Musculoskeletal Systems

Objectives:
- Review Anatomy and physiology
- Describe normal MS assessment
- Describe age related changes
- Discuss tests and nursing interventions
- Recognize diversity issues

Musculoskeletal System

Objectives (cont):
- Discuss etiology, pathophysiology, clinical manifestations, nursing interventions and collaborative management of:
  - Strains, sprains, dislocations, bursitis, carpal tunnel, meniscus issues, and muscle spasms
  - Fractures
Skeleton

- Supports soft tissue
- Protects vital organs
- Stores minerals
- Site of hematopoiesis

Muscles

- 3 types of muscle
  - Skeletal
  - Smooth
  - Cardiac

Joints

- Classification by structure:
  - Fibrous
  - Cartilaginous
  - Synovial
- Classification by function:
  - Synarthrosis
  - Amphiarthrosis
  - Diarthrosis
Diagnostic tests
- X-ray
- CT scan
- MRI
- Bone scan
- Bone density scan
- Arthroscopy
- Blood tests

Musculoskeletal Assessment
- Health history
- Inspection
- Palpation
- ROM

Soft tissue injuries
- Contusions
- Strains
- Sprains
- Dislocation
- Bursitis
- Carpal tunnel
- Meniscus
- Muscle spasms
Contusions and Strains

- Contusion:
  - Bleeding into soft tissue
  - Result of blunt force
- Strain: Stretching injury to a muscle or a muscle-tendon unit
  - Caused by mechanical overload
  - Muscle is forced to extend past its elasticity

Sprains

- Stretch or tear of a ligament surrounding a joint
- Sprains of the ankle and knee are most common

Interdisciplinary Care

- Primary goal in soft-tissue trauma is to reduce swelling and pain: R-I-C-E:
  - Rest
  - Ice
  - Compression
  - Elevation
- X-ray to rule out or evaluate damage
- MRI if follow up needed
- May need immobilization, splint/sling
- Medicate with NSAID or other analgesic
Nursing diagnosis for soft tissue injury

- Acute pain r/t: _____ aeb:_______ (or mb___)
  - Assess
    - pain (location, intensity, precip and relieving factors)
  - Neurovascular
  - Treat with R I C E
  - Collaborate with ______
  - Teach patient
    - RICE
    - Meds
  - Use of adjunctive devices
  - Medicate with ____ per order
    - Evaluate the response to pain med in ___ min
    - Evaluate for side effects of pain meds such as ___

Nursing diagnosis for soft tissue injury – cont:

- Impaired physical mobility r/t:___ aeb:____
- Risk for fall r/t:____
- Activity intolerance r/t:___ aeb:___
- Knowledge deficit r/t:____ mb:____

Dislocations

- Ends of two connected bones separate
  - Results from extreme force put on a ligament
  - congenital
- Most common sites for dislocation include:
  - Shoulder
  - Subluxation: partial dislocation
Dislocation
• Interdisciplinary Care:
  • Diagnosis – H&P, X-ray, MRI
  • Correction of dislocation – reduction
  • Pain management
• Nursing diagnosis:
  • Acute pain
  • Risk for injury
  • Others???

Bursitis
• Inflammatory condition of the bursa
  • Bursa - fluid-filled sac located adjacent to tendons near large joints
  • Functions: gliding surface to reduce friction between tissues of the body

Bursitis
• Causes:
  • Injury
  • Infection
  • Underlying rheumatic condition (RA)
  • Inflammation of elbow bursa from gout crystals
• Diagnosis:
  • Clinical symptoms
  • X-ray
Bursitis

- Collaborative management:
  - Ice
  - Rest
  - Meds: Anti-inflammatory, pain-med, cortisone
  - Aspiration of fluid

Septic Bursitis

- Aspiration
- Culture of fluid to identify organism
- Antibiotic therapy, sometimes IV
- May need repeated aspiration of fluid
- Surgical drainage and removal of infected bursa sac
- Urgent medical interventions

Carpal Tunnel Syndrome

- The median nerve in the wrist becomes compressed causing pain and numbness
- Repetitive injury - Most common cause
  - Occupational
  - Recreational
  - Other causes:
Carpal tunnel syndrome

- **Diagnosis:**
  - H&P
  - Phalen test
  - X-ray
  - MRI

CTS: Interventions

- **Non-surgical**
  - Drug therapy: NSAIDs, steroid injections
  - Immobilization of wrist (splint)
- **Surgical**
  - Required in half of clients with CTS
  - Involves nerve decompression
  - OCTR (open carpal tunnel release)
  - ECTR (endoscopic carpal tunnel release)

Knee Injuries: Meniscus

- **Pathophysiology**
  - Tearing of either the medial meniscus or the lateral meniscus
  - Usually a result of twisting the leg when the knee is flexed and foot is on ground
Torn Meniscus: Symptoms

- Pain, swelling and tenderness in the knee
- Clicking or snapping sound when the knee is moved

McMurray Test

Treatment for Torn Meniscus

- **Locked knee:**
  - Manipulation and casting for 3-6 weeks
  - Partial or total meniscectomy

- **Post-op care:**
  - Neurovascular check
  - Check for bleeding
  - Leg exercises
Muscle spasms

- **Causes:**
  - Muscle fatigue
  - Heavy exercise
  - Dehydration
  - Hypothyroidism
  - Low levels of magnesium or calcium
  - Alcoholism
  - Kidney failure

- **Location:**
  - Calves
  - Neck or lower back

Muscle Spasms

- **Duration:**
  - Generally of short duration
  - Acute low back pain
  - 90% recover within 3 months

- **Treatment:**
  - Hydration
  - Non-medical
  - Medication

Classification of fractures

- **Complete fracture**
  - Bone is divided into two distinct sections

- **Incomplete fracture**
  - Break is through only part of the bone

- **Open or compound fracture**
  - Wound visible externally

- **Closed or simple fracture**
  - Does not extend through the skin - no visible wound
Common types of fractures

- Pathologic or spontaneous fracture
  - Minimal trauma
  - Weakened bone
- Fatigue or stress fracture
  - Excessive stress to bone
- Compression fracture
  - Most common site - vertebra

Causes

- Pathologic or spontaneous fracture
  - Minimal trauma
  - Weakened bone
- Fatigue or stress fracture
  - Excessive stress to bone
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Signs and symptoms of fractures

- Pain
- Diminished mobility/movement
- Change in bone alignment
- Alteration in length of extremity
- Decreased ROM
- Swelling
- Discoloration
- Crepitation
- Subcutaneous emphysema
Emergency treatment

- Cover wound with sterile dressing
- Immobilize
- Do not attempt to clean out
- Do not reduce
- Transport
  - Needs xray for location and extent of damage

Diagnostic tests

- Standard Xrays
- CT scans
- Bone scan (not commonly done)
- MRI

Neurovascular Assessment

- Compare the injured area with its symmetric counterpart
- Color
- Temperature
- Movement
- Sensation
- Pulses
- Capillary refill
- Pain
- Edema
Lower Extremity Fractures

- Fractures include those of the:
  - Femur
  - Tibia and fibula
  - Ankle and foot

Non-surgical Management Fracture

- Cast
- Skin (Buck's) traction
- Skeletal traction

- Traction is temporary followed by the use of a cast brace or surgery

Examples for different casts
Cast Materials

- **Plaster of Paris**
  - 24+ hours to dry
  - Perform petaling for sharp edges
  - Window the cast if skin is disrupted
  - Handle wet cast with palms of hands

Cast Materials (continued)

**Fiberglass**
- Lighter
- Dry in 10-15 minutes – weight bearing in 30 minutes

**Polyester-cotton knit**
- Dry in 7 minutes
- May bear weight in 20 minutes

casts – Practice Assessment
Cast Care

- Handle with care while drying
- Elevate on pillows
- Monitor Neurovascular status
  - Make sure cast is not too tight
  - Check for drainage
- Teaching
  - Report: numbness, coolness, swelling, increased pain, change in color
  - No objects inside cast!! No hair dryer to dry cast
  - Crutches

Cast Complications

- Infection
- Circulation impairment – compartment syndrome
- Peripheral nerve damage
- Complications of immobility
  - Skin breakdown
  - Pneumonia/Atelectasis
  - Thromboembolism
  - Constipation

Nursing diagnosis

- Acute pain r/t
- Risk for neurovascular dysfunction
- Risk for infection
- Impaired physical mobility
Cast Removal

The saw vibrates, but does not rotate. Cast saws make noise, but will not harm cast.

Skin Traction

• Weights need to stay in place!
• Center client on bed
• Weights need to hang freely
• Assess skin,
• Assess neurovascular

Skeletal Traction

• Center client
• Assess skin
• Assess neurovascular
• Pin care
External Fixation

• Pins implanted into the bone
• External metal frame to prevent bone movement
  • Check N/V status every 4 hours
  • Elevate extremity

Routine Pin Care

Primary Purpose

• Keep site free of infection
• Done q shift
• Assess for signs of infection
  • Erythema, purulent drainage, edema, warmth

Open Reduction with Internal Fixation (ORIF)

• Allows surgeon direct visualization of the fracture site
• Uses metal pins, screws, rods, plates, or prosthetic devices to immobilize the fracture during healing
Fractures of the Hip

- Intracapsular
- Extracapsular

Signs and Symptoms of a Hip Fracture

- Pain in hip or groin
- Edema, stiffness and bruising
- Inability to bear weight on affected extremity
- Muscle spasm
Examples ORIF
intramedullary rod; prosthesis of head

Postoperative Care for Hip Fracture

- Neurovascular check
- Maintain skin integrity
- Monitor VS
- I+O
- Respiratory exercises
- Maintain proper alignment by using hip precautions
- Avoid flexion > 90 degrees
- Early ambulation
Post-operative Care (continued)

- Case study
  - 78 y/o female admitted to med/surg s/p ORIF L hip 12 hours ago. Dressing to L hip, JP in place.

Fractures of the Pelvis

- Most common cause - trauma
- Internal damage the chief concern in pelvic fracture
  - Hemorrhage and shock
- Management of pelvic fractures
  - Single fx site – bedrest,
  - 2 or more fx sites - surgery
Compression Fractures of the Spine

- Most associated with osteoporosis
- Nonsurgical management
  - bedrest, analgesics, and physical therapy.
- Minimally invasive surgeries
  - vertebroplasty and kyphoplasty
  - Halo immobilizer

Vertebroplasty

Initial Entry: A biopsy needle is guided into the fractured vertebra through a small incision in the skin.

Stabilization: Acrylic bone cement is injected into the vertebra, filling the spaces within the bone.

Post-operative: Restored vertebra with hardened cement, stabilizing the vertebral structure and relieving pain.

Balloon Kyphoplasty

1. Fractured Vertebra
2. Insert Instrument
3. Inflate Balloon Tamp
4. Fill with a "support cast"
Cervical spine injury
- Traction
- Halo placement
- Used in non-displaced cervical fracture

Complications of fractures
- Acute compartment syndrome
- Shock
- Fat Embolism syndrome
- Infection (osteomyelitis)
- Ischemic necrosis
- Fracture blisters
- Delayed union, nonunion and malunion
- DEEP VEIN THROMBOSIS

Acute Compartment Syndrome
- Acute compartment syndrome
  - Ischemia – edema cycle
  - Most common site is lower leg and forearm
  - Internal and external causes
    - Internal = hemorrhage
    - External = casts and constricting dressings
  - Edema causes pressure on nerve endings and subsequent pain
Acute compartment syndrome

**Signs and symptoms**
- Numbness and tingling (paresthesia)
- Pallor of tissue
- Weak pulses
- Pain with passive movement of extremity
- Pain that is unrelieved by pain medication
NCLEX

- A client has a total knee replacement, and a CMP device is being used. The nurse understands that teaching was effective when the client ID the goal of Tx as:
  - A. maintain muscle tone
  - B. Improve flexion of joint
  - C. Prevent tissue breakdown
  - D. Avoid formation of thrombus

NCLEX

- A client is in skeletal traction while awaiting surgery for repair of a fractured femur. The client c/o of leg discomfort and asks the nurse to release the traction. Which is the nurse's best initial response:
  - A. I will remove half the weights and notify your physician
  - B. I’ll get your pain med to help relieve your discomfort
  - C. I can’t do that because the weights are needed to keep your bones in alignment.
  - D. I have to follow the physician’s directions, and releasing the weights is not ordered
NCLEX

- A client’s leg is set in a long leg cast. Because of the long leg cast, the nurse should monitor for a clinical indicator of compromised circulation such as:
  - A. Foul odor
  - B. Swelling of the toes
  - Drainage on the cast
  - Increased temperature

Questions?