Caring for Patients with Musculoskeletal Disorders

Assessment of the Musculoskeletal System

History of Present Illness and Review of System

General Assessment

The following characteristics of each symptom should be elicited and explored:

- Onset (sudden or gradual); Chronology
- Current situation (improving or deteriorating)
- Location; Severity; Quality; Radiation
- Timing (frequency, duration)
- Precipitating and aggravating factors; Relieving factors; Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments; Efficacy of previous treatments

Cardinal Symptoms

In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited as follows.

Bones and Joints

- Pain, swelling, redness, heat, stiffness
- Time of day when the symptoms are most bothersome
- Relation of symptoms to movement, Limitation of movement
- Deformity
- Extra-articular findings: urethritis, pustular rash, **tophi**, nodules
- Trauma: obtain accurate description of exact mechanism of injury

Muscles

- Pain, Weakness, Wasting
- History of previous injuries and treatment received

Neurovascular Structures

- Paraesthesia, Paralysis

Functional Assessment

- Any self-care deficits in bathing, dressing, toileting, grooming, mobility, use of mobility aids.

Medical History (Specific to Musculoskeletal System)

- Previous trauma (e.g., to bones, joints, ligaments)
- Arthritis (rheumatoid or osteoarthritis)
- Diabetes mellitus (associated with greater risk of carpal tunnel syndrome)
- Hypothyroidism (associated with greater risk of carpal tunnel syndrome)
- Recent immobilization of an extremity
- Medications (e.g. Steroids)
- Allergies, Obesity, Osteoporosis, Cancer, Menopause
- Immune deficiency (recent infection)

Family History (Specific to Musculoskeletal System)

- Rheumatoid arthritis

- Diabetes mellitus, Hypothyroidism
- Osteoporosis, Cancer (bone)

Personal and Social History (Specific to Musculoskeletal System)

- Absenteeism from work or school (multiple days)
- Occupational hazards (activity involving repetitive joint motion, e.g., kneeling, reaching overhead)
- Sport activities (especially contact sports)
- Risk behaviors for injuries (e.g., snowmobiling, skateboarding, injection drug use, alcohol abuse [specifically drinking and driving])
- Calcium intake
- Smoking
- Exercise habits

Examination of the Musculoskeletal System

The purpose of examining the musculoskeletal system is to assess function and performance of activities of daily living, as well as to check for abnormalities.
A screening exam. is appropriate for most people.

General

- Apparent state of health
- Appearance of comfort or distress
- Color (e.g., flushed, pale)
- Nutritional status (obese or emaciated)
- Match b/n appearance and stated age

Musculoskeletal Screening Exam

- Observe client walking into examination room; Assess gait, posture and use of aids.
- Determine ability to perform activities of daily living (e.g., sitting, standing, walking, and dressing).
- **Examine specific joints** in the following order-Compare corresponding paired joints.
  - Cervical spine, Shoulders, Elbows, Wrists and hands
  - Hips, Knees, Ankles and feet, Lumbar spine

1. ***Inspection of Joints***
   - Symmetry of structure & function
   - Note alignment, size (muscle bulk, bone enlargement) & contour of the joint.
   - Inspect skin and tissues over joints for color, swelling, rash, masses or deformity
2. ***Palpation of Joints***
   - Palpate each joint, including skin, muscles, bony articulations &area of joint capsule, for the following features: Heat, Swelling, Tenderness, Nodules, masses, Crepitus, Ligament instability
3. ***ROM***

- Ask client to demonstrate range of active motion while stabilizing the body area proximal to the joint being moved. If you see a limitation, gently attempt passive motion.
- The normal ranges of active and passive motion should be the same.

4. ***Muscle Testing***
   - Test strength of prime muscle groups (i.e., flexors and extensors) for each joint.
   - Muscle strength should be equal bilaterally &should fully resist your opposing force.
   - There is wide variability in normal muscle strength among different people.
5. ***Ligament Stability around Joints***
   - Determine stability of collateral ligaments of ankle, collateral & cruciate ligaments of knee.
6. ***Neurovascular Status***
   - Assess limbs for the following aspects and conditions: Sensation, Pulses, Paresis, and Paralysis.
   - This part of the examination is particularly important if the client has experienced trauma.

Diagnostic Examinations

- Radiologic & imaging procedures:
  - X-ray, CT scan, MRI
  - Angiography, myelography

Laboratory Studies

- CBC, Hct, Blood Chemistry, and U/A…

Nursing diagnoses Common to patients with musculoskeletal disorders include:

- Impaired physical mobility
- Pain
- Actual or high risk for impaired skin integrity
- Constipation
- Altered peripheral tissue perfusion
- High risk for infection
- Knowledge deficit about the disease process &treatment regimen
- Self-care deficits
- Disturbance in body image, self-esteem, role performance
- Ineffective individual coping
- Altered family processes
- Potential for sexual dysfunction
- Powerlessness
- Sleep pattern disturbance
- Potential for altered nutrition – less than body requirements.

Sprain and Strain

Sprain is an injury to a joint, ligament or muscle and tendon in the region of a joint

- It usually occurs a result of forcing a limb beyond the normal range of movement.
- The ankles, fingers, wrists and knee are most often sprained.

Clinical features

- Swelling
- Tenderness
- Pain up on motion
- Dislocation

Strains are injuries to muscle resulting from over stretching.

- The fibers are stretched and some times partially torn.
- Commonly strains occur on the back muscles, due to improper lifting techniques.

Diagnostic Investigation

- X-ray to rule out fracture

First aid

Suggestions for immediate treatment of sprains or strains include:

- Stop your activity; Rest the injured area.
- Use icepacks every two hours, applied for 15 min, separated from the skin by wet toweling.
- Compress or bandage the injured site firmly.
- Elevate the injured area; Immobilization
- Avoid exercise, heat, alcohol and massage, which can exacerbate swelling.

Medications: Analgesics

Dislocations

Dislocation is a displacement of a bone end from the joint particularly at the shoulder, elbow, fingers or thumb usually as a result of a fall or direct blow.

Sign &symptoms

- Swelling
- Obvious deformity
- Pain upon movement
- Tenderness to touch

Diagnostic studies

- X-ray

Management:

- Goals of Treatment
  - Relieve pain
  - Reduce dislocation
  - Prevent complications
- Nonpharmacologic Interventions
  - Splint &immobilize, apply a sling if appropriate, elevate the affected part.
- Pharmacologic Interventions
  - Analgesia - meperidine (Demerol) 75-100 mg IM
- Monitoring and Follow-Up
  - Monitor pain &neurovascular status frequently until transfer.
- Referral
  - Medevac to hospital if unable to perform reduction on site.
  - Recurrent dislocation may require surgical repair.

Osteoarthritis

- Degenerative joint disease Characterized by degeneration and loss of articular cartilage in synovial joint
- Non systemic

Epidemiology

- Gradual, insidious onset
- Rarely have symptoms before age 40, but 90% have X- ray changes
- 20 -40 million people affected in the U.S

Risk factors

- Age
- Obesity
- Previous joint trauma
- Repetitive mechanical joint overuse
- Metabolic disorders, endocrine disorders

Manifestations

- Joint pain/stiffness
- Decreased ROM
- Grating Or Crepitus with movement
- Joint enlargement (bony hard &cool on palpation) - Heberden's &Bouchard's nodes

Most frequent joints – hips, knees, lumbar &cervical vertebrae, fingers, wrists, big toe.

Diagnostic Tests

- History /physical exam
- X- rays

Pharmacological Management - Analgesics

- **Aspirin**
  - Anti-inflammatory
  - Analgesics
  - Side effects: GI Disturbances, Bleeding, Tinnitus
- **Tylenol**: No anti-inflammatory properties, Analgesic, Liver Toxicity
- **NSAIDs**
  - Indocin, Ibuprofen…
  - Used if ASA not tolerated or not effective
  - Side effects: GI irritation, ulceration, bleeding, Rental Toxicity
  - Nursing Interventions
    - Monitor renal/hepatic functions
    - Give with food
- **Intra-articular corticosteroid injections** (often mixed with local anesthetic)

Surgical Management

- Arthroscopy - arthrscope introduced into joint (most often knee) through a small stab incision; damaged cartilage debrided, loose bodies & osteophytes removed.
- Osteotomy - incision into or transection of the bone; done to realign an affected joint, especially with bony overgrowth.
- Arthroplasty – reconstruction or replacement of a joint (may involve total joint replacement)

Nursing Care

- Chronic pain
  - Analgesics
  - Encourage rest of painful joints (often relieved by rest)
  - Heat to painful joints (Shower, tub, warm packs, hot wax baths, heated gloves)
  - Emphasize importance of proper posture &good body mechanics
  - Encourage weight reduction
  - Splints as needed
  - Nonparmacological methods

- Impaired Physical Mobility
  - Active &passive ROM; isometric, progressive resistance &low impact aerobic exercise.
  - Analgesics prior to activity
  - Pain rest periods throughout day
  - Teach how to use ambulatory aids (cane, walker)
- Self Care Deficit
  - Assess home setting to determine need of assistive devices.
- Other Nursing Diagnoses
  - Risk for disuse syndrome
  - Risk for Injury.

Rheumatoid Arthritis

- Chronic, progressive, systemic, inflammatory process that affects primarily synovial joints.

Incidence

- Prevalent in woman 3:1
- Peak onset 30 – 50 yrs

Cause

- Essentially unknown
- Genetic link
- Endocrine factors
- Autoimmune - thought to be initiated by viral infection

Pathophysiology

A. Joint inflammation &production of excess synovial fluid

B. Formation of pannus (granulation inflammatory tissue) that covers &invades cartilage & destroys joint capsule &bone.

C. Tough fibrous connective tissue replaces pannus resulting in decreased joint motion malalignment &deformity.

D. Fibrous tissue calcifies resulting in bony ankylosis & total joint immobility.

Key Features

- Insidious onset
- Bilateral & symmetrical joint involvement.
- Most common sites – Fingers, toes, wrists, ankles, Knees

Joint Manifestations

- Inflammation - slightly reddened, warm, stiff, swollen, tender or painful
- Morning stiffness
- Joints may feel soft b/s synovitis & effusions
- Muscle atrophy
- Decreased ROM in joints
- Deformities (e.g. ulnar deviation)

Systemic Manifestations

- Low grade fever
- Fatigue
- Weakness
- Anorexia/Weight loss
- Paresthesias
- Round, movable, non tender subcutaneous nodules (Ulnar surface of arm).
- Vasculitis
- Anemia
- Heart /Lung/Renal involvement

Diagnostic Tests

- Can help support a diagnosis, but cannot confirm it.
- Positive Rheumatoid factor
- Elevated ESR
- Increased Antinuclear Antibody Titer (ANA)
- Synovial fluid analysis
  - Increased turbidity
  - Decreased viscosity
  - Increased Protein
- CBC: Mild leukocytosis, Anemia
- X- ray changes

Pharmacological Management

- Aspirin
- NSAIDs
- Antimalarial agents:
  - Decreases the inflammation by affecting the production of inflammatory proteins &enzymes
  - Hydroxychloroquine
  - Side effects: Mild abdominal symptoms: nausea bloating, or cramping abdominal pain, Vision changes /loss
  - Nursing Interventions: Encourage vision checks Q 6 month
- Gold Salts (PO or IM)
  - Action unknown
  - May produce remission in some clients
  - Decreases new bony erosions
  - Side effects: Dermatitis, Stomatitis, Bone marrow depression
  - Nursing Interventions: Regular CBC & UA (to check toxic response).
- Immunosuppressive /Cytotoxic

- Methotrexate weekly PO dose: Given if no response to NSAIDs.

- Corticosteroids
  - Prednisone
    - Decreases inflammation
    - Does not halt joint destruction
    - Side effects: Poor wound heading, Increased risk of infection, Osteoporosis, GI bleeding
    - Nursing Interventions:
  - Monitor side effects
  - I/O - edema
  - Check wt gain
  - Give with food
- Adjunctive Therapy
  - Intra-articular steroids
  - Antidepressants
- Nursing care
    - Medications
    - Balance rest/ exercise
    - Rest affected joints
    - ROM to preserve joint function
    - Low impact aerobic exercise
    - Cold/heat

Gout

Metabolic disorder characterized by an elevated serum uric acid concentration and deposition of urate crystals in synovial fluid and surrounding joint tissues.

Causes

- ***Primary gout***: High levels of uric acid from either increased production or decreased excretion of uric acid.
- ***Secondary gout***: Hyperuricemia from primary acquired diseases such as hypertension, renal failure, hemolytic anemia, glycogen storage disease, psoriasis, renal insufficiency, sarcoidosis, enzyme deficiencies.

Incidence

- Males 9:1
- Incidence increases with age

Risk Factors

- Obesity
- Lead intoxication
- Medications - salicylates, thiazide diuretics, cytotoxic drugs, diazepam, ethambutol, nicotinic acid
- Alcohol abuse
- Other risk factors: family history, diabetes mellitus, hypertension, renal failure, hypothyroidism, hyper or hypo-parathyroidism, pernicious anemia

Pathophysiology

° Increased purine metabolism (uric acid is the breakdown product of purine metabolism) or decreased excretion of uric acid.
° Serum uric acid levels rise & urate crystals form in peripheral body tissues.
° Inflammation of the joint - red, hot, swollen, painful.
° Untreated hyperuricemia will lead to development of **tophi** (firm, movable, cream-colored or reddened nodules).
° Nephropathy can result with untreated gout.

Differential Diagnosis

- Septic arthritis, Osteomyelitis, Pseudogout, Bursitis, Cellulitis
- Degenerative arthritis with acute inflammation, Rheumatoid arthritis

Complications

- Recurrent attacks
- Joint deformity and reduced mobility
- Chronic pain
- Renal calculi
- Nephropathy (may take 10 years to develop)
- Tophi (deposition of uric acid crystals in soft tissues)

Diagnostic Tests

° Increased serum uric acid levels - >7.5 mg/dL
° Increased WBC – in acute phase
° Increased ESR - in acute phase
° Analysis of synovial fluid - urate crystals.
° X-ray

Pharmacological Management

° NSAIDs – Indomethacin (Indocin)
° Analgesics
- Codeine or Demerol PO
- Avoid ASA-may interfere with uric acid excretion

° Colchicine - decreases urate crystal deposition.
- Side effects - significant abdominal cramping, diarrhea, N/V
- Nursing Interventions:
  - Give on empty stomach.
  - Drink 3-4 Lit/day.
  - No alcohol or CNS depressants.

° Uricosuric agents
- Decreases uric acid levels
- Allopurinol - can cause an acute attack when initiated.
- Probenecid (Benemid)
- Give with or after meals, increase fluids, no ASA.

° Corticosteroids
- Intra-articular route preferred if one joint is affected.

Nursing Care

- **Acute Pain**
  - Elevate affected joint

- Foot cradle
- NSAIDs, antigout drugs
- Analgesics
- Bed rest

- **Impaired Physical mobility**

- Bed rest until acute inflammation subsides
- Active/Passive ROM
- When ambulation permitted, help with cane or walker

- **Knowledge deficit**

- Teach to avoid excessive purines
- Teach to increase fluids

- **Other Nursing Diagnoses**

- Activity Intolerance
- Body Image Disturbance
- Noncompliance with cessation alcohol intake

Fracture

- A fracture is a break in the continuity of bone or cartilage.

Cause

- Trauma
- Indirect causes – powerful muscular contraction
- Fatigue – bones of the feet are particularly prone to develop fracture when they cannot tolerate repeated stress.
- Pathological – due to bone diseases - osteoporosis, osteogenesis imperfecta.

Types of Fractures

1. Complete**:** – involves the entire cross section of the bone, usually displaced.
2. Incomplete**:** - involves a portion of the cross section of the bone or may be longitudinal.
3. Closed (Simple): – when the skin is not broken.
4. Open (compound): – when the skin is broken, leading directly to fracture.
5. Pathologic – through an area of diseased bone (osteoporosis, bone cyst, bone tumor, Bony metastasis)

Fractures can be classified by their character:

- Spiral fracture
- Greenstick fracture
- Impacted fracture
- Oblique fracture
- Compression fracture
- Depressed fracture
- Comminuted fracture
- Linear fracture
- Transverse

Fractures are classified by their location.

- Spiral fracture of the femur,"
- "Greenstick fracture of the radius,"
- "Impacted fracture of the hummers,“
- "Linear fracture of the ulna,"
- "Oblique fracture of the metatarsal,"
- "Compression fracture of the vertebrae,"
- "Depressed fracture of the skull."

Physical Finding

- Pain at site of injury – usually progressive.
- Swelling, Tenderness, Deformity & Ecchymosis
- Crepitus (grating sensation)
- Loss of function & False motion
- Signs of shock
- Paresthesia

Altered Neurovascular Status

- Injured muscle, blood vessels, nerves
- Compression of structures resulting in ischemia
- Progressive, uncontrollable pain
- Pain on passive stretch, movement
- Altered sensation
- Loss of active motion
- Diminished capillary refill response
- Pallor

Diagnostic Evaluation

1. X – ray &other imaging studies
2. Blood studies (CBC, Hct, Hgb)
3. Arthroscopy detects joint movement

General principles of treatment

The treatment of a fracture depends on;

- Type of fracture
- Its severity and location
- The underlying condition of the patient

Emergency Aid

- Stabilize the basic life support measures
- Stop any bleeding.
- Immobilize the injured area.
- Apply ice packs to limit swelling &help relieve pain.
- Treat for shock**.**

The mgt process is a three step processes:

a) **Reduction** – restoration of the # fragments in to anatomic position &alignment.

b) **Immobilization**: - maintains reduction until bone healing occurs

c) **Rehabilitation** – regaining normal function of the affected part.

Approach to managements

1. **Closed reduction**
   - º Bony fragments are brought into apposition by manipulation & manual traction - restores alignment.
   - º May be done under anesthesia for pain relief & muscle relaxation.
   - º **Cast** or splint is applied to immobilize extremity & maintain reduction.
2. **Traction**
   a. Pulling force applied to accomplish and maintain reduction and alignment
   b. Used for fractures of **long** bones.
   c. Techniques:
      - º **Skin** traction: force applied to the skin using foam rubber, tapes, &so forth. Used in children with adhesive plaster and 2% hanging weight.
      - º **Skeletal** traction: force applied to the bony skeleton directly, using wires, pins, or tongs placed into or through the bone. used in adult with metallic nail and 10%hanging weight
3. **Open reduction with internal fixation**
   - ° Bone fragments are directly visualized. Internal fixation devices are used to hold bone fragments in position until solid bone healing occurs; they may be removed when bone is healed.
   - ° Prevents neurovascular compromise.
   - ° Monitor for:
      a. Pain, Pulsation, Skin color – pale, cyanotic
      b. Weakness progressing to paralysis
      c. Altered sensation, Paresthesia
      d. Poor capillary refill response
   - ° Reduce a swelling by elevating the injured extremity &applying cold.
   - ° Relieve pressure caused by immobilizing devices.
   - ° Relieve pressure on skin to prevent development of pressure ulcers by: Frequent repositioning, Skin care, Special mattresses

Complications*:*

Complications associated with immobility:

- ° Muscle atrophy, loss of muscle strength and endurance
- ° Joint contracture, Pressure sores at bony prominences or immobilizing device pressing on skin
- ° Diminished respiratory, cardiovascular, GI function, resulting in possible pooling of respiratory secretions, orthopedic hypotension, anorexia, constipation, and so forth.

Other Acute complications:

1. Venous stasis& thromboembolism – **DVT-**(fracture of hip & lower extremities)

2. **DIC**- Disseminated intravascular coagulopathy
3. Compartment syndrome - Neuromuscular compromise
4. Infection – especially with open fracture
5. Shock – due to significant hemorrhage
6. Fat embolism
7. Pulmonary embolism - Embolization of marrow or tissue fat or platelets & free fatty acids to the pulmonary capillaries, producing rapid onset of:
    a. Respiratory distress (increased RR, hypoxemia, crackles, wheeze)
    b. Mental disturbance, irritability, confusion
    c. Fever
    d. Petechia (buccal membrane, chest)

Long Term complications:

- Bone union problems - Delayed union, Nonunion, Malunion (Misaligned)
- Avascular necrosis of bone
- Reaction to internal fixation devices

Nursing Diagnosis

- Fluid volume deficit related to hemorrhage and shock.
- Impaired gas exchange related to immobility & potential pulmonary emboli or fat emboli.
- Risk for peripheral neurovascular dysfunction
- Risk for injury related to thromboembolism
- Pain related to injury
- Risk for infection related to open fracture or surgical intervention
- Bathing & hygiene self care deficit related to immobility.
- Impaired physical mobility related to injury or treatment modality.
- Risk for disuse syndrome related to injury and immobilization
- Post trauma response.

Nursing intervention

1. **Evaluation for hemorrhage and shock.**
    - Monitor vital signs, Review laboratory data
    - Watch for evidence of hemorrhage
    - Administer prescribed fluids &blood products, & monitor intake & out put.
2. **Monitor for impaired gas exchange**.
    - Evaluate mental status,
    - Position to enhance respiratory effort
    - Encourage coughing &deep breathing to promote lung expansion
    - Administer oxygen as directed, &

- Report any sudden or progressive change in respiratory status.

3. **Prevent neurovascular compromise**
   - Monitor: Pulsation, Pain, Paresthesia, Paleness and Temperature.
   - Reduce swelling by elevating injured extremity & cold application
   - Relief pressure sores by special mattress, skin care, frequent repositioning.
4. **Prevent development of thromboembolism**
   - Encourage passive& active exercises, encourage mobility
   - Elevate legs
   - Administer anti coagulant as prescribed (for DVT)
   - Use elastic stocking, foot pump,&/or Painkillers for superficial venous thrombosis
   - Monitor for pain, tenderness in calf, increase in size & temperature of calf.
5. **Relieving pain**
   - Secure data concerning pain
   - Administer prescribed analgesics
   - Encourage nonpharmacologic pain relieving measures
   - Initiate activities to prevent or modify pain: Immobilize, Correct alignment, Support splinted fracture, & Elevate extremity to diminish congestion.
6. **Monitor for development of infection**
   - Cleanse, debride, & irrigate open fracture wound, use sterile technique
   - Evaluate vital sign, report purulent discharge, administer antibiotics
7. **Promote self care activities**
   - Encourage participation in care, arrange patient area to promote independence
   - Allow time for patient to accomplish task, teach the use of mobility & other aids.
8. **Promote physical mobility**
   - Perform active & passive exercises to all non-immobilized joints.
   - Encourage patient participation in frequent position change.
   - Encourage ambulation.
9. **Prevent development of disuse syndrome**
   - Teach isometric exercises (to the immobilized extremities) to diminish muscle atrophy & prevent development of disuse syndrome.
10. **Patient education & Health maintenance**
    - Explain basis of fracture Rx& need of patient participation in therapeutic regimen.
    - Promote adjustment of usual lifestyle.

° Instruct patient on exercise to strengthen upper extremity muscles if crutch walking is planed.
° Instruct patient in safe method of ambulation - walkers, crutches, and cane.
° Encourage patient to follow adequate balanced diet.
° Discuss prevention of recurrent fractures.