NEUROLOGICAL DISORDERS
Common Congenital Pediatric Conditions

Spina Bifida (myelodysplasia)
- There are several types of spina bifida or neural tube defects

Spina Bifida (myelodysplasia)
- a neural tube defect
- a disorder involving incomplete development of the brain, spinal cord and/or their protective coverings
- caused by the failure of the fetus’ spine to close properly during the first month of pregnancy
Types of Spina Bifida: Occulta

- Posterior vertebral arches fail to fuse
- No herniation
- Spinal cord remains intact
- Usually not visible
- Meninges are not exposed on skin surface

Types of Spina Bifida: Occulta

- Skin depression or dimple
- Tufts of hair at base of spine
- Port wine angiomaticus nevi
- Neurologic defects not usually present
- May have gait / foot weakness, bowel and bladder disturbance
Types of Spina Bifida: Cystica

- Protrusion of spinal cord and/or its meninges
- A visible defect

Meningocele

- Protrusion involves meninges and a sac-like cyst that contains CSF but no neural elements
- Located in the mid-line of the back
- Associated with neurological deficits.

Myelomeningocele

- Protrusion of meninges, CSF, and nerves
- Sac is covered with a thin membrane that is prone to leakage or rupture
- Neurological deficits evident, usually in lumbar sacral area
Types of Spina Bifida: Cystica

**Encephalocele**
- Brain and meninges herniated through defect in the skull into a sac

**Hydrocephalus**
- Occurs in 90% of cases
- Associated with Neural Tube Defect (NTD) due to downward displacement of the cerebellum through foramen magnum

**Etiology**
- Specific cause unknown
  - Factors include:
    - Heredity
    - Medication such as Valporic Acid
Etiology

- Poor maternal nutrition
- Radiation
- Research indicates that Folic Acid deficiency of mother is also indicated

Pathophysiology

- Fusion failure of vertebral laminae of spinal column during the 4th week of gestation
- Varying degree of neurological deficits present related to the portion of the spinal cord involved

Pathophysiology

- The higher the defect, the greater the neurologic dysfunction
- Below 2nd lumbar vertebrae: partial paralysis of lower extremity, varying degrees of sensory deficits, bowel and bladder disturbances
Complications of NTD

- Joint deformities produced in utero causes hip dislocation, scoliosis, and foot deformities
- Hydrocephalus may be present
- Cerebral paralysis

Complications of NTD

- Mental retardation
- Fracture related to decreased muscle mass
- Painless ulcerations
- Injuries
- Burns decubitus

Diagnostics

- Increased alfa-fetal protein from leaking CSF in maternal serum and amniotic fluid at 14-16 weeks (obtained by amniocentesis)
- Ultra sound of the fetus, MRI, CT scan and flat films of spinal column after delivery
- Usually evident at newborn exam
- Sac examination
Therapeutic Management: 
medications

- Antibiotics: prophylactically to prevent infection (UTI/s)
- Anticholinergics-Probanthine: decreases bladder tone
- Direct Acting Cholinergics-Urecholine: to manage urinary incontinence related to contraction of the bladder

Therapeutic Management: 
medications

- Antispasmodics-Uripas: to control bladder spasm
- Laxatives and stool softeners-Dulcolax and Colace: to achieve bowel continence

Therapeutic Management: 
treatment

Correction of orthopedic deformities:
- Casting
- Bracing
- Traction
- Bowel and bladder: surgery and training program.
Therapeutic Management:

- Various neurological and plastic surgical procedures can be used for skin closure without disturbing the neural elements or removing any portion of the sac.
- Vesicostomy: stoma created on abdominal wall for urinary drainage.

Pre-Operative Care: if menigocele or mylomeningocele:

- Assess spinal column for defect.
- Monitor vital signs and neuro status.
- Protect the sac: cleanse using sterile technique and sterile normal saline—cover with sterile saline moistened gauze.

Pre-Operative Care:

- No diapers—padding underneath.
- Gentle handling with feeding.
- Avoid pressure on sac.
Pre-Operative Care

- Prone or side-lying
- Keep sac free of infection: gentle cleansing around the sac
- Avoid contamination with feces or urine

Pre-Operative Care

- Observe for signs and symptoms of infection (meningitis) and increased ICP (hydrocephalus)
- Measure head circumference: high risk for hydrocephalus
- Avoid exposure to all products that contain latex: catheters, elastic bandages, baby bottle nipples, pacifier and balloons

Pre-Operative Care

Symptoms of latex allergy
- Watery eyes
- Wheezing
- Hives
- Rash
- Swelling
- Severe anaphylaxis
**Post-Operative Care**

- Provide routine post-op care
  - Check vital signs, neuro status, hydration, intake and output
  - Check incision
  - Monitor for urinary retention and stress incontinence (may diaper)

**Post-Operative Care**

- Perform crede’s maneuver to empty bladder or clean intermittent catheter q 3 hrs - 4 hrs, according to MD’s order
- Teach signs and symptoms of UTI
- Provide orthopedic appliances if necessary

**Post-Operative Care**

- Prevent constipation, develop bowel program
- Teach procedure to child and family
- Promote independence
- Refer to community agencies (SB Association)
Nursing Diagnoses

- High risk for infection
- High risk for impaired skin integrity
- Altered urinary elimination
- Bowel incontinence/constipation
- Impaired physical mobility

HYDROCEPHALUS

- Increased amount of CSF within the ventricles of the brain
- May be caused by obstruction of CSF flow or by overproduction or inadequate reabsorption of CSF
- May result from congenital malformation or be secondary to injury, infection, or tumor

Hydrocephalus: Classifications

- Noncommunicating:
  - Flow of CSF from the ventricles to subarachnoid space is obstructed

- Communicating:
  - Flow is not obstructed, but CSF is inadequately reabsorbed in the subarachnoid space
Hydrocephalus: Assessment

- Assessment findings depend on age of onset and amount of CSF in the brain
- Infant to 2 years:
  - Enlarging head size, bulging, non-pulsating fontanels, downward rotation of eyes (sunset), poor feeding, vomiting, lethargy, irritability, high-pitched cry and abnormal muscle tone

Hydrocephalus: Assessment

- Older Children:
  - Changes in head size less common
  - Signs of increased ICP (vomiting, ataxia, headache) common
  - Alteration in consciousness and papilledema late signs
SHUNTS

- Insertion of a flexible tube into the lateral ventricle of the brain
- Catheter is threaded under the skin and the distal end positioned in the peritoneum (common) or the right atrium
- Shunt drains excess CSF from the lateral ventricles; fluid is absorbed by the peritoneum or absorbed in the general circulation via the right atrium

Nursing Interventions

**Pre-operative**
- Monitor head circumference
- Monitor for signs of ICP
- Small frequent feedings

**Post-operative**
- Position on opposite side of surgery or back
- Avoid sedation
- Monitor for signs of ICP
- Educate parents concerning signs and symptoms of shunt infection or shunt malfunction
A non-progressive motor disorder of the CNS resulting in alteration in movement and posture
- Cause is trauma, hemorrhage, anoxia or infection before, during or after birth
- 1/3 of children have some degree of mental retardation

Cerebral Palsy

Classified as:
- Spastic
  - Spasticity (hypertonicity of muscle groups)
- Athetoid
  - Worm-like movements of extremities
- Ataxic
  - Disturbed coordination
- Mixed
Cerebral Palsy - Assessment

- May have hypertonicity or hypotonia of varying degrees on different extremities
- May have scissoring of the legs
- Absence of expected reflexes or presence of reflexes that extend beyond expected age
- Failure to meet developmental milestones
- Difficulty swallowing
- Altered speech

Nursing Diagnoses

- Impaired physical mobility
- Self-care deficit
- Altered nutrition: less than body requirements
- High risk for injury related to neuromuscular, perceptual or cognitive impairments

Treatment

- Self-care is a goal for all children
  - Team approach
- Nutrition
  - Increased caloric intake
  - Special feeding devices
- Community referrals
- Emotional support
ACQUIRED NEUROLOGICAL DISORDER

Meningitis

Meningitis

- Inflammation of the meninges
- Most common infection of the CNS
- Two primary classifications
  - Viral
  - Bacterial

Assessment of Meningitis

- Viral meningitis
  - Infants and toddlers
    - Irritability, lethargy, vomiting
    - Change in appetite
  - Older children
    - Usually preceded by a nonspecific febrile illness
    - Headache, malaise, muscle aches, nausea/vomiting, photophobia, nuchal/spinal rigidity
Assessment of Meningitis

- **Bacterial meningitis**
  - Infants and toddlers
    - Poor feeding/suck, vomiting, high-pitched cry, bulging fontanel, fever or hypothermia, poor muscle tone
  - Children and adolescents
    - Abrupt onset
    - Fever, chills, headache, nuchal rigidity, vomiting, changes in LOC, photophobia, extreme irritability

Nursing Diagnoses

- Risk for ineffective breathing
- Pain
- Risk for injury
- Risk for ineffective thermoregulation
**LP Results**

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<th></th>
<th>Normal</th>
<th>Viral</th>
<th>Bacterial</th>
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<td>Pressure</td>
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<td>Normal/sl</td>
<td>Elevated</td>
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<td>Appearance</td>
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<td>Clear</td>
<td>Cloudy</td>
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<tr>
<td>WBCs (mm³)</td>
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<td>Slightly ↑</td>
<td>Elevated</td>
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<tr>
<td>Protein (mg/dL)</td>
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<td>Elevated</td>
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<tr>
<td>Sugar (mg/dL)</td>
<td>40-80</td>
<td>Normal or ↓</td>
<td>Decreased</td>
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**Nursing Interventions**

- Place child in isolation until 24 hours of antibiotic therapy has completed
- Administer antibiotics (7-14 days)
- Fever control
- Monitor for signs of ICP
- Monitor for fluid overload
- Viral meningitis is treated symptomatically

**Mental Retardation**
Mental Retardation

- Significant below average intellectual functioning which is associated with impaired learning difficulties
- 3% of US population

Causes
- Genetic
- Pre-natal
- Perinatal
- Post-natal

MR - Classifications

- Mild
  - Slow learner, can work, marry, have children, may need assistance with crisis
- Moderate
  - Needs life supervision
- Severe
  - Needs a caretaker for basic needs
- Profound

Interventions

- Goal is to promote optimal development
- Family support
- Community referrals