Neurological Disorders of Infancy and Childhood

Revised by Mary Ann Gagen, Professor of Nursing
Chapter 52: Topics

• Neurological Assessment
• Spina Bifida
• Hydrocephalus
• Cerebral Palsy
• Seizure Disorders
• Altered States of Consciousness
• Meningitis
• ADHD, Chapter 53, 1542
Readings: Chapter 52

- Definitions, pg 1486
- Review of CNS ("yellow pages"), pp 1487-1491
- Nursing Care Plans
- Pathophysiologies
- Critical to Remember, pp 1497, 1522, 1525
- Box 52-1, pg 1497
- Table 52-1, pg 1497
- Posturing, Fig 52-1, pg 1498
- Figure 52-2, pg 1501
- Table 52-2, pg 1506
- Box 52-3, pg 1509
- Box 52-5, pg 1517
- Parents Want to Know...pg 1518
- Drug Guide: Table 52-3, pg 1519
- Key Concepts, pg 1530
- Chapter 53: ADHD p 1542-1544
Neuro Assessment

- Head
- Eyes
- Mouth
- V/S
- Muscles
- Neck

**History**
- Chief concern: Seizure, loss of consciousness, delay in developmental tasks, headache, clumsiness at motor tasks.
- Past medical history: Infection during pregnancy; difficult birth; difficulty with initiating respirations at birth; head injury from fall or accident.
- Family medical history: History of seizures or headache in other family members.

**Physical examination**
- Increased head circumference; bulging fontanelles, bulging forehead
- Unequal size and response of pupils; unequal eye globe movements
- Projectile vomiting
- Widening systolic and diastolic blood pressure
- Decreased pulse rate
- Headache increased temperature
- Pain on neck flexion
- Ineffective sucking
- Decreased respiratory rate
- Spasticity of muscles

Assessment 49-1 Assessing the Child for Signs and Symptoms of a Neurologic Disorder

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Reaction</th>
<th>A.M.</th>
<th>P.M.</th>
<th>A.M.</th>
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<tr>
<td></td>
<td></td>
<td>8</td>
<td>10</td>
<td>12</td>
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<td>Eye Opening</td>
<td>Spontaneously</td>
<td>4</td>
<td>X</td>
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<tr>
<td>Response</td>
<td>To speech</td>
<td>3</td>
<td>X</td>
<td>X</td>
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<td></td>
<td>To pain</td>
<td>2</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>Motor Response</td>
<td>Obeys verbal command</td>
<td>6</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Localizes pain</td>
<td>5</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Flexion withdrawal</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexion</td>
<td>3</td>
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<td>Extension</td>
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<td></td>
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<tr>
<td></td>
<td>No response</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal Response</td>
<td>Oriented x3</td>
<td>5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Conversation confused</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inappropriate speech</td>
<td>3</td>
<td></td>
<td></td>
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<td>Incomprehensible sounds</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
<td></td>
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</tbody>
</table>

FIGURE 52.5 Glasgow Coma Scale scoring for a child. A score of 3 to 8 denotes severe trauma; 9 to 12, moderate trauma; 13 to 15, slight trauma. Notice the gradual improvement from coma in this example.

Spina Bifida

- Abnormality of embryonic neural tube
- Most common developmental disorder of CNS - multifactorial inheritance
- 1-5 per 1000 live births
- Prenatal testing
- Folic acid use
Pathophysiology

• Failure of the neural tube to close

• Degree of neurological dysfunction is directly related to the anatomic level of the defect and the nerves involved


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Diagnostic Evaluation

Based on clinical manifestations and exam of sac

• Prenatal detection
• Labs - alpha-fetoprotein at 16-18 wks
• Amniocentesis
• Fetal Ultrasound
• CT and Myelography after birth
Therapeutic Management

Multidisciplinary approach:

- Antenatal microsurgical closure
- Initial care of Newborn
- Early closure during 1st 24 hours
- Bladder/bowel dysfunction
- Family support
Care of Myelomeningocele Sac

- Wet dressings, normal saline
- Sterile field
- Closely inspect for leaks and notify physician immediately
- Latex allergies (18%-60%)
Prevention/Prognosis

- Depends on neurological deficit
- Depends on early intervention
- Folic Acid use will prevent 50-70%
- Education
Hydrocephalus

• Imbalance in the production and absorption of CSF in the ventricular system
• Causes passive dilation of ventricles with S & Sx of increased ICP
• Incidence: 1.2 in 1000 births
• Hydrocephalus with spina bifida – 3 to 4 in 1000 births
Pathophysiology

- Congenital, acquired, or unknown etiology
- Obstructive-noncommunicating (99%)
- Absorption - communicating
Diagnostic Evaluation

- Primary diagnostic tools: CT&MRI
- Infancy - serial head measurements
- Early to late childhood - S & SX of increased ICP and space-occupying lesions
- Manifestations: depends on developmental stage (Table 52-2, pg 1506)
Therapeutic Management

- Bypass blockage: surgery with VP shunt
- Treatment of complications
- Management of problems
- Prevention of infection

An example of a shunt in place: a soft but durable structure which removes excess Cerebro-Spinal Fluid (CSF) pressure from the brain, draining to either the abdomen or the heart.
Prognosis

• If surgically treated with follow-up, 80% survival rate
• Highest incidence of mortality within 1st year of treatment
• Surviving children-1/2 have neurologic disabilities and 1/3 are normal
Nursing Care Management

- Watch for increased ICP - S&Sx
- Prevent infection
- Avoid scalp vein IV’s
- Observe for abdominal distention
- Family support
- Education
Cerebral Palsy

- Chronic, nonprogressive disorder of posture and movement

The Cerebral Palsy Network

"Making a difference in the lives of individuals with CP & the people who love them and the world we all live in."
Etiology & Manifestations

Most common permanent physical disability of childhood

- Prenatal, perinatal, or postnatal damage to motor system (Box 52-3, pg 1509)
- Incidence: 2 in 1000 live births
- Abnormal posturing, perceptual problems, language deficits, intellectual impairment
Pathophysiology

- Cerebral assault: loss of voluntary muscular control
- Neuromuscular disability: determined by area of brain damage
Diagnostic Evaluation

- Neuro exam & history
- Test: R/O other pathology
- Primitive reflexes continue
- Physical signs include poor head control after 3 months of age, feeding difficulties and floppy or limp body posture
Therapeutic Management

• Early recognition and intervention to attain optimum development, maximum abilities
• Multidisciplinary approach
• Establish locomotion, communication and self help
• Provide educational opportunities
• Promote socialization
Seizure Disorders

Brief paroxysmal behavior due to malfunctions of the brain’s electric system (excessive discharge of neurons)

Most common observed neurologic dysfunction in children

• 3% - 5% children under 18 mos
• 3% - 4% children 6 mos - 3 yrs (febrile)
• Neonatal seizures: 20% of preterm infants
• Epilepsy: seizure onset before 18 yrs: 60%
Epilepsy: a chronic seizure disorder with recurrent and unprovoked seizures. Seizures are characteristic of epilepsy: not every seizure is epileptic.
Etiology

• Symptomatic of altered neuronal activity in CNS
• *Primary*: no underlying brain structure abnormality
• *Secondary*: structural or metabolic abnormality
• 50% idiopathic (cause unknown)
• Most common in the first 2 years of life
Classification

- Generalized
- Tonic-Clonic
- Atonic
- Myoclonic
- Absence
- Partial
Diagnostic Evaluation

- Health history & family history
- Behavior prior, during, & after seizure
- Video recording and EEG
- Complete physical and neurological exam
- Lab tests (metabolic causes)
- CT & MRI (trauma, tumor, congenital)
- Neonates: TORCH titers
Therapeutic Management

• Discover cause and effect
• Live normal life
• Medication
• Oral care
• Don’t stop medication abruptly! Reduce medication dose gradually.
Nursing Care Management

- Assessment
- Protect from harm during seizure
- Reorient to environment
- Determine trigger factors
- Medication
- Family support
Status Epilepticus

Continual or recurrent seizures lasting 30 minutes or more with no return to normal consciousness

- Support and maintenance of vital functions
- IV administration of diazepam (Valium) or lorazepam (Ativan)
- IV phenobarbital (2nd round)
- Monitor closely
- Safety
Febrile Seizures

- During temperature rise > 102°F, (38.8°C)
- Increased susceptibility in families
- Accompany URI infection (90%)
- Boys affected twice as often as girls
- 3% develop epilepsy
Meningitis

Most common CNS infectious process: bacterial or viral
• **Primary**: bacteria or viruses
• **Secondary**: neurosurgery, trauma, sinus, ear, or systemic infections
• Most common between 1 month and 5 years; any age
• > in boys; > in African-Americans
Etiology:
2mos-12 years: *H. influenzae* type B, *N. menigitidis*, & *Streptococcus pneumoniae* (95% of bacterial meningitis)
Neonatal: *E. coli* & group B strep
Older children/adolescents: Meningococcal (droplet transmission)
Pathophysiology

- Vascular dissemination from infection elsewhere: most common
- Entry by direct implantation
- Spread to CSF
- Ill child with petechial rash needs medical care immediately
Diagnosis

- LP
- Blood Cultures
- CBC
FIGURE 49-11 (A) Brudzinski's sign. The nurse flexes the child's neck forward. (B) Positive response. Bilateral hip, knee, and ankle flexion indicates meningeal irritation. (C) Kernig's sign. The nurse flexes the child's hip and knee, forming a 90-degree angle. (D) Positive response. As the leg is extended, pain, resistance, and spasm are noted, indicating meningeal irritation.

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Therapeutic Management

- **Medical Emergency**
- Isolation (droplet) precautions for 24 hours after antibiotic treatment begins
- Antimicrobial therapy
- Hydration
- Reduce increased ICP

- Management of bacterial shock
- Control seizures
- Control temp extremes
- Treatment of complications
Nursing care

• Assessment: History & PE
• Neuro: HA, photophobia, hearing loss, seizures, change in LOC, pupil changes, nuchal rigidity, muscle flaccidity, irritability
• N&V, loss of appetite
• Hx recent immunizations or illness
• Prophylaxis for others exposed
• Family support
Prognosis

- Age of child
- Type of organism
- Severity of infection
- Duration before therapy
- Sensitivity of organism to antimicrobial drugs
- Infants - Communicating hydrocephalus
- Older children - inflammatory process or vasculitis
- Mortality rate & poor neurological outcome: highest with pneumococcal meningitis
Prognosis
ADHD: (Attention-Deficit Hyperactivity Disorder)

Most common chronic behavioral disorder of children

- Developmentally inappropriate degrees of inattention and concentration, impulsiveness, and hyperactivity
- Incidence: 1% - 20%; 4% - 12% > consensus
- 3:1 males to females
- Onset: 3-4 years
Diagnostic Evaluation

- Battery of tests
- Hand eye coordination
- Auditory and visual perception
- Comprehension, memory, IQ
- Symptoms present 6 months or more, before age 7, present in 2 settings (e.g., home, school, recreation, church)
Therapeutic Management

- **Medication:** methylphenidate Ritalin, Dexedrine, Adderall
- **Environmental manipulation**
- **Classroom education**
- **Support to family**
- **Parenting classes**
Nursing Care Management

• Education
• Focus on type of LD to provide direction for family
• Support to family
• Parenting classes
Post Lecture Quiz
Test Question

The priority nursing diagnosis for a baby just born with a myelomeningocele is:

• A. Alteration in nutrition R/T NPO status
• B. Alteration in neurological status R/T neuromuscular defect
• C. Body image disturbance R/T congenital effect
• D. Risk for infection R/T open sac
Another Test Question

The priority nursing intervention for a school-aged child in status epilepticus is:

- A. Educate the parents on the causes of status epilepticus
- B. Maintain a patent airway
- C. Protect the child from injury
- D. Obtain a blood pressure
Test Question: one more try

A young child with hydrocephalus is admitted to the Peds Unit following the placement of a ventriculoperitoneal shunt. Which of the following is a necessary nursing intervention?

• A. Daily x-rays to evaluate the shunt
• B. Measure head circumference daily
• C. Palpate fontanels frequently
• D. Keep the child prone
Which of the following assessments in a child with bacterial meningitis would be most alarming for the nurse?

• A. Irritability
• B. Nuchal rigidity
• C. Loss of appetite
• D. A hemorrhagic rash