Pediatric Neurologic Disorders NCLEX Review

The neurologic system is divided into three categories: central nervous system (CNS), peripheral nervous system, and the autonomic nervous system (ANS).

CENTRAL NERVOUS SYSTEM

The CNS is comprised of the brain and spinal cord. The brain is contained in the skull. Anterior and posterior fontanels of the skull are separated allowing the brain to increase in size. After 8 weeks of age, the posterior fontanel closes, and the anterior fontanel closes by 18 months of age. The portion of the skull that encloses the brain is called the cranium. The brain and the spinal cord are covered by a three-layer membrane called the meninges. Collectively they protect the brain and the spinal cord. The layers of the meninges are as follows:

- Dura mater: This is the outer membrane that folds the brain into compartments.
- Arachnoid mater: This is the inner membrane of fibrous and elastic tissue that contains a spongy structure of subarachnoid fluid.
- Pia mater: This is the third layer of a fine membrane that contains small blood vessels.

CEREBRAL SPINAL FLUID

Blood in the capillary network called the choroid plexuses form a clear liquid called cerebral spinal fluid (CSF). CSF contains water, glucose, protein, and minerals. CSF surrounds the brain helping to absorb shock and reduces forces that might be applied to the brain. CSF also fills four cavities within the brain called ventricles. Each cerebral hemisphere (see cerebrum) contains a ventricle. A third ventricle is located midbrain (see brain stem), and a fourth is located at the posterior brain fossa at the base of the brain. CSF is reabsorbed in blood vessels in the arachnoid villi.

BRAIN

The brain is divided into three areas. These are the cerebrum, cerebellum, and brainstem.

Cerebrum

The cerebrum is the nerve center that controls motor activities, sensory information, and intelligence. The outside layer of the cerebrum is called the cerebral cortex and consists of neuron cells commonly referred to as the gray matter. The inner layer of the cerebrum contains axons and basal ganglia. Axons are referred to as white matter. Basal ganglia controls balance and motor coordination. Fissures divide the cerebrum longitudinal into two hemispheres. The hemispheres are connected by nerve fibers called the corpus callosum, which is used to transmit impulses between hemispheres. The left hemisphere controls the right side of the body, and the right hemisphere controls the right side of the body.

Below the corpus callosum is the thalamus. The thalamus is a relay station that passes perceptual data from other areas of the brain to the cerebral cortex, helping the cerebral cortex manage information. Beneath the thalamus is the hypothalamus, which regulates blood pressure,

temperature, appetite, breathing, and sleep. Other fissures divide the cerebral cortex into four lobes. The fissure of Sylvius separates the frontal and parietal lobes from the temporal lobe. The fissure of Rolando separates the parietal lobe from the frontal lobes. The parieto-occipital fissure separates the parietal lobes from the occipital lobe. Each of the four lobes controls a function:

- Frontal lobe: Moving voluntary muscles, speech (Broca area), personality, behavior, judgment, problem solving, memory, intelligence, autonomic functions, emotional response, and cardiac response.
- Temporal lobe: Interprets spoken language, smell, taste, and hearing.
- Parietal lobe: Interprets sensory information.
- Occipital lobe: Interprets visual stimuli.

Cerebellum

The cerebellum is at the base of the brain and is responsible for maintaining muscle tone, equilibrium, smooth muscles, and coordinating impulses to muscles.

Brainstem

The brainstem connects the spinal cord to other parts of the brain. The brainstem is divided into three parts:

- Midbrain: The reflex center for the eye.
- Pons: Regulates chewing, saliva secretion, taste, and helps respirations, equilibrium, and hearing.
- Medulla oblongata: Helps vasomotor function, cardiac and respiratory functions.

SPINAL CORD

The spinal cord leads from the brainstem through the second lumbar vertebra. The spinal cord has 31 pairs of spinal nerves that carry sensory impulses from parts of the body to the brain and motor impulses from the brain to the peripheral nervous system. The spinal cord generates reflex impulses such as deep tendon reflexes that are outside of the brain control.

Peripheral Nervous System

The peripheral nervous system is portion of the neurologic system that is outside the CNS and divided into two subsystems:

- Somatic nervous system: Responsible for voluntary function and for reflex actions, and conscious and subconscious mental processes.
- Autonomic nervous system: Responsible for involuntary function.

The autonomic nervous system is divided into two opposing systems:

- Sympathetic nervous system: Expends energy by releasing adrenergic catecholamines.
- Parasympathetic nervous system: Conserves energy by absorbing cholinergic neurohormone acetylcholine.

The peripheral nervous system also consists of 31 spinal nerves and 12 pairs of cranial nerves. Spinal nerves extend from the spinal cord forming a network of overlapping nerves that transmit nerve impulses from nerve endings to the brain and from the brain to nerve endings. Spinal nerves are identified by its origination point in the vertebra:

- Cervical (C1 to C8)
- Thoracic (T1 to T12)
- Lumbar (L1 to L5)
- Coccygeal

Cranial nerves transmit motor and sensory impulses between the brainstem and the neck. The cranial nerves are labeled as follows:

- I Olfactory nerve—sensory: Smell
- II Optic nerve—sensory: Vision
- III Oculomotor nerve—motor: Extraocular eye movement
- IVTrochlear nerve—motor: Extraocular eye movement
- V Trigeminal nerve—sensory: Corneal reflex, face and head senses; motor: Biting and jaw movement.
- VI Abducens nerve—motor: Extraocular eye movement
- VII Facial nerve—sensory: Taste; motor: Facial expression
- VIII Vestibulocochlear nerve—sensory: Hearing and balance
- X Vagus nerve—sensory: Larynx, thoracici, throat, lungs, heart, and digestive tract; motor: Swallowing peristalsis, heart rate, gag reflex
- XI Accessory nerve—motor: Head rotation, shoulder
- XII Hypoglossal nerve—motor: Tongue

I. Hydrocephalus

- Circulation and absorption of CSF is disrupted à accumulation of CSF in the ventricles à ventricles dilate and increase ICP.

2 Types:
1**. Noncommunicating** – caused by an obstruction of CSF flow.

2. Communicating – cased by disruption of CSF absorption.

Signs and Symptoms:

- **Arnold-Chiari malformation** (When part of the cerebellum extends below the foramen magnum and into the upper spinal canal)
- Nuchal rigidity
- Weak sucking
- Anorexia
- Shrill cry

- Projectile vomiting
- Irritability
- Rapidly increasing head circumference
- Fontanels are bulging
- Underdeveloped neck muscles
- **Setting-sun sign** (sclera is above the iris)
- Distended scalp veins
- Shiny thin scalp

MANIFESTATIONS OF INCREASED ICP

INFANTS	CHILDREN	PERSONALITY BEHAVIOR SIGNS	LATE SIGNS
· Bulging fontanels · Separated cranial sutures · Macewen's sign · Irritability · High-pitched cry · Increased head circumference · Distended scalp veins · Poor feeding · Crying when disturbed · Setting sun sign (sclera prominent over the iris; eyes appear to be looking downward)	· Headache · Nausea · Forceful vomiting · Diplopia · Blurred vision · Seizures	· Irritability · Drowsiness · ? school performance. · ? physical activity · ?sleepiness · lethargy	· Bradycardia · Dec motor response · Dec, sensory response to stimuli · Altered pupilary size and reaction · Decerebrate or decorticate · Cheyne-Stokes (increased in deep RR, then shallow, decreased RR to periods of apnea) · Papilledema · Decreased consciousness · coma

Diagnostics:

1. Measure head circumference.
2. CT scan and MRI: visualizes ventricle dilation.
3. X-ray: determines if the skull is thinning or widening.

Treatment:

1. Ventriculoperitoneal shunt – connects the ventricles to the peritoneal cavity or to the right atrium of the heart to bypass the obstruction.
2. Administer Tylenol as needed postoperatively.
3. VP shunt infection/malfunction:

- Administer vancomycin IV
- Monitor for increase ICP

Nursing Interventions:

1. **Preoperative:**

- Measure head circumference daily and report increases of 0.5 cm to HCP
- Monitor s/s of increase ICP
- Monitor VS q4
- Measure I&O strictly
- Provide small feedings due to risk of vomiting.
- Burp frequently.
- Support the child’s head during feeding.

1. **Postoperative:**

- Position: supine, on the non-operative site to prevent CSF leaks.
- Asses LOC.
- Monitor for vomiting.
- Assess for infection and VP malfunction.
- Redness along the shunt
- Fluid around the VP shunt valve.
- Fever
- Lethargy
- Assess for abdominal distention resulting from paralytic ileus due to the VP shunt
- No contact sports.
- Explain to the family that the VP shunts may have to be replaced periodically to accommodate the child’sgrowth.

II. Meningitis

- Meningeal covering of the brain and spinal cord becomes inflamed, which is commonly caused by bacteria (children), virus, fungus protozoa, or toxic exposure.

Bacterial Meningitis

- Most common

- CA: Streptococcus pneumoniae (pneumococcal), Neisseria meningitides (meningococcal), or Hemophilus influenza (decreased due to Hib vaccine in the early 1900). Others: Staphylococcus aureus, Escherichia coli, Pseudomonas.
- Route: enters the CNS by bloodstream or through direct contamination (skull fracture, extension from sinus infection).
- When is it common? Cold weather, close living conditions (dorms, prison, barracks)

Viral Meningitis – follows viral infections (parotitis, herpes simplex or zoster, enterovirus, or measles). Self-limiting.

Fungal Meningitis – common in immunocompromised patients. CA: Cryptococcus neoformasns.

- Always isolate patients who are suspected of having bacterial meningitis until it is ruled out.

Signs and Symptoms:

Nuchal rigidity – meningeal and spinal nerve irritation.

Brudzinski sign - when head is flexed while in supine position, child experiences pain, or hips and knees are flexed.

Kernig's sign – child lies flat with legs flexed at hips and knees. The child resists positioning and experiences pain.

Signs of Increased ICP: headache, nausea, vomiting, seizures.

Infants: bulging fontanels

Fever, malaise and fatigue due to infection

Myalgia due to viral infection

Photophobia (sensitivity to light)– irritation of the cranial nerves.

Petechial rash on skin and mucous with meningococcal infection.

Test Results:

CSF analysis:

Bacterial meningitis: low glucose, high protein, elevated neutrophils, and culture.

Increased CSF

Polymerase chain reaction (PCR) to test for organism .

Culture and Sensitivity: results may take up to 72 hours.

Blood cultures

Ct scan

TREATMENT

TYPE	MEDICATIONS
Bacterial Meningits	Penicillin G, Ceftriaxone, Cefotaxime, Vancomycin plus Ceftriaxone or cefotaxime, ceftazidime
Fungal Meningitis	Amphotericin B, Fluconazole, Flucystosine

- Dexamethsaone – decrease inflammation in pneumococcal infection
- Mannitol – cerebral edema
- Acetaminophen – headache
- Phenytoin – anticonvulsant
- Decadron (IV) – every 6 hours for 4 days to reduce hearing loss and severe neurologic damage.
- Bed rest
- Administer D5/0.22 NSS IV plus potassium to reduce intracranial pressure.
- Fluid restriction.

Nursing Interventions:

1. Monitor intake and output.
2. Keep room darkened (photophobia)
3. Minimal environmental stimuli.
4. Monitor neurological status every 2-4 hours.
5. Seizure precautions.
6. Assess anterior fontanel
7. Assess motor skills
8. Monitor vital signs
9. Assess level of consciousness.
10. Administer a cooling blanket if with fever.

III. Encephalitis

- Inflammation of the brain tissue commonly caused by a virus.
- The virus enters the blood ctream, enters the CNS and begins to reproduce.
- CA: HSV1, cytomegalovirus, echovirus, coxsackie virus, herpes zoster.
- CA: insects (mosquitoes and ticks) transmit West Nile virus, St .Louis encephalitis, or equine encephalitis.

Demyelination of the nerve fibers, hemorrhage, edema, and necrosis à small cavities in the brain.

Signs and Symptoms:

- fever
- Signs of increased ICP (nausea and vomiting, drowsiness, lethargy, stupor, headache, altered mental status, infant: bulging fontanels)
- Stiff neck (meningeal irritation)
- Seizure

Test Results:

Blood culture

CT and MRI

Analysis of CSF for m.o. causing the infection

Treatment:

Nursing Interventions:

1. Perform active or passive ROM
2. Turn and position the client.
3. Monitor neurologic status: Glasgow Coma Scale.
4. Provide a quiet environment.
5. Monitor intake and output.

IV. Brain Tumor

- Growth of abnormal cells within the brain tissue. Can be primary (originating from the brain) or secondary (metastasized from another organ).

1. Infratentorial tumor (below the tentorium cerebella) – most common.

- Located in the posterior third of the brain (cerebellum or brainstem).

1. Supratentorial tumor – within the anterior two thirds of the brain –cerebrum.

TYPES	MALIGNANCY	DEFINITION
MENINGOMAS - **Common in women and older people**	BENIGN	Begins t the meninges TX: surgical removal, but regrowth occurs.
GLIOMAS	MALIGNANT	Neuroglial cells are affected. Nonspecific symptoms of increased ICP. TX: surgical debulking of the tumor; Followed by: chemotherapy or radiation.
ASTROCYTOMA	VARIABLE	Most common glioma. **Oligodendroglioma** is slow growing and may be calcified. **Glioblastoma** is poorly differentiated glioma with a poor prognosis.

Signs and Symptoms:

1. **Cerebellum or brainstem**

- Lack of coordination
- Ataxia
- Hypotonia of the limbs

1. **Frontal lobe**

- Inability to speak (expressive aphasia)
- Slowing of mental activity
- Personality changes
- anosmia

1. **Occipital lobe**

- Impaired vision: pt could be unaware
- Prosopagnosia (unable to recognize familiar faces)
- Change in color perception

1. **Parietal Lobe**

- Seizures
- Sight disturbances
- Sensory loss: unable to identify object placed in hand without looking.

1. **Temporal Lobe**

- Seizures

The child's level of consciousness provides the earliest indication of an improvement or deterioration of the neurological condition

- Auditory, olfactory, and taste hallucinations
- Depersonalizxation
- Emotional changes
- Visual field defects
- Receptive aphasia
- Altered perception of music

Test Results:

MRI (gadolinium contrast) – defines tumor and size.

CT – shows characteristics of meningioma

Angiography – tumors displace vessels as they grow.

Treatment:

1. Chemotherapy – oral, IV, ommaya reservoir.

- Drugs are based on cell type: carmustine, lomustine, procarbasine, vincristine, temozolomide, ertolinib, geftinib

1. Irradiation
2. Craniotomy to remove tumor. Multiple sites à
3. Glucocorticoid – reduce swelling or inflammatory response.
4. Mannitol – cerebral edema
5. Anticonvulsant: phenytoin, Phenobarbital, carbamazepine, lamotigrine, clonazepam, topiramate, ethosuximide.
6. Sucralfate – mucosal barrier to reduce risk of gastric irritation.
7. H2 receptor antagonists: Ranitidine, nizatidine, cimetidine to prevent gastric irritation.
8. PPI: lansoprazole, omeprazokem esomeprazole, rabeprazole, pantoprazole.

Nursing Intervention:

PRE-OP:

1. Check neurologic function at least every 4 hours.
2. Seizure precautions
3. Assess weight loss and nutritional status.
4. Shave the child's head (provide a favorite cap)
5. Prepare the child (tell him/her that she/he will wake up with a large head dressing).

POST-OP:

1. Assess neurological and motor functions.
2. Monitor temperature (may be elevated because of hypothalamus or brainstem involvement during surgery) – provide a cooling blanket.
3. Monitor for respiratory infection
4. Monitor for meningitis or meningeal irritation (opisthotonous, Kernig's and BRdzinski's)
5. Monitor for signs of increased ICP
6. Monitor hemorrhage.
7. Assess papillary response (sluggish, dilated, or unequal pupils due to increased ICP or brainstem herniation).
8. Monitor for colorless drainage on the dressing or from ears and nose. Dipstick for the presence of glucose.
9. HCP's positioning:

- Never place the child on the operative side because the brain may suddenly shift to that cavity.
- **INFRA**TENTORIAL: FLAT and on either side.
- **SUPRA**TENTORIAL: HEAD ELEVATED above the HEART LEVEL to facilitate CSF drainage and to decrease excessive blood flow to the brain to prevent hemorrhage.
- **X trendelenburg**

1. Monitor IVF closely
2. Prevent vomiting (causes increased ICP and incisional rupture)
3. Provide a quiet environment
4. Give analgesics as prescribed.
5. Provide emotional support to parents and child.

V. Duchenne Muscular Dystrophy

- X-linked recessive (Males) – mutation of a gene that codes dystrophin protein à muscles die.
- Onset is gradual, age: 3-5 y.o.
- Wheel chair bound: 9-11 y.o.
- Death: 15-25 y.o.
- EARLY SIGNS: delayed in motor development (2 y.o.), parents may note delayed walking, difficulty climbing stairs, or frequent

Clinical features:

1. Progressive, symmetric muscle weakness.
2. Primary affectation: proximal muscles (pelvic girdle), eventually involves respiratory muscles.
3. Gower's sign – patient uses hands to get up from floor because the weakness in the proximal lower extremity muscles make it difficult to arise without support. Enlarged calf muscles – true muscle hypertrophy at first, followed by pseudohypertrophy as fat replaces muscle.
4. Weak pelvic muscles
5. Wide stance
6. Waddling gait
7. Scapular flaring due to weakened thoracic muscles.
8. Results in wheelchair confinement, respiratory failure, and death in the third decade.
9. Intellectual ability: mild mental retardation is common; IQ < 90.

Diagnosis:

Serum creatinine phosphokinase – elevated.

DNA testing

Muscle biopsy

EMG

Nursing Diagnosis:

- Impaired physical mobility r/t progressive muscle weakness.
- Self-Care deficits r/t muscle weakness.
- Altered family process r/t having a child with a probably fatal disability.

Treatment:

- Prednisone may slow the progression of the disease.
- Physical Therapist referral.

Nursing Interventions:

1. **GOAL:** maintain function in unaffected muscles for as long as possible.

- Assist child to remain as active as possible for as long as possible.
- Perform ROM.
- Assist with braces to maintain ambulation.
- Whenever possible, incorporate play into therapeutic exercises.
- Encourage socialization with peers.
- Prevent infection

1. **GOAL:** prepare child to perform ADLs as independently as possible.

- Do not perform activities that the child is capable of doing.
- Assist only if the child is unable to perform independently.
- Select assistive devices that maximize the child's independence: clothes, utensils, grooming, toileting.
- Teach child how to apply splints.
- When child can no longer ambulate, assist child to use wheelchair.
- Schedule regular rest periods and adequate sleep to conserve energy for ADLs.

1. **GOAL:** Provide a balanced diet to prevent obesity
2. **GOAL:** support family and child

- Encourage family and child to discuss their concerns and issues related to diagnosis.
- Refer family o support group, supportive agencies.
- Discuss how parents will need to modify their social activities.
- Discuss with the parents long-term care needs and possible placement of the child.
- Allow family and child to discuss concerns related to death and dying

VI. Reye's Syndrome

- An acute encephalopathy that follows a viral illness (influenza/varicella) + aspirin use and is characterized by cerebral edema and fatty changes in the liver.
- Salicylates a causes mitochondrial damage a inhibits oxidative phosphorylation and fatty-acid

During the urea cycle, ammonia is changed to urea in the liver. Urea is then excreted by the kidneys. In Reye syndrome, there is a disruption in the urea cycle resulting in an increase in ammonia levels in the blood and increased fatty acids that infiltrate the kidneys, muscles, and

neuronal cells. Reye syndrome occurs within 3 days from a viral infection and is linked to the use of aspirin in children. Recovery is related to the degree of cerebral edema. If the patient is diagnosed and treated in the early stages, recovery is excellent; otherwise the patient may die within a few days. The prognosis is poor for a patient who has lapsed into a coma.

NCLEX!!! Children <15 years who exhibit fever and flulike symptoms should be administered acetaminophen rather than aspirin. Alka Seltzer, Anacin, Ascriptin, Bufferin, Pamprin, Pepto-Bismol, and Vanquish all contain aspirin.

Assessment:

Evidence of viral infection 4-7 days prior to the onset of symptoms

Fever

Nausea and vomiting

Altered hepatic function à lethargy

Progressive neurological deterioration

Increased blood ammonia levels

5 Stages of Reye's Syndrome:

1. Viral Infection:

- Fever
- Flu-like symptoms

1. Recovery Period

- No symptoms

1. Intractable vomiting, confusion, agitation

- Listlessness
- Increased BP, PR
- Hyperactive reflexes
- Confusion
- Disorientation
- Combativeness
- Irritability

1. Coma – loss of consciousness
2. Seizures, decreased respiration, decreasd tendon reflexes

- Delirium
- Convulsions
- Respiratory failure

Definitive Diagnosis: Liver Biopsy (confirms damage)

Other Labs: Decreased serum glucose levels

Elevated ALT, AST, and Ammonia levels

Treatment:

Acetaminophen (Tylenol)

DO NOT GIVE aspirin to children <15 y.o. who exhibit fever and flulike symptoms. Other meds containing aspirin: Aka Seltzer, Anacin, Ascriptin, Bufferin, Pamprin, Pepto-Bismol, Vanquish.

Dextrose IV for hypoglycemia

Monitor electrolytes, blood chemistry and pH.

Nursing Interventions:

1. Provide Rest
2. Decrease environmental stimuli.
3. Monitor for Increased ICP.
4. Monitor for signs of altered hepatic function
5. Monitor for Liver Function studies.
6. Monitor I&O
7. Monitor for signs of bleeding.

VII. Neural Tube Defects

The neural tube develops into the brain and the spinal cord. A neural tube defect is the failure of the neural tube to close within 28 days after conception in an area of the neural tube or the entire length of the neural tube resulting in a neurologic disorder in the fetus. The cause of neural tube defects is unknown; however, there is a link between inadequate intake of folic acid prior to pregnancy and during the first trimester. The most common neural tube defects are as follows:

- **Spinal bifida occulta:** This is the incomplete closure without the spinal cord or meninges protruding. This patient usually doesn't experience neurologic dysfunction, although there

might be bladder or bowel disturbances or weakness in the foot.

- **Spinal bifida cystica:**This is the incomplete closure with the spinal cord or meninges protruding in a sac. There are two types of spinal bifida cystica:

a. Myelomeningocele: The sac contains the spinal cord, CSF, and meninges. This patient usually experiences neurologic dysfunction.

b. Meningocele: The sac contains CSF and meninges. This patient rarely experiences neurologic dysfunction.

- **Anencephaly:** Cerebral hemispheres of the brain and the top portion of the skull. The brainstem is intact, enabling the infant to have cardiopulmonary functions; however, the infant is likely to die of respiratory failure a few weeks after birth.
- **Encephalocele:** Portions of the brain and meninges protrude in the sac. This patient usually experiences neurologic dysfunction.

TYPES	PROTRUSION	DESCRIPTION	NEUROLOGICAL DEFICITS
SPINA BIFIDA OCCULTA	INACT spinal cord and meninges	Posterior vertebral arches fail to close in the lumbosacral area v Tuft of Hair in the area v Depression in the area v hemangioma	Not usually present
SPINA BIFIDA CYSTICA	Spinal cord , meninges, or both	Incomplete closure of the vertebral and neural tubes which results to a **saclike** protrusion in the lumbosacral area, with varying degrees of nervous tissue involvement	S/S: Sac Bowel & bladder incontinence Hydrocephalus Spastic paralysis Club foot Knee contractures Spinal curve Arnold-Chiari
MENINGOCELE	Meninges	Saclike cyst that contains CSF in the	Usually not present

	NO SPINAL CORD INVOLVEMENT	middle of the back (lumbosacral)	
MYELOMENINGOCELE	Meninges, CSF, nerve roots, portion of spinal cord	The sac is covered by a thin membrane prone to leakage/rupture	evident

Anencephaly – Cerebral hemispheres of the brain and top portion of the skull is missing.

- Intact brainstem à good cardiopulmonary function; but the infant is likely to dies of respiratory failure a few weeks after birth.

Encephalocele – portion of the brain and meninges protrude in the sac.

- Patient is with neurological dysfunction.
- Mental retardation, paralysis, hydrocephalus

Test Results:

AFP: measure it between 16-18 weeks of gestation.

Amniocentesis: IF AFP is abnormal, this is assessed for the presence of AFP in the amniotic fluid.

UTZ: eveidence of neural tube defects.

Transillumination of sac: differentiates between myelomeningocele and meningocele.

CT and X-ray: after birth.

Treatment:

- Surgery within 48 hours of birth to close the opening and to decrease the risk of infection and spinal cord damage.
- Insert a shunt to relieve hydrocephalus.

Nursing Interventions:

1. PRE-NATAL

- Adequate amounts of Folic acid.

- Explain the disorder and treatment following birth

1. AFTER BIRTH

- Position: on the side
- Covering: sterile dressing soaked in warm saline solution to keep it moist.
- Place a strip of plastic below the sac to prevent contamination form urine and stool
- Measure head circumference.
- Assess for infection
- Assess for leakage around the sac
- Assess bladder and bowel function
- Assess neurologic status,
- Reposition q2 to prevent pressure ulcers.

1. POST SURGERY

- Monitor VS
- Monitor signs of infection
- Positioning
- Monitor bowel and bladder function
- Assess neurologic status
- Measure head circumference

VIII. Seizure Disorders

- Excessive and unorganized neuronal discharges in the brain that activate associated motor and sensory organs.
- Causes: birth injury, infections, congenital defects.

Type	**Characteristics**
1. Tonic	· Unconsciousness · Continuous muscle contraction · Sustained stiffness
2. Clonic	· Alternating muscle contract in a rhythmic jerking motion · Syncope · Incontinence · Biting of the tongue · Holding breath

3.	**Tonic-clonic (grand-mal)**	· Electrical activity simulatenously occurs in both hemispheres and them moves from the cortex to the brainstem. · Unconsciousnessàcontinuous muscle contractionàclonic phase.
4.	**Simple partial seizure**	· Occurs in one hemisphere or from an area of the cerebral cortex. · No loss of consciousness · Lasts for <30 sec. · Continuous muscle contraction and stiffness and jerking motion of the face, neck and extremities. · Deviation of the eye · Head turning
5.	**Complex Partial Seizure**	· One hemisphere or from an area of the cerebral cortex. · Imparied consciousness, post seizure confusion. · Lasts up to 5 mins. · Impaired consciousness · Blinking · Staring · Lip smacking · Sleepwalking · Chewing · Night terrors · Sucking
6.	**Absence Seizure (petit mal)** - Brief loss of consciousness lasting <30 seconds.	· no post-seizure confusion and minimal or no loss of postural tone. · Eye blinking · Rolling of eyes

7.	**Atonic**	· Drooping eyelid · Loss of postural tone · Drop-and-fall action
8.	**Myoclonic** - Occurs when falling asleep or awakening. - No loss of consciousness or confusion.	· Involuntary jerking · Loss of body tone à · Falling forward · Flexing the upper chest · Infantile spasms · Pallor
9.	**Akinetic**	· Brief loss of consciousness · Brief loss of muscle tone
10.	**Infantile spasms** - Begins at 2 months old and resolves by 2 y.o.	· Abrupt jerking · Contraction of the head and neck · Cyanosis · Altered consciousness · Eye rolling
11.	**Febrile** - Rapid rise in body temperature in children 6 months to 6 y.o. - Tonic/clonic seizures lasting <15 min.	· >102.2 F(39 C) · Unconsciousness · Continuous muscle contraction · Sustained stiffness · Alternating muscle contract in a rhythmic repetitive jerking motion · Syncope · Incontinence · Biting of the tongue · Holding breath
12.	**Status Epilepticus** - Continuous seizure or a set of seizures lasting for >30 mins, with loss of consciousness.	· Same as febrile seizures but without the fever.

Post seizure period can last up to 2 hours.

Treatment:

- Surgically remove the portion of the brain causing the seizure.
- Seizures lasting 5 mins à self-limiting
- 5-10 mins à anticonvulsants

Assessment:

- Obtain time of onset, precipitating event, behavior before and after the seizure
- Determine the child's seizure history.
- Aura
- Monitor apnea and cyanosis
- Post-seizure: sleepiness and disorientation

Interventions:

1. Ensure a patent airway
2. Have suction equipment and O2 at bedside (administer 100% O2 using a face mask if hypoxic).
3. Time the episode
4. If sitting, ease the child down to the floor and place in side-lying.
5. Place a pillow or folded blanket under the head (if none, place head on your hand or on your lap)
6. Loosen restrictive clothing
7. Remove eyeglasses.
8. Clear area for hazards
9. If vomiting: turn the child on the side as a unit.
10. Don't restrain, place on NPO
11. Prepare medications
12. Remain with the client
13. Observe for incontinence
14. Document

IX. Guillain-Barre Syndrome

- An acute postinfectious or idiopathic polyneuritis with progressive ascending paralysis.
- Both sexes are affected
- AGE: 4-9 y.o. highest incidence.
- CAUSE: upper respiratory or gastrointestinal infections as well as the administration of immunizations such as influenza vaccine.
- DEATH is due to respiratory failure.

Assessment:

- History reveals an infection several days before the onset of the illness.
- Onset can be rapid and acute or gradual over days or weeks.
- Neurological signs and symptoms:

1. Generalized weakness
2. Numbness and tingling in the feet and legs
3. Ascending symmetrical paralysis (paresthesia) peaks at 3rd week then slowly resolves.
4. Facial nerve: asymmetry when smiling.
5. Intercostal or phrenic nerve: breathlessness and shallow, irregular respirations.
6. Elimination: urinary incontinence or retention, constipation.

DX: EMG, CSF reveals ? CHON, other labs normal.

Nursing Diagnosis:

- Ineffective breathing pattern related to neuromuscular dysfunction.
- Risk for injury related to immobility.

Nursing Interventions:

1. **GOAL:** maintain adequate respirations:

- Maintain a patent airway; suction prn. Assist the child to cough to clear airway.
- Position:maximize lung expansion; organize care to decrease energy expenditure.
- Monitor respiratory status frequently; report any difficulty swallowing or breathing.
- Monitor VS and level of consciousness
- Bedside: tracheostomy set and suction equipment.
- Reduce anxiety and stress: Encourage parents to remain with the child.

1. **GOAL:** prevent complications of immobility:

- Turn and position frequently: maintain good body alignment; perform passive ROM exercises.
- Provide bowel and bladder care.
- Monitor for skin breakdown.
- Assist with or implement physical therapy plan to prevent contractures and assist with recovery.

Evaluation/Outcome:

- Adequate respirations are maintained.

- No complications of immobility occur.

X. Cerebral Palsy

- Dysfunction of the portion of the brain that controls motor function resulting in partial paralysis and uncontrolled movement.
- **CAUSES:** gestational rubella infection, hemorrhage, anoxia, malnutrition, abnormal placental attqachment, toxemia, radiation, medication, prolapsed umbilical cord, or multiple births.

TYPE	DEFINITION	SIGNS AND SYMPTOMS
1. SPASTIC	Cortex affectation results in scissor-like gait (one foot crosses in front of the other)	Scissor-like gait Underdeveloped limbs Increased DTR Contractures Involuntary muscle contraction and relaxation Flexion
2. ATHETOID	Basal ganglia affectation causes uncoordinated involuntary motion.	Uncontrolled movements Drooling Writhing All extremities move with voluntary movement Difficulty swallowing Facial grimace
3. ATAXIA	Cerebellum I affected à poor balance and muscle coordination.	

Treatment:

1. Baclofen (Lioresal) – muscle relaxant to reduce spasticity.
2. Phenytoin (Dylantin) – anticonvulsant, Phenobarbital (Bellatal) to control seizures.
3. Surgery to correct contractures.

Nursing Diagnosis:

1. Ineffective airway clearance related to hyperactive gag reflex and possible aspiration.
2. Altered nutrition, less than body requirements, related to difficulty swallowing and sucking.
3. Fluid volume deficit r/t speech difficulties.
4. Sensory/perceptual alterations related to potential vision and hearing defects.
5. Risk for injury related to difficulty controlling voluntary muscles.
6. Self-esteem disturbance r/t disability.

Interventions:

1. **GOAL:** maintain a patent airway.

- Have suction and oxygen readily available.
- Use feeding and positioning techniques to maintain patent airway.
- Institute prompt, aggressive therapy for Upper Respiratory Infections to prevent the possible development of pneumonia.

1. **GOAL:** promote adequate nutrition.

- High calorie due to increased metabolic demands of high motor function.

1. **GOAL:** maximize the child's abilities

- Multidisciplinary approach (PT, OT, ST, education and recreation) to meet needs
- Assess mental and developmental level.

1. **GOAL:** Prevent Injury:

- Provide head gear and kneed pads to prevent injury.
- Implement seizure precautions.
- Provide a safe environment.
- Provide safe, and appropriate toys for the child's age and developmental level.

1. **GOAL:** promote locomotion:

- Using mobilizing devices (parallel bars, crutches, and braces).
- Physical therapy for exercise program.
- Incorporate play into exercise routine.
- Surgical procedures – to relieve contractures.

1. **GOAL:** encourage independence in activities of daily living

- Adapt clothing, feeding utensils, etc. to facilitate self-help.
- Encourage child to perform ADL as much as possible, offer positive reinforcement.

- Assist parents to have realistic expectations for their child.

XI. Near Drowning

- Survival of at least 24 hours after submersion in a fluid medium
- Hypoxia/asphyxiation à cell damage.
- 4-6 minutes of submersion, cerebral cells may sustain irreversible cell damage.
- >10 min of submersion, no response to CPR within 25 min has a poor prognosis.

Nursing Interventions:

- Provide ventilator and circulatory support.
- Monitor respiratory compromise
- WOF cerebral edema which may occur after 24 hours.
- Monitor for aspiration pneumonia.
- Monitor neurological status.
- Teach parents about pool precautions to prevent accidents.