

MUSCULOSKELETAL

NURSING STUDY NOTES

Musculoskeletal nursing bundle



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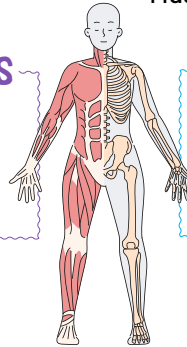
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MUSCULOSKELETAL SYSTEM

THE MUSCULOSKELETAL SYSTEM INCLUDES:

- ♥ Bones
- ♥ Joints
- ♥ Muscles
- ♥ Ligaments
- ♥ Tendons
- ♥ Connective tissues



MUSCLE FUNCTIONS

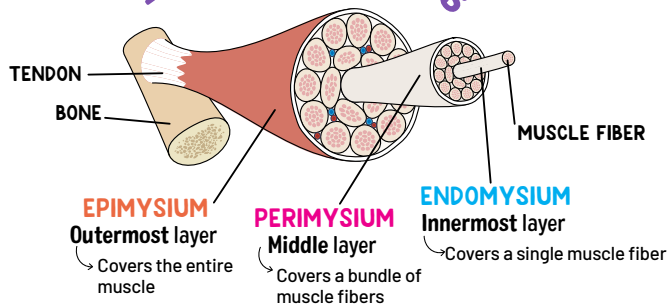
- ★ Produces movement
- ★ Stabilizes joints
- ★ Generates heat
- ★ Maintains posture

SKELETAL FUNCTIONS

- ★ Provides body structure
- ★ Protects organs
- ★ Storage of minerals & fats
- ★ Blood cell production

ERYTHROPOIETIN (renal hormone) stimulates bone marrow for RBC production

MUSCLE LAYERS



FASCIA is connective tissue that covers the **EPIMYSIUM**

AXIAL SKELETON

Forms the central axis of the body

REMEMBER THE LAW OF ONE'S AND TWO'S

WE HAVE ONE:

- Skull
- Ribs
- Thoracic cage
- Sternum

APPENDICULAR SKELETON

Bones that attach to the axial skeleton

WE HAVE TWO:

- Upper limbs
- Lower limbs
- Shoulder girdles
- Pelvic girdles

TYPES OF BONE MARROW

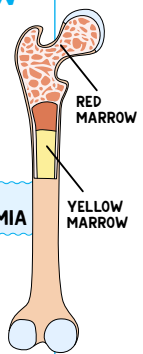
RED BONE MARROW

Site of blood cell (RBC, WBC & platelet) development
Found in "spongy bone" at end of bones

Renal failure patients can't produce erythropoietin which stimulates **red bone marrow**, causing **ANEMIA**

YELLOW BONE MARROW

Site of fat storage
Found in long bones surrounded by red bone marrow



TENDON	LIGAMENT	CARTILAGE
connects muscle to bone	connects bone to bone	covers end of bone
REMEMBER: T FOR TWO TYPES	REMEMBER: L IS LIKE TO LIKE	REMEMBER: C FOR CAP OF BONE

SHOCK ABSORBER

STRAIN: injury to Tendon or muscle

SPRAIN: injury to ligament

TYPES OF JOINTS

WHAT IS A JOINT?

Point where two bones make contact

BALL & SOCKET	SADDLE	HINGE	CONDYLOID	PIVOT	GLIDING
One bone is hooked into hollow space of another bone EXAMPLE: HIP JOINT	Opposing bones are reciprocally concave & convex EXAMPLE: THUMB	Two bones flex & extend in one plane, like a door hinge EXAMPLE: ELBOW	Oval shaped bone that fits into cavity between other bones EXAMPLE: METACARPAL JOINTS	Permits movement around a single axis, like a wheel EXAMPLE: NECK	Sliding movement of bones past each other EXAMPLE: WRIST
✓ FLEXION/EXTENSION ✓ ABDUCTION/ ADDUCTION ✓ ROTATION	✓ FLEXION/EXTENSION ✓ ABDUCTION/ ADDUCTION ✗ ROTATION	✓ FLEXION/EXTENSION ✗ ABDUCTION/ ADDUCTION ✗ ROTATION	✓ FLEXION/EXTENSION ✓ ABDUCTION/ ADDUCTION ✗ ROTATION	✗ FLEXION/EXTENSION ✗ ABDUCTION/ ADDUCTION ✓ ROTATION	✗ FLEXION/EXTENSION ✗ ABDUCTION/ ADDUCTION ✗ ROTATION
MOST MOBILE					GLIDING ONLY

MUSCULOSKELETAL ASSESSMENT

IMPORTANCE of a musculoskeletal assessment:

Assesses the function and ability to perform activities of daily living (ADL'S)

ACTIVITIES OF DAILY LIVING

Fundamental skills required to independently care for oneself

- ▶ Bathing
- ▶ Dressing
- ▶ Getting out of bed
- ▶ Walking
- ▶ Eating
- ▶ Using the bathroom

ASK THE PATIENT:

- ★ Do you use any assistive devices? (cane, walker, brace, etc.)
- ★ Have you had any recent falls?
- ★ Do you need assistance performing any daily tasks? (cooking, eating, bathing)

1 INSPECT

Observe for any abnormalities by inspecting:

- Postural & overall stance
- Gait & balance while walking/standing
- Curvature of spine
- Pain with **ACTIVE ROM**

RANGE OF MOTION (ROM)

How far & in what direction you can move a joint

ACTIVE ROM

Carried out by patient (involves muscular contraction)

PASSIVE ROM

Carried out by outside force (does not involve muscular contraction)

2 PALPATE

Observe for any abnormalities by:

→ Palpating muscles & joints for warmth, swelling, or tenderness

→ Perform **PASSIVE ROM**

Assess muscle strength

STRENGTH SCALE

5 Normal movement against gravity & resistance

4 Movement against moderate resistance

3 Movement against gravity but not resistance

2 Movement only when gravity eliminated

1 Muscle contracts; no movement (twitch)

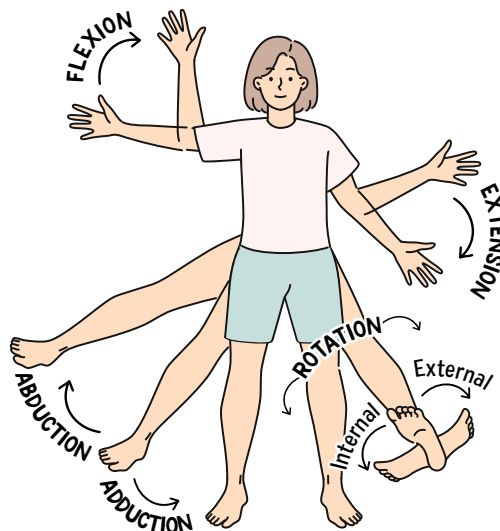
0 No movement

FACTORS AFFECTING PHYSICAL MOBILITY

Anything that causes damage to the muscular or skeletal system or the ability to control it

- Aging
- Sedentary lifestyle
- Recent surgery
- Pain
- Obesity or malnutrition
- Fractures/ injury
- Nerve degeneration
 - ▶ Diabetes
 - ▶ Multiple sclerosis
 - ▶ Stroke
- Bone degeneration (Osteoarthritis)
- Sedative medications
- Muscle atrophy

Non-mobility related factors such as orthostatic hypotension or shortness of breath can also affect a patient's ability to safely mobilize



TYPES OF MOVEMENT

FLEXION: bending a joint

EXTENSION: straightening a joint

ADDUCTION: towards the midline

ABDUCTION: away from midline



Think the limb is being abducted from the body

INTERNAL ROTATION: rotate towards midline

EXTERNAL ROTATION: rotate away from midline

PRONATION: facing down

SUPINATION: facing up

CIRCUMDUCTION: rotating in a circle

PLANTAR FLEXION: toes pointing away (tip-toes)

DORSIFLEXION: toes pulling towards head

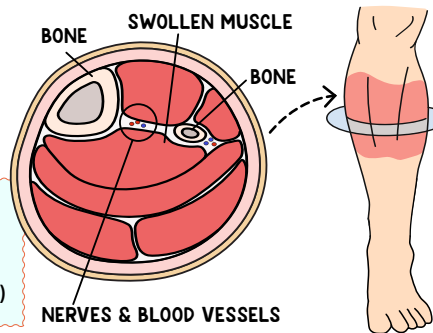
ACUTE COMPARTMENT SYNDROME

WHAT IS IT?

Rapid increase in pressure caused by swelling within a muscle compartment

LEADS TO:

- ① **PAIN** (from excessive compartment pressure)
- ② **↓ BLOOD FLOW** (from compressed blood vessels)
- ③ **NEUROVASC. IMPAIRMENT** (from compressed nerves)



CAUSES

- Fractures
- Restricting casts or bandages
- Crush injuries
- Burns
- Bleeding disorders
- IV infiltration



MOST COMMON CAUSE
Tibial fractures

DIAGNOSTICS

- ★ **COMPARTMENT PRESSURE TEST:** needle device inserted into muscle to measure pressure

NORMAL: 0–10 mmHg

ELEVATED: >20 mmHg

EMERGENT: >30 mmHg

- **CREATINE KINASE:** detect muscle destruction

- **CT SCAN/ MRI**

- **NEAR-INFRARED SPECTROSCOPY:** assesses blood flow to muscle compartment

SYMPTOMS

REMEMBER THE **6 P'S**

PAIN: commonly felt with passive stretch **EARLY SIGN**

PALLOR: paleness of extremity

PARESTHESIA: tingling or burning sensation

PARALYSIS: inability to move limb

POIKILOthermia: cold to touch

PULSELESSNESS: no peripheral pulse **LATE SIGN**

TREATMENT

- Opioid analgesics & NSAID's
- IV Fluids: increase perfusion to limb
- Elevate extremity at **heart level**
Do not elevate above heart level; this will decrease perfusion & worsen compartment syndrome!

PROCEDURES

- **Fasciotomy:** incision into fascia to relieve pressure & restore blood flow
- **Amputation:** in severe cases if limb becomes gangrenous (to avoid gangrene from spreading)

COMPLICATIONS

RHABDOMYOLYSIS

Myoglobin released due to muscle damage & filtered out through kidneys causing acute kidney injury

- ▶ Tea colored urine
- ▶ Muscle pain
- ▶ Muscle weakness

GANGRENE

Lack of blood flow to tissue or limb causes tissue to break down & die causing permanent damage

- ▶ Red/purple/ black skin in affected area
- ▶ Sores or blisters
- ▶ Foul smelling wound

NURSING INTERVENTIONS

- Frequent neurovascular checks
- Administer oxygen as needed
- Pain management
- Monitor VS
- Keep extremity elevated (heart level)
- Promote calm environment
(stress causes vasoconstriction which worsens perfusion)

ASSESS:

- ▶ Pulse
- ▶ Color
- ▶ Cap refill
- ▶ Temperature
- ▶ Sensation
- ▶ Movement

AVOID

- ▶ Restrictive clothing
- ▶ Tight casts or bandages
- ▶ Placing limb above or below heart level

ON AFFECTED LIMB NO:

- ❌ BP measurements
- ❌ IV lines
- ❌ Blood draws