalances
- lumbar puncture to rule out infection or trauma
- skull x-rays, CT scan, or ultrasound of the head, brain scan, arteriogram, or pneumoencephalogram to detect any pathologic defects

### Assessment findings

- EEG may detect abnormal wave patterns characteristic of different types of seizures
- 1) children may be awake or asleep; sedation is ordered and child may be sleep deprived the night before the test
- 2) evocative stimulation – flashing stobe light, clicking sounds, hyperventilation

### Nursing Interventions

- prevent falling, gently support head
- decrease external stimuli; do not restrain
- loosen tight clothing
- keep airway open
- observe and record seizure

## Cerebrovascular Accident (CVA)

- destruction (infarction) of brain cells caused by a reduction in cerebral blood flow and oxygen
- - caused by thrombosis, embolism, hemorrhage

## Risk factors

- hypertension, diabetes mellitus, arteriosclerosis/atherosclerosis, cardiac disease (valvular disease/ replacement, chronic atrial fibrillation, myocardial infarction)
- obesity, smoking, inactivity, stress, use of oral contraceptives

## Pathophysiology

- interruption of cerebral blood flow for 5 minutes or more causes death of neurons in affected area with irreversible loss of function

## Modifying factors

- cerebral edema – develops around affected area causing further impairment
- 2) vasospasm – constriction of cerebral blood vessel may occur, causing further decrease in blood flow
- 3) collateral circulation – may help to maintain cerebral blood flow when there is compromise of main blood supply

## Stages of development

- a. Transient ischemic attack (TIA)
  - - warning sign of impending CVA
  - - brief period of neurologic deficit – visual loss, hemiparesis, slurred speech, aphasia, vertigo
  - - may last less than 30 seconds, but no more than 24 hours with complete resolution of symptoms

## Stages of development

- b. Stroke in evolution
  - progressive development of stroke symptoms over a period of hours to days
- c. completed stroke
  - - neurologic deficit remains unchanged for a 2-to-3-day period

## Assessment findings

- Headache



- Generalized signs – vomiting, seizures, confusion, disorientation, decreased LOC, nuchal rigidity, fever, hypertension, slow bounding pulse, Cheyne-Stokes respirations
- Focal signs ( related to site of infarction) – hemiplegia, sensory loss, aphasia, homonymous hemianopsia

#### Assessment findings

- CT and brain scan reveal lesion
- EEG – abnormal changes
- Cerebral arteriography – may show occlusion or malformation of blood vessels

#### Nursing Interventions acute stage

- Maintain patent airway and adequate ventilation
- Provide complete bed rest as ordered
- nasogastric tube feedings if client unable to swallow
- c. fluid restriction as ordered to decrease cerebral edema
- head of bed may be elevated 30- 45 degrees to decrease ICP
- turn and reposition every 2 hours (only 20 minutes on the affected side)
- passive ROM exercises every 4 hours
- administer stool softeners and suppositories as ordered to prevent constipation and fecal impaction
- Establish a means of communicating with the client
- Administer medications as ordered
  - a. hyperosmotic agents, corticosteroids to decrease cerebral edema
  - b. anticonvulsants to prevent or treat seizures
  - c. anticoagulants for stroke in evolution or embolic stroke
- Heparin
- warfarin (Coumadin) for long-term therapy
- aspirin and dipyrimadole (Persantine) to inhibit platelet aggregation in treating TIAs
- Antihypertensives if indicated for elevated blood pressure

#### Nursing Interventions – rehabilitation

- Hemiplegia
  - – results form injury to cells in the cerebral motor cortex or to corticospinal tracts (causes contralateral hemiplegia since tracts cross in medulla)
  - turn every two hours
  - use proper positioning and repositioning to prevent deformities
  - support paralyzed arm on pillow or use sling while out of bed to prevent subluxation of shoulder
  - elevate extremities to prevent dependent edema
  - provide active and passive ROM exercises every 4 hours

### Susceptibility to hazards

- keep side rails up at all times
- institute safety measures
- inspect body parts frequently for signs of injury

### Dysphagia

- check gag reflex before feeding client
- place food in unaffected side of mouth
- offer soft foods

### Homonymous hemianopsia

- – loss of half of each visual field
- approach client on unaffected side
- place personal belongings, food, etc., on unaffected side
- gradually teach client to compensate by scanning (turning the head to see things on affected side)

### Emotional lability

- create a quiet, restful environment with a reduction in excessive sensory stimuli
- maintain a calm, nonthreatening manner
- explain to family that the client's behavior is not purposeful

### Aphasia

- a. receptive aphasia
  - 1) give simple, slow directions
  - 2) give one command at a time; gradually shift topics
  - 3) use nonverbal techniques of communication (pantomime, demonstration)
- b. expressive aphasia
  - 1) listen and watch very carefully when the client attempts to speak
  - 2) anticipate client's needs to decrease frustration and feelings of helplessness
  - 3) allow sufficient time for client to answer

### Sensory/ perceptual deficits

- characterized by impulsiveness, unawareness of disabilities, visual neglect (neglect of affected side and visual space on affected side)
  - a. assist with self-care
  - b. provide safety measures
  - c. initially arrange objects in environment on unaffected side
  - d. gradually teach client to take care of the affected side and to turn frequently and look at affected side

## Apraxia

- loss of ability to perform purposeful, skilled acts
- guide client through intended movement (take object such as washcloth and guide client through movement of washing)
- b. keep repeating the movement

## Left Hemiplegia Versus Right Hemiplegia

- a. Left hemiplegia
  - 1) perceptual, sensory deficits; quick and impulsive behavior
  - 2) use safety measures, verbal cues, simplicity in all areas of care
- b. Right hemiplegia
  - 1) speech- language deficits; slow and cautious behavior
  - 2) use pantomime and demonstration

## Multiple Sclerosis

- - chronic, intermittently progressive disease of the CNS, characterized by scattered patches of demyelination within the brain and spinal cord

## Assessment findings

- visual disturbances:
- impaired sensation
- euphoria or mood swings
- impaired motor function:
- impaired cerebellar function
- nystagmus, dysarthria, intention tremor
- bladder : retention or incontinence
- constipation
- sexual impotence in male
- CSF studies – increased protein and Ig (immunoglobulin)
- Visual evoked response (VER) determined by EEG – may be delayed
- CT scan – increased density of white matter
- MRI – shows areas of demyelination

## 4. Nursing Interventions

- muscle-stretching and strengthening exercises
- assistive devices : canes, walker, rails, wheelchair as necessary
- Administer medications
  - a. for acute exacerbations : corticosteroids (ACTH [IV], prednisone) to reduce edema at sites of demyelination
  - b. for spasticity : baclofen (Lioresal), dantrolene (Dantrium), diazepam (Valium)
- Encourage independence in self-care activities
- perform intermittent catheterization as ordered
- Force fluids to 3000 cc/day

- test bath water with thermometer
- avoid heating pads, hot-water bottles
- inspect body parts frequently for injury
- make frequent position changes

### Myasthenia Gravis

- - a neuromuscular disorder in which there is a disturbance in the transmission of impulses from nerve to muscle cells at the neuromuscular junction, causing extreme muscle weakness
- - thought to be autoimmune disorder whereby antibodies destroy acetylcholine receptor sites on the postsynaptic membrane of the neuromuscular junction
- - voluntary muscles are affected, especially those muscles innervated by the cranial nerves

### Surgery (thymectomy)

- surgical removal of the thymus gland (thought to be involved in the production of acetylcholine receptor antibodies)

### Plasma exchange

- removes circulating acetylcholine receptor antibodies
- use in clients who do not respond to other types of therapy

### Assessment findings

- Diplopia, dysphagia
- Extreme muscle weakness, increased with activity and reduced with rest
- Ptosis, masklike facial expression
- Weak voice, hoarseness

### Assessment findings

- Tensilon test – IV injection of Tensilon provides spontaneous relief of symptoms (lasts 5-10 minutes)
- Electromyography (EMG) – amplitude of evoked potentials decrease rapidly
- Presence of antiacetylcholine receptor antibodies in the serum

### Nursing Interventions

- Administer anticholinesterase drugs as ordered
- check gag reflex and swallowing ability before feeding
- Monitor respiratory status frequently : rate, depth; vital capacity; ability to deep breathe and cough
- Observe for signs of myasthenic or cholinergic crisis

- a. Myasthenic crisis
- 1) abrupt onset of severe, generalized muscle weakness with inability to swallow, speak, or maintain respirations
- 2) caused by undermedication, physical or emotional stress, infection
- b. Cholinergic crisis
- -excessive salivation and sweating, abdominal cramps, nausea and vomiting, diarrhea, fasciculations
- 2) caused by overmedication with the cholinergic (anticholinesterase) drugs
- 3) symptoms worsen with Tensilon test; keep atropine sulfate and emergency equipment on hand

### Nursing Care in Crisis

- maintain tracheostomy or endotracheal tube with mechanical ventilation as indicated
- administer medications as ordered
- a) myasthenic crisis – increase doses of anticholinesterase drugs as ordered
- b) cholinergic crisis – discontinue anticholinesterase drugs as ordered until the client recovers
- establish a method of communication

### Parkinson's Disease

- a progressive disorder with degeneration of the nerve cells in the basal ganglia resulting in generalized decline in muscular function; disorder of the extrapyramidal system
- usually occurs in the older population

### Pathophysiology

- disorder causes degeneration of the dopamine-producing neurons in the substantia nigra in the midbrain
- dopamine influences purposeful movement
- depletion of dopamine results in degeneration of the basal ganglia

### Assessment findings

- tremor – mainly of the upper limbs, “pill rolling”, resting tremor; most common initial symptom
- rigidity : cogwheel type
- bradykinesia – slowness of movement
- fatigue
- stooped posture; shuffling, propulsive gait
- difficulty rising from sitting position
- masklike face with decreased blinking of eyes
- quiet, monotone speech

- emotional lability, depression
- increased salivation, drooling
- cramped, small handwriting
- autonomic symptoms – excessive sweating, seborrhea, lacrimation, constipation; decreased sexual capacity

### Nursing Interventions

- 1. Administer medications as ordered
- Levodopa (L-dopa)
- Carbidopa- levodopa (Sinemet)
- Amantadine (Symmetrel)
- Anticholinergic drugs
- Antihistamines: diphenhydramine (Benadryl)
- Bromocriptine (Parlodel)
- Side rails on bed; rails and handlebars in toilet, bathtub, and hallways; no scatter rugs
- Hard-back or spring-loaded chair to make getting up easier
- Improve communication abilities: instruct client to practice reading aloud, to listen to own voice, and enunciate each syllable clearly
- cut food into bite-sized pieces
- provide, small, frequent feedings

### Trigeminal Neuralgia (Tic Douloureux)

- - disorder of cranial nerve V causing disabling and recurring attacks of severe pain along the sensory distribution of one or more branches of the trigeminal nerve

### Medical management

- 1. anticonvulsant drugs : carbamazepine (Tegretol), phenytoin (Dilantin)
- 2. Nerve block: injection of alcohol or phenol into one or more branches of the trigeminal nerve; temporary effect, lasts 6-18 months
- 3. Surgery
  - a. peripheral – avulsion of peripheral branches of trigeminal nerve
  - 1)retrogasserian rhizotomy
    - – total severance of the trigeminal nerve intracranially; results in permanent anesthesia, numbness, heaviness, and stiffness in affected part; loss of corneal reflex
  - 2) microsurgery
    - – uses more precise cutting and may preserve facial sensation and corneal reflex
  - 3) percutaneous radio-frequency rhizotomy –thermally destroys the trigeminal nerve in the area of the ganglion
  - 4) microvascular decompression of trigeminal nerve
    - - decompresses the trigeminal nerve;

## Assessment findings

- sudden paroxysms of extremely severe shooting pain in one side of the face
- attacks may be triggered by a cold breeze, foods/fluids of extreme temperature, toothbrushing, chewing, talking, or touching the face
- During attack: twitching, grimacing, and frequent blinking/tearing of the eye
- poor eating and hygiene habits
- withdrawal from interactions with others

## Nursing Interventions

- assess characteristics of the pain including triggering factors, trigger points, and pain management techniques
- administer medications as ordered; monitor response
- maintain room at an even, moderate temperature, free from drafts
- provide small, frequent feedings of lukewarm, semiliquid, or soft foods that are easily chewed
- provide the client with a soft washcloth and lukewarm water and perform hygiene during periods when pain is decreased
- prepare the client for surgery if indicated

## Bells' Palsy

- - disorder of cranial nerve VII resulting in the loss of ability to move the muscles on one side of the face
- - complete recovery in 3-4 months in majority of clients

## Assessment findings

- loss of taste over anterior two-thirds of tongue on affected side
- complete paralysis of one side of face
- loss of expression, displacement of mouth toward unaffected side, and inability to close eyelid (all on affected side)
- pain behind the ear

## Nursing Interventions

- Assess facial nerve function regularly
- provide soft diet with supplementary feedings as indicated
- instruct to chew on unaffected side, avoid hot fluids/foods, and perform mouth care after each meal
- provide special eye care to protect the cornea
- dark glasses (cosmetic and protective reasons) or eyeshield
- artificial tears to prevent drying of the cornea

- ointment and eye patch at night

### Guillain- Barre Syndrome

- symmetrical, bilateral, peripheral polyneuritis characterized by ascending paralysis
- cause unknown; may be an autoimmune process
- - precipitating factors – antecedent viral infection, immunization

### Assessment findings

- mild sensory changes; in some clients severe misinterpretation of sensory stimuli resulting in extreme discomfort
- clumsiness : usually first symptom
- progressive motor weakness in more than one limb (classically is ascending and symmetrical)
- cranial nerve involvement (dysphagia)
- ventilatory insufficiency if paralysis ascends to respiratory muscles
- absence of deep tendon reflexes
- autonomic dysfunction
- CSF studies- increased protein
- EMG – slowed nerve conduction

### Nursing Interventions

- Maintain adequate ventilation
- Check individual muscle groups every 2 hours in acute phase to check for progression of muscle weakness
- Assess cranial nerve function : check gag reflex and swallowing ability; ability to handle secretions; voice
- monitor vital signs and observe for signs of autonomic dysfunction such as acute periods of hypertension fluctuating with hypotension, tachycardia, arrhythmias
- administer corticosteroids to suppress immune reaction as ordered

### Encephalitis

- inflammation of the brain caused by virus, e.g. herpes simplex (type I) or abovirus (transmitted by mosquito or tick)
- may occur as a sequela of other diseases such as measles, mumps, chicken pox

### Assessment findings

- headache
- fever, chills, vomiting
- signs of meningeal irritation



- possibly seizures
- alteration in LOC

#### Nursing Interventions

- monitor vital signs and neuro checks frequently
- provide nursing measures for increased ICP, seizures, hyperthermia if they occur
- provide nursing care for confused or unconscious client as needed

#### Meningitis

- - inflammation of the meninges of the brain and spinal cord
- - caused by bacteria, viruses, or other microorganisms
- - may reach CNS
  - a. via the blood, CSF, lymph
  - b. by direct extension from adjacent cranial structures (nasal sinuses, mastoid bone, ear, skull fracture)
  - c. by oral or nasopharyngeal route

#### Assessment findings

- headache, photophobia, malaise, irritability
- chills and fever
- signs of meningeal irritation
  - a. Nuchal rigidity – stiff neck
  - b. Kernig's sign – contraction or pain in the hamstring muscle when attempting to extend the leg when the hip is flexed
  - c. Brudzinski's sign – flexion at the hip and knee in response to forward flexion of the neck
- Vomiting
- Possible seizures and decreasing LOC
- Lumbar puncture – measurement and analysis of CSF shows increased pressure, elevated WBC and protein, decreased glucose and culture positive for specific microorganism

#### Nursing Interventions

- Administer large doses of antibiotics IV as ordered
- Provide bed rest; keep room quiet and dark if client has headache or photophobia
- Monitor vital signs and neuro checks frequently
- 5.
- NEUROLOGICAL MEDICATIONS

#### Antimyasthenic Medications

- Relieve muscle weakness associated with myasthenia gravis by blocking acetylcholine breakdown at the neuromuscular junction
- Used to treat or diagnose myasthenia gravis or to distinguish cholinergic crisis

#### Antimyasthenic Medications

- Edrophonium chloride (Tensilon, Enlon)
- Neostigmine bromide (Prostigmin Bromide)

#### Side effects: Cholinergic Crisis

- GI disturbances
- Abdominal cramps
- Nausea, vomiting, diarrhea
- Increased salivation and tearing
- Increased bronchial secretions
- Sweating
- Miosis
- Hypertension

#### Implementation

- Monitor the client for signs and symptoms of medication overdose (cholinergic crisis) and underdose (myasthenic crisis)
- Instruct the client to take medications on time to prevent weakness, because weakness can impair the client's ability to breathe and swallow
- Instruct the client to take the medication before meals for best absorption

#### Tensilon test

- tensilon is injected by IV
- The Tensilon test can cause ventricular fibrillation and cardiac arrest
- Atropine sulfate is the antidote for overdose
- Diagnosis of myasthenia gravis: Most myasthenic clients will show a marked improvement in muscle tone within 30 to 60 seconds after injection, and the muscle improvement lasts for 4 to 5 minutes
- Diagnosis of cholinergic crisis (overdose with anticholinesterase) or myasthenic crisis (undermedication)

#### Tensilon test

- In cholinergic crisis, muscle tone does not improve after the administration of Tensilon, and muscle twitching may be noted around the eyes and face
- A Tensilon injection makes the client in cholinergic crisis temporarily worse (negative Tensilon test)

- A tensilon injection temporarily improves the condition when the client is in myasthenic crisis (positive Tensilon test)

### Antiparkinsonian Medications

- restore the balance of the neurotransmitters acetylcholine and dopamine in the central nervous system (CNS), decreasing the signs and symptoms of Parkinson's disease

### Dopaminergic medications

- stimulate the dopamine receptors
- increase the amount of dopamine available in the CNS or enhance neurotransmission of dopamine
- Contraindicated in cardiac, renal, or psychiatric disorders
- Levodopa taken with a monoamine oxidase inhibitor (MAOI) antidepressant can cause a hypertensive crisis

### Medications to treat Parkinson's Disease

- Medications affecting the amount of Dopamine
- Amantadine (Symmetrel)
- Bromocriptine (Parlodel)
- Carbidopa-levodopa (Sinemet)
- Anticholinergics
- Benztropine mesylate (Cogentin)
- Biperiden hydrochloride (Akineton)
- Trihexyphenidyl hydrochloride (Artane)
- Antihistamine
- Diphenhydramine hydrochloride (Benadryl)

### Side effects

- Dyskinesia
- Involuntary body movements
- Nausea and vomiting
- Urinary retention
- Constipation
- Dizziness
- Orthostatic hypotension
- Confusion
- Mood changes
- Hallucinations

### Implementation

- Instruct the client to take the medication with food if nausea and vomiting occur
- Assess for signs and symptoms of parkinsonism, such as rigidity, tremors, akinesia, and bradykinesia; a stooped forward posture; shuffling gait; and masked facies
- Monitor for signs of dyskinesia
- Instruct the client to change positions slowly to minimize orthostatic hypotension

#### Implementation

- Instruct the client to avoid alcohol
- Inform the client that urine or perspiration may be discolored and that this is harmless, but it may stain the clothing
- When administering levodopa, instruct the client to avoid excessive vitamin B6 intake to prevent medication reactions

#### Anticholinergic medications

- block the cholinergic receptors in the CNS, thereby suppressing acetylcholine activity
- reduce the rigidity and some of the tremors but have a minimal effect on the bradykinesia
- Contraindicated in clients with glaucoma

#### Side effects

- Blurred vision
- Dry mouth and dry secretions
- Increased pulse rate
- Constipation
- Urinary retention
- Restlessness and confusion
- Photophobia

#### Implementation

- Assess for risk of injury
- Encourage the client to avoid alcohol, smoking, caffeine, and aspirin to decrease gastric acidity
- Instruct the client to minimize dry mouth by increasing fluid intake and by using ice chips, hard candy, or gum
- Instruct the client to use sunglasses in direct sun because of possible photophobia

#### Anticonvulsant Medications

- Used to depress abnormal neuronal discharges and prevent the spread of seizures

## Anticonvulsant Medications

- Phenytoin (Dilantin)
- Carbamazepine (Tegretol)
- Lorazepam (Ativan)
- Valproic acid (Depakene)

## Implementation for clients on anticonvulsants

- Initiate seizure precautions
- Monitor urinary output
- Take anticonvulsant with food to decrease GI irritation, but avoid milk and antacids, which impair absorption
- Do not discontinue medication
- Urine may be a harmless pink-red or red-brown color
- Report symptoms of sore throat, bruising, and nosebleeds, which may indicate a blood dyscrasia

## Side effects

- Gingival hyperplasia
- Reddened gums that bleed easily
- Slurred speech
- Confusion
- Depression
- Nausea and vomiting
- Constipation
- Headaches
- Blood dyscrasias: decreased platelet count and decreased white blood cell count (WBC) count
- Elevated blood glucose
- Alopecia
- Hirsutism

## Implementation

- When administering phenytoin, dilute in normal saline, because dextrose causes the medication to precipitate
- Instruct the client about the importance of good oral hygiene and regular dental examination

## Barbiturates

- used for tonic-clonic seizures and acute episodes of seizures resulting from status epilepticus
- Barbiturates

- Phenobarbital

#### Side effects

- drowsiness
- dizziness
- hypotension
- respiratory depression
- tolerance to medication

#### Benzodiazepines

- to treat absence seizures
- Diazepam (Valium)
- – used to treat status epilepticus, anxiety, and skeletal muscle spasms
- Clonazepam (Klonopin)
- – is used as adjunctive therapy for partial seizures
- Side effects
- ataxia
- respiratory and cardiac depression
- medication tolerance and drug dependency

#### Benzodiazepine

- Diazepam (Valium)
- Lorazepam (Ativan)

#### Central Nervous System Stimulants

- used to treat narcolepsy and attention deficit hyperactivity disorders
- used to treat respiratory depression
- used as adjunctive therapy for exogenous obesity

#### Side effects

- irritability
- restlessness
- tremors
- insomnia
- heart palpitations
- tachycardia
- hypertension
- dry mouth
- anorexia
- weight loss
- diarrhea or constipation

- impotence
- dependence and tolerance

### Implementation

- 1. Monitor vital signs
- 2. Assess mental status
- 3. Instruct the client to take the medication before meals
- 4. Instruct the client to avoid foods and beverages containing caffeine to prevent additional stimulation
- 5. Instruct the client not to discontinue the medication abruptly
- 6. Instruct the client to take the last daily dose of the CNS stimulant at least 6 hours before bedtime to prevent insomnia

### Narcotic analgesics

- suppress pain impulses but can suppress respiration and coughing by acting on the respiratory and cough center in the medulla of the brainstem

### Narcotic analgesics

- Codeine sulfate
- effective cough suppressant at low doses
- can cause constipation
- Hydromorphone hydrochloride (Dilaudid)
- can decrease respiration
- can cause hypotension

### Narcotic analgesics

- Meperidine hydrochloride (Demerol)
- used for acute pain and as a preoperative medication
- contraindicated in head injuries and increased intracranial pressure, respiratory disorders, hypotension, shock, severe hepatic and renal disease, and in clients taking monoamine oxidase inhibitors
- should not be taken with alcohol or sedative hypnotics because it may increase the CNS depression

### Meperidine Hydrochloride (Demerol)

- Side effects
- Respiratory depression
- Hypotension
- Tachycardia
- Drowsiness
- Constipation

- Urinary retention
- Nausea
- Vomiting
- Tremors

#### Narcotic analgesics

- Morphine sulfate
  - used for acute pain resulting from myocardial infarction (MI) or cancer, for dyspnea resulting from pulmonary edema, and as a preoperative medication
  - contraindicated in severe respiratory disorders, head injuries, increased intracranial pressure, severe renal disease, or seizure activity
- Nalbuphine hydrochloride (Nubain)
  - preferable for treating the pain of an MI because it reduces the oxygen needs of the heart without reducing blood pressure

#### Morphine sulfate

- Side effects
- Respiratory depression
- Orthostatic hypotension
- Urinary retention
- Nausea
- Vomiting
- Constipation
- Cough suppression
- Reduction in papillary size
- Miosis

#### Implementation for narcotic analgesics

- Administer medications 30 to 60 minutes before painful activities
- Monitor respiratory rate, and if the rate is less than 12 breaths per minute in an adult, withhold the medication unless ventilatory support is being provided
- Auscultate breath sounds because narcotic analgesics suppress the cough reflex
- Have naloxone (Narcan) available for overdose
- Monitor for pupil changes because pinpoint pupils indicate morphine overdose
- Note rate and depth of respirations
- Avoid alcohol or CNS depressants because they can cause respiratory depression

#### Narcotic Antagonists

- used to treat respiratory depression from narcotic overdose
- Implementation
- Auscultate breath sounds



- Have resuscitation equipment available
- do not leave the client unattended
- Monitor the client closely for several hours because when the effects of the antagonist wears off, the client may again display signs of narcotic overdose

#### Narcotic Antagonists

- Naloxone hydrochloride (Narcan)
- Naltrexone (ReVia)

#### Osmotic Diuretics

- increase osmotic pressure of the glomerular filtrate, inhibiting reabsorption of water and electrolytes
- used for oliguria and to prevent renal failure
- used to decrease intraocular pressure in narrow-angle glaucoma
- used to decrease intracranial pressure

#### Osmotic Diuretics

- Mannitol (Osmitrol)

#### Side effects

- fluid and electrolyte imbalances
- pulmonary edema from the rapid shifts of fluid
- nausea and vomiting
- tachycardia from the rapid fluid loss
- hyponatremia and dehydration

#### Implementation

- Monitor lungs and heart sounds for signs of pulmonary edema
- Change the client's position slowly to prevent orthostatic hypotension
- Monitor for crystallization in the vial of mannitol prior to administering the medication; if crystallization is noted, do not administer the medication