

- Chapter 24

- The Child with a Musculoskeletal Condition
- Objectives
- Demonstrate an understanding of age-specific changes that occur in the musculoskeletal system during growth and development.
- Discuss the musculoskeletal differences between the child and adult and how they influence orthopedic treatment and nursing care.
- Describe the management of soft-tissue injuries.
- Discuss the types of fractures commonly seen in children and their effect on growth and development.
- Objectives (*cont.*)
- Differentiate between Buck's extension and Russell traction.
- Compile a nursing care plan for the child who is immobilized by traction.
- Describe a neurovascular check.
- Discuss the nursing care of a child in a cast.
- List two symptoms of Duchenne's muscular dystrophy.
- Describe the symptoms, treatment, and nursing care for the child with Legg-Calvé-Perthes disease.
- Objectives (*cont.*)
- Describe two topics of discussion applicable at discharge for the child with juvenile rheumatoid arthritis.
- Describe three nursing care measures required to maintain skin integrity for an adolescent child in a cast for scoliosis.
- Identify symptoms of abuse and neglect in children.
- Describe three types of child abuse.

- State two cultural or medical practices that may be misinterpreted as child abuse.
- Overview
- Muscular and skeletal systems work together
- Arises from the mesoderm in the embryo
 - A great portion of skeletal growth occurs between the 4th to 8th weeks of fetal life
- Supports the body and provides for movement
- Locomotion develops gradually and in an orderly manner
- Observation of the Musculoskeletal System in the Growing Child
- Assessment of the musculoskeletal system includes
 - Observation of gait and muscle tone
 - Palpation
 - ROM
 - Gait assessment in children who can walk
 - Children who do not walk independently by 18 months of age have a serious delay and should be referred for further follow-up
- Musculoskeletal Differences Between a Child and an Adult
- Observation of Gait
- Toddler who begins to walk has a wide, unstable gait
 - Arms do not swing with the walking motion
- By 18 months, the wide base narrows and walk is more stable
- By 4 years of age, the child can hop on one foot and arm swings occur
- By 6 years of age, the gait and arm swing is similar to the adult

- Observation of Gait (*cont.*)
- The nurse's role is to reassure parents that unless there is pain or a problem with motor or nerve functions, many minor abnormal-appearing alignments will spontaneously resolve with activity
- Observation of Muscle Tone
- Assess symmetry of movement and the strength and contour of the body and extremities
- Neurological exam includes an assessment of reflexes, a sensory assessment, and the presence or absence of spasms
- Diagnostic Tests
- Radiographic studies include
 - Bone scans
 - CT scans
 - MRI scans
 - Ultrasound
- Laboratory tests include
 - CBC
 - ESR
 - May help rule out septic arthritis or osteomyelitis
 - Human leukocyte antigen (HLA) B-27
 - May help diagnose rheumatological disorders
- Treatments for Musculoskeletal System
- Arthroscopy
- Bone biopsy
- Traction
- Casting

- Splints
- Characteristics of the Child's Musculoskeletal System
- Bone is not completely ossified
- Epiphyses are present
- Periosteum is thick
 - Produces callus more rapidly than in the adult
- Lower mineral content of the child's bone and greater porosity increases the bone's strength
- Bone overgrowth is common in healing fractures of children under 10 years of age because of the presence of the epiphysis and hyperemia caused by the trauma
- Pediatric Trauma
- Soft-tissue injuries include
 - Contusion
 - Sprain
 - Strain
- Injuries should be treated immediately to limit damage from edema and bleeding
- Prevention
- Proper use of pedestrian safety
- Car seat restraints
- Bicycle helmets and other protective athletic gear
- Pool fences
- Window bars
- Deadbolt locks
- Locks on cabinet door

- Health Promotion
- Principles of managing soft-tissue injuries include
 - *Rest*
 - *Ice*
 - *Compression*
 - *Elevation*
- Traumatic Fractures and Traction
- A fracture is a break in a bone and is mainly caused by accident
- Characterized by
 - Pain, tenderness on movement, and swelling
 - Discoloration, limited movement, and numbness may also occur
- Fractures heal more rapidly in children
- The child's periosteum is stronger and thicker, less stiffness on mobilization
- Injury to the cartilaginous epiphysis is serious if it happens during childhood
 - May interfere with longitudinal growth of the bone
- Types of Fractures
- Bryant's Traction
- Used for the young child who has a fractured femur
- Note that the buttocks are slightly off the bed to facilitate countertraction
- Active infants may require a jacket restraint to maintain body alignment
- Buck's Extension
- A type of skin traction used in fractures of the femur and in hip and knee contractures
 - It pulls the hip and leg into extension

- Countertraction is supplied by the child's body
- Essential that the child not slip down in bed
- Bed should not be placed in high-Fowler's position
- Used to reduce pain and muscle spasm associated with slipped capital femoral epiphysis
- Russell Skin Traction
- Similar to Buck's extension traction
- A sling is positioned under the knee, which suspends the distal thigh above the bed
 - Pulls in two directions
 - Prevents posterior subluxation of the tibia on the femur
 - Two sets of weights, one at the head and one at the foot of the bed
- Skeletal Traction
- Safety Alert
- The checklist for a traction apparatus includes
 - Weights are hanging freely
 - Weights are out of reach of the child
 - Ropes are on the pulleys
 - Knots are not resting against pulleys
 - Bed linens are not on traction ropes
 - Countertraction is in place
 - Apparatus does not touch foot of bed
- Forces of Traction

- Overcoming the Effects of Traction
- Safety Alert
- Checklist for the patient in traction
 - Body in alignment
 - HOB no higher than 20 degrees
 - Heels of feet elevated from bed
 - ROM of unaffected parts at regular intervals
 - Antiembolism stockings or foot pumps as ordered
 - Neurovascular checks performed regularly and recorded
 - Skin integrity monitored regularly and recorded
 - Pain relieved by medication is recorded
 - Measures to prevent constipation are provided
 - Use of trapeze for change of position is encouraged
- Infections Related to Skeletal Traction
- Carries the added risk of infection from skin bacteria that may cause osteomyelitis
- Meticulous skin and pin care is essential
- Neurovascular Checks
- Done to check for tissue perfusion of the toes or fingers distal to the site of an injury or the cast
- The check includes
 - Peripheral pulse rate and quality
 - Color of extremity
 - Capillary refill time
 - Warmth

- Movement and sensation
- How to Test for Nerve Damage
- Casts and Splints
- Can be made from a variety of materials
- Child is at increased risk for
 - Impaired skin integrity
 - Compartment syndrome
 - Progressive loss of tissue perfusion because of an increase in pressure caused by edema or swelling that presses on the vessels and tissues
 - If not carefully monitored, significant complications can occur
- Nursing Care of a Child in a Cast
- Material used determines positioning of effected extremity for up to 72 hours
- Elevate effected extremity on a pillow
- Perform frequent neurovascular checks
- Teach cast care and how to support cast, safe transfers to/from chair/bed, how to use crutches safely, when a cast is too loose or too tight
- Osteomyelitis
 - An infection of the bone that generally occurs in children younger than 1 year of age and in those between 5 and 14 years of age
 - Long bones contain few phagocytic cells to fight bacteria that may come to the bone from another part of the body
 - Inflammation produces an exudate that collects under the marrow and cortex of the bone
- Osteomyelitis (*cont.*)

- Common organisms
 - *Staphylococcus aureus* in children older than 5 years of age
 - Accounts for 75% to 80% of cases
 - *Haemophilus influenzae* most common cause in young children
- May be preceded by a local injury to the bone
- Osteomyelitis (*cont.*)
- Vessels in affected area are compressed
 - Thrombosis occurs
 - Leads to ischemia and pain
 - Collection of pus under the periosteum of the bone can elevate the periosteum
 - Can result in necrosis of that part of the bone
 - Local inflammation and increased pressure can cause pain
 - Associated muscle spasms can cause limited active ROM
- Osteomyelitis (*cont.*)
- Diagnostics
 - Elevated WBC and ESR
 - X-ray may initially fail to reveal infection
 - Bone scan may be more reliable
- Treatment
 - Intravenous antibiotics for several weeks
 - If pus is present, it is drained and bone is immobilized
 - Early passive ROM once splint is removed may be ordered

- Pain relief
- Diversional and physical therapy
- Duchenne's or Becker's Muscular Dystrophy (MD)
- Group of disorders in which progressive muscle degeneration occurs
 - Duchenne's MD is most common
 - Onset is generally between 2 and 6 years of age
 - A history of delayed motor development during infancy may be evidenced
- Duchenne's or Becker's Muscular Dystrophy (MD) (*cont.*)
- Additional signs and symptoms
 - Calf muscles in particular become hypertrophied
 - Progressive weakness as evidenced by
 - Frequent falling
 - Clumsiness
 - Contractures of the ankles and hips
 - Gower's maneuver to rise from the floor
 - Intellectual impairment is common
- Duchenne's or Becker's Muscular Dystrophy (MD) (*cont.*)
- Diagnostics
 - Marked increase in blood creatine phosphokinase level
 - Muscle biopsy reveals a degeneration of muscle fibers replaced by fat and connective tissue
 - Myelogram shows decreases in the amplitude and duration of motor unit potentials
 - ECG abnormalities are also common

- Duchenne's or Becker's Muscular Dystrophy (MD) (*cont.*)
- Disease progressively worsens
- Death usually from cardiac failure or respiratory infection
- Nursing care is primarily supportive to prevent complications and maintain quality of life
- Child may experience depression because he or she cannot compete with peers
- Slipped Femoral Capital Epiphysis
- Also known as coxa vera
- Spontaneous displacement of the epiphysis of the femur
- Occurs most often during rapid growth of the preadolescent and is not related to trauma
- Symptoms include thigh pain and a limp or the inability to bear weight on the involved leg
- Buck's extension traction is used to minimize further slippage until surgical intervention can take place
- Legg-Calvé-Perthes Disease
(Coxa Plana)
- One of a group of disorders called the osteochondroses in which the blood supply to the epiphysis, or end of the bone, is disrupted
 - Tissue death that results from inadequate blood supply is termed avascular necrosis
 - Affects the development of the head of the femur
- More common in boys 5 to 12 years of age
- Healing occurs spontaneously over 2 to 4 years
- Legg-Calvé-Perthes Disease
(Coxa Plana) (*cont.*)
- Symptoms include

- Painless limp
- Limitation of motion
- X-ray films and bone scans confirm the diagnosis
- Self-limiting, heals spontaneously with the use of ambulation-abduction casts or braces that prevent subluxation
 - Some may require hip joint replacement
- Osteosarcoma
- Primary malignant tumor of the long bones
 - Mean age of onset is 10 to 15 years of age
 - Children who have had radiation therapy for other types of cancer and children with retinoblastoma have a higher incidence of this disease
- Metastasis occurs quickly because of the high vascularity of bone tissue
 - Lungs are primary site of metastasis
- Osteosarcoma (*cont.*)
- Manifestations
 - Experiences pain and swelling at the site
 - May be lessened by flexing the extremity
 - Pathologic fractures can occur
- Diagnosis
 - Confirmed by biopsy
 - Radiological studies help to confirm
- Treatment
 - Radical resection or amputation surgery

— Phantom limb pain can occur because nerve tracts continue to “report” pain

- Ewing’s Sarcoma
- Malignant growth that occurs in the marrow of the long bones
- Mainly occurs in older school-age children and early adolescents
- When metastasis is present, prognosis is poor
- Primary sites for metastasis are lungs and long bones
- Treatment

— Radiation therapy and chemotherapy

- Juvenile Idiopathic Arthritis (JIA)
- Formerly known as *juvenile rheumatoid arthritis (JRA)*
- Most common arthritic condition of childhood
- Systemic inflammatory disease involving joints, connective tissues, and viscera
- No specific tests or cures for JIA
- Duration of symptoms is important, particularly if they have lasted longer than 6 weeks

● Juvenile Idiopathic Arthritis (JIA) (*cont.*)

● Three distinct methods of onset

— Systemic (or acute febrile)

— Polyarticular

— Pauciarticular

● Juvenile Idiopathic Arthritis (JIA) (*cont.*)

● Systemic

- Occurs most often in children 1 to 3 years of age and 8 to 10 years of age
- Intermittent spiking fever (above 103° F) persisting for over 10 days
- Nonpruritic macular rash
- Abdominal pain
- Elevated ESR and C-reactive protein

- Juvenile Idiopathic Arthritis (JIA) (*cont.*)

- Polyarticular

- Involves five or more joints
 - Often hands and feet
 - Become swollen, warm, and tender
- Occurs throughout childhood and adolescence
- Predominantly seen in girls

- Juvenile Idiopathic Arthritis (JIA) (*cont.*)

- Pauciarticular

- Limited to four or fewer joints
 - Generally in larger joints such as hips, knees, ankles, and elbows
- Occurs in children younger than 3 years of age (mostly in girls)
- May be at risk for iridocyclitis, an inflammation of the iris and ciliary body of the eye
 - Symptoms include redness, pain, photophobia, decreased visual acuity, and nonreactive pupils

- Juvenile Idiopathic Arthritis (JIA) (*cont.*)

- Treatment

- Goals of therapy

- Reduce joint pain and swelling
 - Promote mobility and preserve joint function
 - Promote growth and development
 - Promote independent functioning
 - Help the child and family to adjust to living with a chronic disease
- Juvenile Idiopathic Arthritis (JIA) (*cont.*)
 - Long-term disease characterized by periods of remissions and exacerbations
 - The nurse helps the family by advocating for the child; in other words, helping the family to recognize the impact of the disease and by openly communicating with the child, family, and members of the health care team
 - Torticollis (Wry Neck)
 - Neck motion is limited because of shortening of the sternocleidomastoid muscle
 - Can be congenital (most common) or acquired
 - Acute or chronic
 - Associated with breech and forceps delivery
 - May be seen in conjunction with other birth defects, such as congenital hip dysplasia
 - Torticollis (Wry Neck) (*cont.*)
 - Symptoms are present at birth
 - Infant holds head to the side of the muscle involved with chin tilted in opposite direction
 - Hard, palpable mass of dense fibrotic tissue (fibroma), not fixed to the skin
 - Resolves by 2 to 6 months of age
 - Passive stretching, ROM, and physical therapy may be indicated
 - Acquired is seen in older children, may be associated with injury, inflammation, neurological disorders, and other causes

- Scoliosis
- Scoliosis (*cont.*)
- More common in girls
- Two types
 - Functional—caused by poor posture
 - Structural—caused by changes in the shape of the vertebrae or thorax
 - Usually accompanied by rotation of the spine
 - Hips and shoulders may appear to be uneven
- Scoliosis (*cont.*)
- Treatment
 - Aimed at correcting curvature and preventing severe scoliosis
 - Curves up to 20 degrees do not require treatment
 - Curves 20 degrees to 40 degrees require the use of a brace
 - Curves greater than 40 degrees and patients in whom conservative therapy were not successful require hospitalization
 - Spinal fusion is performed
- Sports Injuries
- Sports-specific examinations are given for those involved in strenuous activity on entry into middle school or high school
- Common injuries include
 - Concussion
 - “Stingers” or “burners”
 - Injured knee
 - Sprain or strained ankle

- Muscle cramps
- Shin splints
- Sports Injuries (*cont.*)
- Sports at higher risk for injury include
 - Gymnastics
 - Wrestling
 - Football/Soccer
 - Hockey
 - Basketball
 - Volleyball
 - Running
 - Skiing or snowboarding
- Family Violence
- Affects children of all social classes
- Includes
 - Spousal and child abuse
 - Neglect
 - Maltreatment
- Child Abuse
- Child Abuse (*cont.*)
- Types of child abuse
 - Emotional abuse

- Emotional neglect
- Sexual abuse
- Physical neglect
- Physical abuse
- Legal
- Reporting suspected abuse or neglect
 - All persons who report suspected abuse or neglect are given immunity from criminal prosecution and civil liability if the report is made in good faith
- Know what your state laws mandate for health care providers
- Nursing Interventions for Abused and Neglected Children and Adolescents
- Teach child anxiety-reducing techniques
- Assist child in managing his or her feelings
- Teach child assertiveness skills
- Assist child in developing problem-solving skills
- Assist child in value-building and clarification
- Assist child in enhancing his or her coping mechanisms
- Assessing for Child Abuse
- Cultural and Medical Issues
- A culturally sensitive history is essential in assessing children suspected to be victims of abuse
- Some cultural practices can be interpreted as physical abuse if the nurse is not culturally aware of folk-healing and ethnic practices

- Document all signs of abuse and interactions as well as verbal comments between the child and parent
- Child protective services should oversee any investigation that is warranted
- Question for Review
- What nursing assessments are involved in a neurovascular check?
- Review
- Objectives
- Key Terms
- Key Points
- Online Resources
- Review Questions