NEUROLOGICAL DYSFUNCTION:
Theoretical Skills and Knowledge,
Scientific Principles, Critical Thinking,
Healthcare Promotion, Wellness
and Illness, and Stress Adaptation

Lecture Objectives
1. Differentiate between the classifications of mental retardation.
2. Formulate the nursing interventions for the child with cognitive or mental disorders that will promote optimum development.
3. Describe the major characteristics associated with Down’s syndrome and Fragile X.
4. Demonstrate the pediatric neurologic assessment.
5. Differentiate between the stages of consciousness and apply the nursing process to the care of the unconscious child.
6. Discuss the signs, symptoms and nursing interventions for a child experiencing increased intracranial pressure.

Lecture Objectives (cont.)
7. Compare and contrast the nursing interventions and care of a child with a CNS tumor, hydrocephalus, and an intracranial infection.
8. Analyze the types of seizure disorders and the nursing implications for caring for a child with a seizure disorder.
9. Apply the nursing process to the care of a child with a disorder of hearing or vision.
10. Apply the nursing process to caring for a child with a head injury.

Cognitive Impairment
- Any type of mental difficulty or deficiency
- Mental retardation (MR)

Early Behavioral Signs of Cognitive Impairment
- Nonresponse to contact, voice, movement
- Irritability
- Poor/slow feeding
- Poor eye contact during feeding
- Diminished spontaneous activity

Mental Retardation
—American Academy of Mental Retardation
- Subaverage intellectual function (IQ <75)
- Onset before age 18
- Functional impairments
Functional Impairments (at Least 2 of These 10)
- Communication
- Home living
- Community use
- Leisure
- Health and safety
- Self-care
- Social skills
- Functional academics
- Work
- Self-direction

Causes of Mental Retardation
- Intrauterine infection and intoxication
- Trauma (prenatal, perinatal, postnatal)
- Metabolic or endocrine disorders
- Inadequate nutrition
- Postnatal brain disease

Causes of Mental Retardation (cont.)
- Chromosomal anomalies
- Prematurity, LBW, postmaturity
- Environmental influences
- Unknown prenatal influences
- Psychiatric disorders with onset in childhood

Classification of MR
- Educable/mild—IQ 50 to 75
- Trainable/moderate—IQ 35 to 55
- Severe—IQ 20 to 40
- Profound—IQ <20 to 25

Primary Prevention of Mental Retardation
- Rubella immunization
- Genetic counseling
- Use of folic acid supplements
- Educate about fetal alcohol syndrome
- Educate about lead exposure

“Syndrome”
- A recognized pattern of malformations with a single, specific, anatomic, physiologic, or biochemical cause
Down Syndrome

- AKA trisomy 21
  - Extra chromosome 21 in 92% to 95%
  - Translocation of chromosome 21 in 3% to 6%
  - Mosaicism in 1% to 3%

- Etiology unknown—likely multiple causality
- Most common chromosomal abnormality
  - 1 in 800 to 1000 live births
- Most common genetic cause of mental retardation

Down Syndrome—Manifestations

- Head, face, eyes, musculoskeletal
- Chest, neck, abdomen
- Genitalia, skin
- Hands, feet

Down Syndrome

- Maternal age
  - Age 30: incidence ~1 in 950
  - Age 40: incidence ~1 in 100
  - In about 5% of cases extra chromosome is from father
  - Most DS infants have moms <35 years old

Down Syndrome Congenital Anomalies

- 40% to 45% heart defects
- Renal, Hirschsprung, T.E. fistula
- Altered immune function
- Skeletal defects
  - Atlantoaxial instability

Down Syndrome IQ

- Wide variation: from severely retarded to low-average intelligence
- Generally mild to moderate mental retardation
Fragile X Syndrome
• Second most common genetic cause of mental retardation after Down syndrome

X-Linked Dominance with Reduced Penetrance
• Differs from X-linked recessive pattern
• Abnormal gene on the lower end of the long arm of the X chromosome
• More common in males; sometime females

Fragile X Syndrome: Gender Differences
• Most of males are mentally deficient
• 30% of females are mentally deficient
  – Males have only the “nonfunctioning” X
  – Females have one “normally functioning” X and one “nonfunctioning” X

Classical Physical Appearance
• Large HC/long face/prognathism/large ears/long palpebral fissures/strabismus
• Mitral valve prolapse
• Macro-orchidism

Classic Physical Appearance
• Palate—high arched
• Hyperextensible finger joints/palmar crease
• Flat feet

Classic Behavioral Features
• Mild to severe mental retardation/normal IQ with LD
• Delayed speech and language
• Hyperactivity
• Autistic-like behaviors
• Aggressive behaviors
Therapeutic Management of Fragile X Syndrome

- Tegretol/Prozac—behavioral control
- Stimulants for hyperactivity (similar to ADHD management)
- Mimic behavior—“mainstream management”

Hearing Impairment

- Ranges from mild to profound
- Deaf: a person whose hearing disability precludes processing linguistic information with or without hearing aid
- Hard of hearing: generally able to hear with hearing aid

Etiology of Hearing Impairments

- Anatomic malformation
- LBW
- Ototoxic drugs
- Chronic ear infections
- Perinatal asphyxia
- Perinatal infections
- Cerebral palsy

Pathology of Hearing Impairments

- Conductive hearing loss—middle ear
- Sensorineural hearing loss—nerve deafness
- Mixed conductive-sensorineural loss—may follow recurrent OM with complications
- Central auditory interception
  - Organic
  - Functional

Symptom Severity

- Measured in decibels (dB)
- Hearing threshold
- Effect on speech

Therapeutic Management

- Medical or surgical interventions
- Hearing aid
- Cochlear implants
Manifestations of Hearing Impairment in Infancy

- Lack of startle reflex
- Absence of babbling by age 7 months
- General indifference to sound
- Lack of response to spoken word

Childhood

- Profound deafness likely to be diagnosed in infancy
- Entry into school
- Concerns with speech development

Promoting Communication

- Lip reading
- Cued speech
- Sign language
- Speech language therapy
- Socialization
- Additional aids

Care for Hearing-Impaired Child during Hospitalization

- Reassess understanding of instructions given
- Supplement with visual and tactile media
- Communication devices
  - Picture board
  - Common words and needs (food, water, toilet)

Prevention of Hearing Loss

- Treatment and management of recurrent otitis media
- Prenatal preventive measures
- Avoid exposure to noise pollution

Visual Impairment

- General term that refers to visual loss that cannot be corrected with regular prescription lenses
Visual Impairment Classification

- Partially sighted
  - Acuity of 20/70 to 20/200
  - Education usually in public school system
- Legal blindness
  - Acuity of 20/200 or less
  - Legal as well as medical term

Etiology of Visual Impairments

- Perinatal or postnatal infections
  - Gonorrhea, chlamydia, rubella, syphilis, toxoplasmosis
- Retinopathy of prematurity
- Perinatal or postnatal trauma
- Other disorders
- Unknown causes

Refractive Errors

- Refraction: bending of light rays through the lens of the eye
- Myopia
- Hyperopia
- Strabismus (may or may not be refractive)

Other Visual Impairments

- Astigmatism
- Amblyopia
- Strabismus
- Cataracts
- Glaucoma

Infections

- Conjunctivitis
  - Ophthalmic antibiotics
  - Systemic antibiotics in some cases
  - Caution with use of steroids—may exacerbate viral infections
  - Infection control concerns

Nursing Assessment

- Infancy
  - Response to visual stimuli
  - Parental observations and concerns
  - Expect binocularity by age 6 months
- Childhood
  - Visual acuity testing
Promoting Child’s Optimum Development

- Play and socialization
- Development of independence
- Education
  - Braille
  - Audio books and learning materials

Hospitalization of the Visually Impaired Child

- Safe environment
- Reassurance
- Orient child to surroundings
- Encourage independence
- Consistency of team members

Measures to Prevent Visual Impairment

- Prenatal care/prevention of prematurity
- Rubella immunizations for all children
- Safety counseling for preventing eye injuries

Periodic Recommended Screening

- Prenatal
- Newborns through preschoolers
- Children of all ages

Emergency Treatment for Eye Injuries

- Foreign body
- Chemicals
- UV burns
- Hematoma
- Penetrating injuries

Deaf–Blind Children

- Profound effects on development
- Motor milestones usually achieved
- Other development often delayed
- “Finger spelling”
- Developing future goals for the child
Autism

• Definition: brain dysfunction accompanied by broad range and severity of intellectual and behavioral deficits
• Etiology unknown
• Genetic basis?

Diagnostic Criteria for Autistic Disorder

• Qualitative impairment in social interaction
• Qualitative impairment in communication
• Restricted repetitive and stereotype patterns of behavior, interests, and activities
• Delays or abnormal functioning with onset before 3 years

—American Psychiatric Association *DSM IV*

Autism: Nursing Considerations

• Wide variation in individual client response to treatment efforts
• No cure for autism
• Most promising results seem to be through highly structured routines and intensive behavior modification programs

Family Support

• Autism often becomes a family disease
• Frequently parents express guilt and shame
• Stress importance of family counseling
• Autism Society of America (ASA) is good source of information
• Managing clients at home or long-term placement facility

Assessment of Cerebral Function

• Infants and young children: observe spontaneous and elicited reflex responses
• Family history
• Health history
• Physical examination

Chapter 51

Cerebral Dysfunction
Increased Intracranial Pressure (ICP)
- Early signs and symptoms may be subtle
- As pressure increases, signs and symptoms become more pronounced and level of consciousness (LOC) deteriorates

Clinical Manifestations of Increased ICP in Infants
- Irritability, poor feeding
- High-pitched cry, difficult to soothe
- Fontanels: tense, bulging
- Cranial sutures: separated
- Eyes: setting-sun sign
- Scalp veins: distended

Clinical Manifestations of Increased ICP in Children
- Headache
- Vomiting: with or without nausea
- Seizures
- Diplopia, blurred vision

Behavioral Signs of Increasing ICP
- Irritability, restlessness
- Drowsiness, indifference, decrease in physical activity and motor skills
- Complaints of fatigue, somnolence
- Inability to follow commands, memory loss
- Weight loss

Late Signs of Increasing ICP
- Decreased LOC
- Decreased motor response to command
- Decreased sensory response to painful stimuli
- Alterations in pupil size and reactivity
- Papilledema
- Decerebrate or decorticate posturing
- Cheyne-Stokes respirations

Levels of Consciousness (in Descending Order)
- Full consciousness
- Confusion: impaired decision making
- Disorientation: to time and place
- Lethargy: sluggish speech
Levels of Consciousness (Continued Descending Order)

- Obtundation: arouses with stimulation
- Stupor: responds only to vigorous and repeated stimulation
- Coma: no motor or verbal response to noxious stimuli
- Persistent vegetative state: permanently lost function of cerebral cortex

Pediatric Glasgow Coma Scale

- Three-part assessment
- Eyes
- Verbal response
- Motor response
- Score of 15: unaltered LOC
- Score of 3: extremely decreased LOC (worst possible score on the scale)

Neurologic Exam

<table>
<thead>
<tr>
<th>Vital signs</th>
<th>Skin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes</td>
<td>Motor function</td>
</tr>
<tr>
<td>Posturing</td>
<td>Reflexes</td>
</tr>
</tbody>
</table>

Special Diagnostic Procedures

- Lab tests: glucose, CBC, electrolytes, blood culture if fever, evaluate for toxic substances, liver function
- Imaging: CT, MRI, echoencephalography, ultrasound, nuclear brain scan, PET
- Lumbar puncture
- EEG
- X-ray (rule out skull fractures, dislocations; evaluate degenerative changes, suture lines)

Nursing Care of the Unconscious Child

- Outcome and recovery of unconscious child may depend on level of nursing care and observational skills
- Emergency management
  - Airway
  - Reduction of ICP
  - Treatment of shock

Assessment Parameters

- LOC
- Pupillary reaction
- VS
- Frequency of assessment depends on condition: range from every 15 minutes to 2 hours
Pain Management for the Comatose Child

- Signs of pain
- Increased agitation and rigidity
- Pain increases ICP
- Alterations in vital signs
  - Usually increase in HR, RR, BP and decrease in oxygen saturation

Drug Therapies for Pain

- Opioids
- Fentanyl + Versed + Vecuronium
- Acetaminophen and codeine

Respiratory Management

- Airway management is primary concern
- Cerebral hypoxia lasting >4 hours may cause irreversible brain damage
- CO₂ causes vasodilation, increased cerebral blood flow, and increased ICP
- May have minimal gag and cough reflexes
- Risk of aspiration of secretions

ICP Monitoring

- Indications for ICP monitoring
  - Glasgow Coma Scale <7
  - Glasgow Coma Scale <8 with respiratory distress
  - Deteriorating neurologic condition
  - Subjective judgment

Types of ICP Monitors

- Intraventricular catheter
- Subarachnoid bolt
- Epidural sensor
- Anterior fontanel pressure monitor

Nursing Care for Child with Increased ICP

- Patient positioning
- Avoid activities that may increase ICP
- Eliminate or minimize environmental noise
- Suctioning issues
**Nutrition and Hydration**
- IV administration of fluids and parenteral nutrition
- Caution with overhydration
- Later begin gastric feedings via NG or GT
- Patient may continue to have risk of aspiration

**Altered Pituitary Secretion**
- Syndrome of inappropriate antidiuretic hormone (SIADH) may accompany CNS diseases
  - Decreased urine output with hyponatremia and hypo-osmolality
- Treatment of SIADH
  - Fluid restriction, observe for electrolyte balance, vasopressin administered

**Medications (as Indicated)**
- Osmotic diuretics for cerebral edema
- Antiseizure medications, with or without sedatives
- Controversy with barbiturates
- Paralyzing agents
- Antipyretics

**Nursing Care Needs**
- Elimination
- Hygienic care
- Position and exercise
- Stimulation
- Family support

**Nursing Diagnoses**
- Sensory/perceptual alterations related to CNS impairment
- Self-care deficits related to physical immobility, perceptual and cognitive impairments
- Risk for aspiration related to depressed sensorium, impaired motor function
- Risk for injury related to depressed sensorium

**Head Injury: Etiology**
- Falls
- Motor vehicle injuries
- Bicycle injuries
**Pathophysiology of Head Injury**
- Force of intracranial contents cannot be absorbed by the skull and musculoligamentous support of the head
- Especially vulnerable to acceleration-deceleration injuries

**Primary Head Injuries**
- Those injuries that occur at a time of trauma
- Including:
  - Skull fracture
  - Contusions
  - Intracranial hematoma
  - Diffuse injury

**Subsequent Complications of Head Injuries**
- Hypoxic brain injury
- Increased ICP
- Infection
- Cerebral edema

**Concussion**
- Transient and reversible
- Results from trauma to the head
- Instantaneous loss of awareness and responsiveness lasting for minutes to hours
- Generally followed by amnesia and confusion

**Contusion and Laceration**
- Terms used to describe visible bruising and tearing of cerebral tissue
- Coup: bruising at point of impact
- Contrecoup: bruising at a site far removed from point of impact

**Skull Fractures in Children**
- Great deal of force required to produce skull fracture in infant
- Fracture on underside of skull can tear meningeal artery causing severe hemorrhage with hypovolemic hypotension
Types of Skull Fractures
- Linear
- Depressed
- Compound
- Basilar
- Diastatic

Complications of Head Trauma
- Epidural hemorrhage
- Subdural hemorrhage
- Cerebral edema

Diagnostic Evaluation
- Assessment of ABCs
- Vital signs
- Neurologic exam
- Special tests: CT, MRI, behavioral assessment

Posttraumatic Syndromes
- Postconcussion syndrome
- Posttraumatic seizures
- Structural complications such as hydrocephalus
- True mental retardation occurs only after severe injuries

Therapeutic Management
- Care in hospital if severe injuries, LOC for several minutes, prolonged or continued seizures
- NPO initially
- Possible surgical interventions
- Prognosis

Nursing Considerations
- Frequent assessment: VS and neurologic checks
- Provide analgesia and sedation
- Careful observation and recording
- Family support
- Rehabilitation
- Prevention
**Near Drowning**
- Drowning is second leading cause of accidental death in children
- Death occurs from asphyxia while submerged
- Can occur with even small quantity of water (even as small as a pail of water)
- Near drowning: survived at least 24 hours after submersion

**Pathophysiology of Drowning**
- Hypoxia
- Aspiration
- Hypothermia

**Therapeutic Management**
- Emergency resuscitative efforts at the scene
- Management is based on degree of cerebral insult
- Aspiration is frequent complication
- Prognosis

**Nursing Considerations**
- Care depends on condition of the child
- Helping parents cope with feelings of guilt
- Parental anxiety related to prognosis
- Prevention of drowning

**CNS TUMORS**
- Brain tumors and neuroblastoma are derived from neural tissue
- Account for approximately 20% of childhood cancers
- Tumors are difficult to treat and result in poor survival rates

**Brain Tumors**
- Most common solid tumors in children
- 60% are infratentorial
  - Occur in posterior third of brain
  - Primarily in cerebellum or brainstem
- 40% are supratentorial
  - Occur in anterior two thirds of brain
  - Mainly in cerebrum
Diagnostic Evaluation
• Signs and symptoms are related to anatomic location, size, and child’s age
• Presenting clinical signs
• Neurologic evaluation
• MRI, CT, EEG, LP
• Histologic diagnosis via surgery

Therapeutic Management
• Depends on type of tumor
• Surgery
• Radiotherapy
• Chemotherapy
• Prognosis

Nursing Considerations
• Prepare child and family for diagnostic and operative procedures
• Considerations related to body image
• Postoperative care
• Support child and family
• Promote return to optimum functioning

Neuroblastoma
• Most common malignant extracranial solid tumor of childhood
• Majority of tumors develop in adrenal gland or retroperitoneal sympathetic chain
• Other sites: head, neck, chest, pelvis
• Metastasis may have already occurred before diagnosis is made

Diagnostic Evaluation of Neuroblastoma
• Objective is to locate primary site + sites of metastasis
• Signs and symptoms depend on location and stage of disease
• Radiologic studies, bone marrow evaluation
• IVP to evaluate renal involvement

Therapeutic Management of Neuroblastoma
• Clinical staging to establish treatment plan
• Surgery to remove tumor and obtain biopsies
• Radiation, chemotherapy
• Bone marrow transplantation
• Stem cell rescue
Prognosis for Neuroblastoma
- Survival rates with all stages grouped together
- 75% of <1 year of age
- 50% of >1 year of age
- In general, younger at diagnosis = better prognosis
- May have spontaneous regression as embryonic cells mature and with development of active immune system

CNS Infections
- CNS has limited response to injury
- Difficult to distinguish etiology by looking at clinical manifestations
- Lab studies required to identify causative agent
- Inflammation can affect meninges, brain, or spinal cord

Bacterial Meningitis
- Acute inflammation of CNS
- Decreased incidence following use of “Hib” vaccine
- Can be caused by various bacterial agents
  - *Streptococcus pneumoniae*
  - Group B streptococci
  - *Escherichia coli*

Transmission of Bacterial Meningitis
- Droplet infection from nasopharyngeal secretions
- Appears as extension of other bacterial infection through vascular dissemination
- Organisms then spread through CSF

Bacterial Meningitis
- Diagnostics: LP is definitive diagnostic test
- Therapeutic management
- Nursing considerations

Nonbacterial Meningitis (Aseptic Meningitis)
- Causative agents are principally viruses
- Frequently associated with other diseases
  - Measles, mumps, herpes, leukemia
- Onset is abrupt or gradual
- Manifestations: headache, fever, malaise
- Diagnosis and treatment
- Prognosis
**Encephalitis**

- Inflammatory process of CNS with altered function of brain and spinal cord
- Variety of causative organisms—viral most frequent
- Vector reservoir in U.S.: mosquitoes and ticks

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**Clinical Manifestations of Encephalitis: Sudden or Gradual Onset**

- Malaise
- Fever
- Headache/dizziness
- Stiff neck
- Nausea/vomiting
- Ataxia
- Speech difficulties

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**Clinical Manifestation of Severe Encephalitis**

- High fever
- Disorientation/stupor/coma
- Seizures/spasticity
- Ocular palsies
- Paralysis

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**Encephalitis**

- Diagnostic evaluation
- Therapeutic management
- Nursing considerations

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**Reye Syndrome (RS)**

- A disorder defined as toxic encephalopathy associated with other characteristic organ involvement
- Characterized by fever, profoundly impaired consciousness, and disordered hepatic function

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**Reye Syndrome**

- Etiology is obscure
- Most cases follow common viral illness
- Potential association between aspirin therapy for fever and development of RS
Reye Syndrome
- Pathophysiology
- Diagnostic evaluation
- Therapeutic management
- Prognosis
- Nursing considerations

HIV Encephalopathy
- Complication of AIDS
- Progressive encephalopathy occurs in 30% to 50% of children infected with HIV
- Neurologic manifestations
  - Unexplained neurodevelopmental regression
  - Focal seizures
  - Progressive motor dysfunction

Rabies
- 12% cases come from domestic animals, especially cats
- Infected wild animals are most commonly raccoons, skunks, foxes, and bats
- Unprovoked attack is more likely to indicate a rabid animal than provoked attack

Therapeutic Management of Rabies
- Inactivated rabies vaccines
- Globulins
- HRIG: human rabies immune globulin ASAP after exposure
- HDCV: human diploid cell rabies vaccine
- Guidelines for use from World Health Organization

Nursing Considerations
- Support and reassurance for child and family
- Analgesia with EMLA cream to injection sites

Seizures
- Caused by malfunctions of brain’s electrical system
- Determined by site of origin
- Most common neurologic dysfunction in children
- Occur with wide variety of CNS conditions
Seizures
• Sign and symptoms
  – Change in LOC
  – Involuntary movements
  – Posturing
  – Changes in perception, behaviors, or sensations

Types of Seizures
• Epileptic
• Nonepileptic
  – Most seizures are idiopathic

Etiology of Seizures
• Idiopathic (no known cause)
• Genetic factors
• Acquired

Incidence and Occurrence
• 2.3 million Americans affected
• Especially children and elderly
  – More seizures in those younger than 2 years than any other age group

Epilepsy
• Definition: ≥2 “unprovoked” seizures
• Idiopathic epilepsy: cause unknown
• Seizures are indispensable characteristics of epilepsy

Seizures
• A single seizure not generally classified as epileptic
• Single seizure not generally treated with LT Rx
Major Causes of Seizures in Children
- Birth injuries (anoxia) or congenital defects of CNS
- Acute infections in late infancy and early childhood
- Usually idiopathic in children >3 years

Absence Seizures
- Formerly called petit mal or lapses
- Brief loss of consciousness
- Minimal or no change in muscle tone
- Almost always appear in childhood (4-12 years old)

Absence Seizures
- Sudden onset of up to 20+ events per day
- No warning/no aura
- Duration 5 to 10 seconds
- Motor: lip smacking, twitching of eyes and face, slight hand movements
- May drop object, child rarely falls
- No incontinence

Absence Seizures
- Often misdiagnosed
  - Inattention or daydreaming
  - ADD/ADHD

Absence Seizures
- School issues
- Behavioral management

Atonic Seizures
- Sudden momentary loss of muscle tone
- Onset usually ages 2 to 5
- May or may not have LOC
- Sudden fall to ground, often on face
- Less severe—head droops forward several times
Myoclonic Seizures
- Sudden brief contractions of muscle group
- May be single or repetitive
- No LOC
- Often occur with falling asleep
- May be nonspecific symptom in many CNS disorders
- May be mistaken as exaggerated startle reflex

Infantile Spasms
- Onset in first 6 to 8 months of life
- Usually associated with some degree of mental retardation
- Cause: possibly due to disturbance of central neurotransmitter regulator at specific phase of brain development

Infantile Spasms
- Specific spike seen on EEG
- Twice as frequent in males
- Head and neck flex forward; knees drawn up (jackknife position)
- May or may not have LOC
- No postictal drowsiness
- Other variants

Infantile Spasms
- Often associated with cerebral anomalies, anoxic brain injury, PKU
- May also have microcephaly, tonic posture, or other abnormal movements
- Poor prognosis (mental and developmental)
- Treatment

Status Epilepticus
- Definition: seizure lasting >30 minutes or series of seizures without regaining premorbid level of consciousness
  - Maintain airway
  - Establish IV access
  - Meds

Status Epilepticus
- Diastat (prefilled rectal syringe)
- Versed (intranasal)
- IV lorazepam (Ativan) or valproic acid
- IV loading with phenytoin for ongoing management
Emergency Management
- High-dose sedatives
- Maintain patent airway
- Prepare for respiratory support

Pediatric Diagnosis of Seizure Disorders
- Ascertain type of seizure
  - History, observation
- Determine the cause of the event
  - Diagnostics
    - EEG, MRI
    - Labs: glucose, electrolytes, BUN, Ca++
    - LP

Common Pediatric Seizure Triggers
- Changes in dark-light patterns (camera flashes, headlights, rotating fan blades, reflections off snow or water)
- Sudden loud noises
- Extreme temperature changes
- Dehydration
- Fatigue

Febrile Seizures
- Transient disorder of childhood
- Affect approximately 3% of children
- Usually occur between ages 6 months and 3 years
- Rare after age 5
- Twice as frequent in males

Febrile Seizures (cont’d)
- Cause?
- Usually in temperatures >101.8° F
- Seizure occurs when temperature is increased, not after
- Seizure usually over before arriving in ER
- Management
  - Avoid tepid baths—usually ineffective
  - Vigorous use of antipyretics
  - Protect child from injury during seizure
  - Call 911 if seizure >5 minutes’ duration

Febrile Seizures (cont’d)
- 95% to 98% of children with febrile seizures will not have epilepsy or neurologic damage
- Management
  - Avoid tepid baths—usually ineffective
  - Vigorous use of antipyretics
  - Protect child from injury during seizure
  - Call 911 if seizure >5 minutes’ duration
Febrile Seizure Treatment

- Fever reduction
- Evaluate history (episodic and family)
- Seizure control if ongoing
  - Diazepam (rectal)

Febrile Seizure Treatment (cont’d)

- Prophylaxis with medications
  - If focal or prolonged seizures
  - If neurologic anomalies
  - If first-degree relative has seizure history
  - Child <1 year old
  - If multiple seizures in 24-hour period

Phenobarbital

- Febrile seizures, neonatal seizures
- Also for other seizures: front-line IV choice if patient does not respond to diazepam
- High dosage may require respiratory support

Phenytoin (Dilantin)

- PO or slow IV push (<50 mg/minute)
- Precipitates when mixed with glucose
- Side effects: gingival hyperplasia, ataxia, rashes, acne, hirsutism, osteoporosis
- Onset 5 to 30 minutes; duration 12 to 24 hours

Fosphenytoin

- May be given with saline or glucose
- Rate up to 150 mg/min
- IV or IM

Valproic Acid

- AKA Depakote, Depakene
- IV or PO
- IV for status epilepticus
- S.E.: hepatotoxicity
**Diazepam**
- AKA Valium IV, Diastat (rectal gel)
- Rx of choice for status epilepticus
- Rectal gel for home or prehospital management
- Onset 3-10 min short duration (minutes)
- Concurrent loading with phenytoin for sustained control of seizures

**Ativan**
- Alternative to diazepam
- May be preferable to diazepam
  - Longer duration of action
  - Less respiratory distress in children older than 2 years

**Midazolam (Versed)**
- Intranasal route
- For acute epileptic seizures
- Onset 3 to 5 minutes

**Pharmacologic Management**
- Monotherapy is treatment of choice for pediatric patients
- Gradual increase of dose until seizure control or signs of toxicity
- Polypharmacy if uncontrolled with one drug

**Pharmacologic Management**
- Monitor therapeutic levels
- Increase dosage as child grows
- Monitor for known side effects
- Avoid abrupt discontinuation—gradual dose reduction

**When to Discontinue Pharmacologic Management**
- When seizure free for 2 years
- Normal EEG
- Avoid during puberty or when subject to frequent infections
- Recurrence possible within first year
Nursing Interventions
- Observe and document episode
  - Protect from injury
  - Stay calm
  - Remain with child
  - Privacy if possible

Home Management of Seizures
- CPR training for family members
- Rectal diazepam available for intractable seizures
- Activity restriction on individual basis
- Safety devices—helmets, no swimming alone, awareness of school, other caregivers

Microcephaly
- Definition
- Primary
  - Intrauterine exposure to toxins (weeks 4-20)
- Secondary
  - Third-trimester exposure
  - Perinatal exposure
  - Exposure in early infancy

Microcephaly—Effects
- Mild hyperkinesis, mild motor impairment
- Decerebration, complete unresponsiveness
- Autistic behavior

Craniofacial Abnormalities
- Usually not life-threatening
- Surgical corrections if possible
- Example: Pierre Robin syndrome

Plagiocephaly
- Skull progressively flattened
- Not associated with brain malformation
- Treatment
  - Helmets/bands/time
**Hydrocephalus**
- Commonly associated with myelomeningocele
- 80% to 85% cases of SB will develop hydrocephalus
- May not be apparent at birth
- May appear after primary closure of defect
- Results from disturbances in dynamics of CSF

**Cerebrospinal Fluid**
- Secreted by choroid plexus
- Circulates throughout ventricular system
- Absorbed within the subarachnoid spaces

**Communicating Hydrocephalus**
- Impaired absorption of CSF within the subarachnoid space

**Noncommunicating Hydrocephalus**
- Obstruction to flow of CSF through ventricular system

**Hydrocephalus: Monitoring**
- H.C. (F.O.C.)
- Fontanel tension
- Serial ultrasounds—ventricle size

**Hydrocephalus: Initial Management**
- Treatment of excessive CSF (shunt)
- Treatment of complications
- Manage problems related to psychomotor development