**Physiologic Effects of Immobilization**

- Delays age-appropriate milestones
- Development of joint contractures
- Bone demineralization
- Decrease in
  - muscle size
  - strength
  - endurance

**Psychological Effect of Immobilization**

- Sensory deprivation
  - Isolation
  - Boredom
  - "No-one cares about me"
- Autonomy vs Shame and Doubt
- Depression
- Regressive behavior
- Inability to discharge anger
Nursing Diagnosis For The Immobilized Child
- Impaired physical mobility
- Risk of impaired skin integrity
- Risk for injury
- Diversional activity deficit

Nursing Care of The Immobilized Child
- Frequent position changes
- High protein, high calorie diet
- Prevent aspiration during feedings
- Teaching the child (dolls)
- Teaching family about child’s special needs
- Promote self-care
- Set reasonable limits
- Promote visitation of family members

Traumatic Injury
- Soft tissue injury
- Fractures
- Cast care
- Traction
- Distraction
- Amputation
Soft Tissue Injury

- Usually results from play/sports
- Contusions and crush injuries
  - Ecchymosis
  - Myositis ossificans
  - Cold therapy
- Dislocations
  - Pain with movement of extremity
  - Phalanges, Hips, shoulders
  - Treatment: reduction

Dislocation - Occurs when a bone and its partner bone are not correctly aligned. This is like a toy train that goes off the track. You have to put it back on track in the right line. That is what happens with bones; sometimes they get dislocated, and a doctor will need to put them back in place. If it is not properly aligned when it is put back, it could be made worse which is why a doctor should be seen. It will hurt until it is put back in place.
Soft Tissue Injury
Continued
• Sprains
  - Torn or stretched ligament
  - Joint laxity
• Strains
  - Tearing to the musculotendinous unit
• Treatment
  - RICE or ICES

Sprains

First Degree
Second Degree
Third Degree

The more severe the sprain, the longer the time it takes to recover from the injury.

Fractures
• Various stages of healing (abuse)
• Causes
  - Bicycle, automobile, skateboard, four wheeler, motorcycle, sports
• Epiphyseal injuries
• Types of fractures:
  - Complete vs incomplete
  - Closed vs compound
  - Complicated vs comminuted
Fractures Continued

- Types
  - Transverse
  - Oblique
  - Spiral
  - Bend
  - Buckle
  - Greenstick
  - Spiral
Clinical Manifestations of a Fracture

- Generalized swelling
- Pain
- Bruising
- Muscular rigidity
- Crepitus
- Limited mobility

Bone Healing and Remodeling

- Typically rapid healing in children
- Neonatal period—2 to 3 weeks
- Early childhood—4 weeks
- Later childhood—6 to 8 weeks
- Adolescence—8 to 12 weeks

Goals of Therapy and Nursing Care

- Realign fracture
- Immobilize part
- Restore function
- Prevent further injury
- Create a calm milieu
- Create a trusting relationship
Cast Care

- Explain the procedure using a doll
- Allow the cast to dry
  - Body cast: turn q two hours
  - Do not use blow dryers
- Observe for “hot spots”
- Observe for compartment syndrome

Casting and Removal

By Dan Gibson

Just when Bill thought his luck couldn't get any worse...it does.
**Child With A Cast**

**Cast Care Continued**
- Elevate casted extremity
- Perform neurovascular assessment
- Do not allow the child to put anything inside the cast

**Purpose of Traction**
- Rest the extremity
- Prevent contracture
- Correct a deformity
- Provide immobilization
- Reduce muscle spasms
Principles of Traction

Types of Traction

- Upper extremity traction
  - Overhead suspension
  - Dunlop traction
- Lower extremity traction
  - Bryant traction
  - Buck extension
  - Russell traction
  - 90-degree-90-degree
  - Balance suspension traction
Types of Traction
Continued

- **Cervical traction**
  - Crutchfield/Barton tongs
- **Guidelines**
  - Understand function of traction
  - Maintain alignment
  - Pin care
  - Prevent skin breakdown
  - Prevent complications (guideline box, pg 1815)
Distraction
• Separation of bone to create space for new growth
• Ilizarov external fixator
• Bone grows 1 cm/month
• Body image-disturbed
• Pin care
• Monitor for infection
• Partial weight bearing

Distraction: Ilizarov External Fixator

Amputation
• Absence of body part
  - Congenital, Traumatic loss, Surgical amputation
• Nursing Care
  - Stump shaping and bandaging
  - Stump elevation for 24 hours only
  - Wound care
  - Phantom limb sensation
Congenital Defects

- Developmental Dysplasia of the Hip
- Congenital Clubfoot
  - Metatarsus Adductus (Varus)
- Skeletal Limb Deficiency
- Osteogenesis Imperfecta

Developmental Dysplasia of the Hip

- Group of disorders
  - Abnormal hip development
- Three types
  - Acetabular dysplasia
    - Nondevelopment of the acetabular roof
  - Subluxation
    - Femur is partially displaced
  - Dislocation
    - Femoral head displaced from acetabulum
DDH Continued

• Diagnostics
  - Ortolani or Barlow test
  - Assessment of gait and hip when the child can walk
  - X-ray not reliable
  - Ultrasound

DDH Continued

• Clinical manifestations
  - Infant
    - Shortened limb
    - Restricted abduction
    - Unequal gluteal fold
    - +ve ortolani/Barlow test
  - Child
    - Shorter limb
    - Trendelenburg sign
    - Prominent trochanter
    - Marked lordosis
    - Waddling gait

Signs of Developmental Dysplasia
Signs of Developmental Dysplasia

DDH Continued

• Therapeutic Management
  - Newborn to age six months
    • Splinting with the Pavlik harness
    • Worn for 3-6 months
  - 6-18 months
    • Traction and cast immobilization
  - Older child
    • Reduction and reconstruction

DDH Continued

• Nursing Care
  - Assess for DDH in newborn
  - Education: reduction device
    • Pavlik harness
      • Sponge bath
      • Do not use powders and lotions
      • Adjustment of harness done by nurse
    • Cast care
    • Involve child in family activities
Congenital Clubfoot (CC)
- Abnormal positioning of the foot
  - Common positions
    - Talipes varus, Talipes valgus
    - Talipes equinus, Talipes calcaneus
  - Metatarsus Adductus (Varus)
    - Most common CC deformity
    - Stretching the forefoot
Congenital Clubfoot Continued

- Therapeutic management
  - Correction of the deformity
  - Serial casting
    - Allows for stretching of skin/structures
    - Accommodates for active growth

- Nursing Care
  - Neurovascular assessment
  - Cast care
  - Parent education

Serial Casting

![Serial Casting Image](image)

Skeletal Limb Deficiency

- Underdevelopment of skeletal parts

- Causes
  - Environmental factors
  - Teratogens
  - Amputation in utero

- Nursing Care
  - Prosthetic training and habilitation
Osteogenesis Imperfecta (OI)

- Inherited disorder of connective tissue
- Clinical Presentation
  - Thin skin
  - Epistaxis
  - Excess diaphoresis
  - Bruise easily
  - Frequent fractures
- Nursing Care
  - Careful handling of the infant/child
  - Prevent dehydration
  - Genetic counseling

Therapeutic Management of OI

- Primarily supportive care
- Drugs of limited benefit
- May rule out OI if multiple fractures occur
- Nursing considerations
  - Caution with handling to prevent fractures
  - Family education
  - Occupational planning and genetic counseling
Acquired Defects
- Legg-Calve-Perthes Disease
- Slipped Femoral Capital Epiphysis
- Kyphosis
- Lordosis
- Scoliosis

Legg-Calve-Perthes Disease
- Necrosis to the femoral head
- Self-limiting
- Cause is unknown
- S/S: limp, soreness, ache
- Nursing Interventions
  - Rest and inactivity
  - Non-weight bearing
  - Education: creative endeavors

Slipped Femoral Capital Epiphysis
- Most common hip disorder in adolescence
- Signs and symptoms
  - Limp on affected side
  - Pain in hip
  - Restricted abduction and adduction
  - Shortening of lower extremity
Kyphosis

- Postural kyphosis most common in children “slouching”
- Kyphosis may be caused by self-consciousness
  - Hide developing breasts
  - Decrease “tallness”
- Remind child to “sit up straight”
- Promote sports
- Bracing

Lordosis

- Usually secondary to
  - Obesity
  - Congenital dislocated hip
  - Slipped femoral capital epiphysis
- Treatment
  - Lose weight
  - Postural exercises
  - Support garments
Scoliosis

- Common with adolescent growth spurt
- Signs and symptoms
  - Uneven hem line
  - Degree of curvature
- Bracing:
  - Slows progression of curvature
  - Boston brace
  - Thoracolumbosacral orthotic
- Surgery: internal fixation (Harrington rod)
TLSO Brace

Scoliosis Continued

- Nursing Care
  - Promote positive self-esteem & body image
  - Education about appliance
  - Preoperative: rod insertion/spinal fusion
    - X-ray, PFT, ABG's, CHEM12
  - Postoperative: rod insertion/spinal fusion
    - Logrolled post surgery
    - Neurological status
    - Urinary retention
    - Pain management
    - Skin care

Infections of Bone and Joints

- Osteomyelitis
- Septic arthritis
- Tuberculosis
Osteomyelitis

- Occurs most commonly between 5-14
  - S. aureus infection from open fracture, penetrating wound, surgery
  - Spread of organisms from furuncles, impetigo, otitis media, abscessed teeth

Diagnostics
- Blood cultures
- Bone cultures
- Bone scans

Osteomyelitis Continued

- Signs and Symptoms
  - Febrile
  - Tachycardia
  - Dehydration
  - Tenderness to site
  - Painful extremity
  - Swelling
Osteomyelitis Continued

- Nursing Care
  - Positioning
  - Support affected limb
  - Administer antibiotic therapy
  - PICC line care
  - Healthy diet
  - Minimize weight bearing till limb healed

Septic Arthritis

- Most common areas
  - Hip
  - Knee
  - Shoulder

- Nursing care
  - IV antibiotic therapy
  - Pain management
  - Minimal weight bearing
Tuberculosis
- Spreads from pulmonary TB
- May affect
  - Fingers, toes
  - Spinal column
- History of TB with +ve PPD
- Administration of antituberculars

Bone and Soft Tissue Tumors
- Osteogenic Sarcoma
- Ewing Sarcoma
- Rhabdomyosarcoma

Osteogenic Sarcoma
- Most common bone cancer in children
- Therapeutic management
  - Amputation
  - Resection of the tumor
  - Chemotherapy
  - Promote normalcy
- Nursing dx:
  - ineffective coping
  - Body image: disturbed
Ewing Sarcoma

- Most often affects 4-25 years
- Originates in the marrow
- Radiation
  - Skin care
    - Moisturizer
  - Protect from sunlight
  - Loose fitting clothes
- Chemotherapy

Ewing Sarcoma

Rhabdomyosarcoma

- Most commonly affects children under 5 years old
- Cancer originates in the muscle
- Highly malignant
- See box 54-10 on page 1833
Rhabdomyosarcoma

Disorders of Joints
- Juvenile Rheumatoid Arthritis
- Systemic Lupus Erythematosus

Juvenile Rheumatoid Arthritis
- Inflammatory disease
- Unknown cause
- Ages 1-3 and 8-10
- Negative rheumatoid factor
- Three types
  - Pauciarticular
  - Polyarticular
  - Systemic
JRA Continued

- S/S
  - Swollen and warm joints
  - Limited range of motion
  - Growth retardation
- Therapeutic Management
  - Preserve joint function
  - Prevent physical deformities
  - Relieve symptoms
  - Screening for iridocyclitis

American College of Rheumatology Diagnostic Criteria

- Age of onset younger than 16 years
- One or more affected joints
- Duration of arthritis more than 6 weeks
- Exclusion of other forms of arthritis
JRA Continued

- Medications
  - NSAIDs
  - Slow-acting antirheumatic drugs
  - Cytotoxic drugs
  - Corticosteroids
  - Immunologic modulators
- Physical therapy
- Occupational therapy

JRA Continued

- Nursing Care
  - Pain management
  - Promote general health
  - Facilitate compliance
  - Encourage the use of heat
  - Engage in regular exercise
  - Provide emotional & social support

Systemic Lupus Erythematosus

- Multisystem autoimmune disease
- More commonly affects girls 10-19
- Triggers
  - hormonal imbalance
  - environmental drugs
  - Infection
  - Sun exposure
  - Stress
SLE

SLE Continued

• Clinical manifestations
  - Butterfly rash
  - Myalgia/joint swelling
  - Seizures
  - Cranial nerve destruction
  - Pericarditis
  - Glomerulonephritis
  - Enlarged lymph nodes
  - Nausea and vomiting

SLE—Criteria for Diagnosis
(must have four of the following)

• Renal disorder
• Neurologic disorders
• Hematologic disorders
• Immunologic disorders
• ANA

• Butterfly rash
• Discoid rash
• Photosensitivity
• Oral ulcers
• Arthritis
• Serositis
SLE Continued

- Medications
  - Corticosteroids
  - Antimalarial preparations
  - NSAIDs
  - Immunosuppressive agents
  - Antibiotics
- Nursing care: promote positive adaptation to the illness

Neuromuscular Disorders

- Cerebral palsy
- Spina bifida
- Werdnig-Hoffmann Disease
- Kugelberg-Welander Disease
- Muscular Dystrophy
- Pseudohypertrophic muscular dystrophy

Cerebral Palsy (CP)

- Disorders with impaired movement and posture
- Premature delivery single most important risk factor for CP
- Classifications (Box 55-1, pg. 1842)
  - Spastic
  - Dyskinetic
  - Ataxic
  - Mixed type
Cerebral Palsy Continued

• Manifestations (Box 55-2, pg. 1842)
  - Delayed gross motor development
  - Abnormal motor performance
  - Alterations of muscle tone
  - Abnormal postures
  - Reflex abnormalities
  - Associated disabilities

Cerebral Palsy Continued

• Diagnostics
  - Neurological examination
  - Observing for clinical manifestations
  - Electroencephalography (EEG)
  - Tomography
  - Serum electrolyte values

Cerebral Palsy Continued

• Therapeutic Management
  - Establish locomotion and communication
  - Promote socialization experiences
  - Orthopedic surgery
  - Selective dorsal rhizotomy
  - Ankle-foot orthoses
  - Medications
    - Baclofen, valium, dilantin, botox
Cerebral Palsy Continued

- Nursing Care Management
  - Assess for delayed developmental milestones
  - Passive ROM exercises
  - Reinforce the therapeutic plan
  - Refer pt to speech therapist
  - Maintain proper feeding of child
  - Provide support to the family

Cerebral Palsy Continued

- Nurse Behaviors
  - Convey acceptance and affection
  - Do not “talk down” to the child
  - Include parents in plan of care

Spina Bifida (Myelomeningocele)

- Neural tube defect where the neural tube does not close
- Types
  - Spina bifida occulta (defect not visible)
  - Spina bifida cystica (visible defect)
    - Meningocele
      - Not associated with neurological deficit
    - Myelomeningocele
      - Associated with neurological deficit
Spina Bifida Continued

- Pathophysiology
  - Splitting of neural tube from excessive CSF pressure
  - Failure of neural tube to close
  - Most are found in the lumbar or lumbosacral area
  - 95% of these children have hydrocephalus
Spina Bifida

• Clinical Manifestations
  - Spina Bifida Cystica
    • partial paralysis of lower extremities
    • Sensory deficit
    • Overflow incontinence
    • Lack of bowel control
    • Talipes algus
    • Kyphosis
    • Hip dislocations

Spina Bifida Continued

• Clinical Manifestations
  - Spina Bifida Occulta
    • Usually nothing you can see
    • Sometimes you see
      • Dark tufts of hair
      • Skin dimple
      • Port wine stain
    • Disturbance of gait with foot weakness
    • Bowel and bladder disturbances
Spina Bifida Continued

• Therapeutic Management
  - Care of the newborn
    - Closure of the defect
    - Prophylactic antibiotics
    - Insert shunt for hydrocephalus
  - Orthopedics
    - Braces, wheelchairs
    - Treat neuropathic bladder dysfunction
      - I&O cath, Ditropan, vesicostomy

• Nursing Management
  - Assess cyst for intactness
  - Perform neurological assessment
    - Anal reflex
    - Measure urine output
    - Measure head daily and inspect fontanels
Spina Bifida Continued

• Nursing Management Continued
  - Avoid rectal temperatures
  - Place infant in incubator
  - Place sterile, moist nonadherent dressing over the defect
  - Change dressings q 2-4 hours
  - Observe for signs of infection
  - Maintain proper positioning
  - Support family
  - Wear NON-LATEX gloves

Werndig-Hoffmann Disease

• Progressive weakness and wasting of skeletal muscles leading to extensive paralysis
• Inherited autosomal-recessive trait
• Signs and Symptoms
  - Weakness and inactivity
  - Weak cry and cough
  - Do not progress to roll over or walk
  - Early death (four years of age)
  - Intellectually normal

Werndig-Hoffmann Disease Continued

• Nursing Care
  - Frequent position changes
  - Suction prn
  - Provide verbal/tactile stimulation
  - Feed slowly and carefully
  - Genetic counseling and family support
Kugelberg-Welander Disease
- Progressive muscular atrophy
- Genetically acquired
- Onset occurs from <1 year-adulthood
- Nursing care is primarily focuses on maintaining mobility as long as possible

Muscular Dystrophies (MD’s)
- Gradual degeneration of muscle fibers with progressive weakness and wasting
- Genetically acquired
- Types (page 1856)
  - Facioscapulohumeral muscular dystrophy
  - Limb girdle muscular dystrophy
  - Duchenne muscular dystrophy
Muscular Dystrophy Continued

- Duchenne
  - pseudohypertrophic muscular dystrophy
  - Most common MD
  - X linked defect
  - Early onset (3-5 years of age)
  - Progressive muscular weakness
  - Calf muscle hypertrophy
  - Loss of ambulation by 9-11 years of age
  - Death due to respiratory failure
Muscular Dystrophy
Continued

- Diagnostics
  - Elevated CPK, SGOT (AST) levels in first 2 years of life
- Nursing care
  - Help family cope with child's illness
  - Promote independence and self-care

Acquired Neuromuscular Disorders

- Guillain-Barre Syndrome
- Tetanus
- Botulism
- Spinal Cord Injuries
Guillain-Barre Syndrome

- Demyelinating polyneuropathy with progressive ascending flaccid paralysis
- Manifestations (Box 55-10, pg 1859)
  - Muscle tenderness
  - Ascending paralysis
  - Loss of reflexes
  - Breathlessness
  - Absent tendon reflexes
  - Sensory impairment
  - Constipation incontinence/retention

Guillain-Barre Syndrome

Nursing Care
- Perform respiratory assessment
  - Ventilator
  - Suction
  - Tracheostomy tray
- Passive range-of motion
- NG feedings
- Support the family
- Skin care
Tetanus

- Caused by Clostridium tetani which enters an open wound and is often fatal
- Progressive stiffness to muscles of neck and jaw
- Inability to open mouth
- Hypersensitivity to light and noise
- Tetany of respiratory muscles
- Tachycardia and diaphoresis

Tetanus Continued

- Prevent with
  - tetanus toxoid immunization
  - tetanus immune globulin
- Nursing Care
  - Decrease light, sound, touch
  - Administer sedatives and muscle relaxants
  - Monitor respiratory status
  - Administer pancuronium bromide
  - Reduce the child’s anxiety
    - Child is mentally alert

Botulism

- Caused by Clostridium botulinum
- Improperly sterilized home-canned foods
- Symptoms
  - appear by 12-36 hours
  - Weakness
  - Dizziness
  - Diplopia
  - Progressive paralysis
  - Vomiting
Botulism Continued

• Infant Botulism
  - Caused by a colonized GI tract
  - Constipation
  - Weakness
  - Decrease in spontaneous movement
  - Loss of head control
  - Difficulty feeding
  - Weak cry
  - Progressive respiratory paralysis

Botulism Continued

• Infant Botulism
  - Nursing Care
    • Isolate infant from other infants till the organisms are excreted
    • Parent education
      - Slow recovery
      - Need for stool softener
      - Risk of aspiration
      - Avoid enemas

Spinal Cord Injuries

• Caused by
  - MVA’s
  - Unrestrained child in the care
  - Diving and surfing
  - Birth injuries
    • breech presentation