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Designation : Assistant Professor
Subject : Anatomy-I
Topic : Unit 1 Puzzles(HBS)

Case 1 — "The Confused Orientation"

Vignette: A first-year physiotherapy student, Mira, is observing a clinical demonstration. The instructor asks her to describe a movement in the "anatomical position" and she incorrectly describes the palms facing backward. A patient later complains that limb movement instructions were confusing.
Key data: Student confusion about anatomical position and planes; demonstration involved shoulder flexion in sagittal plane.
Discussion questions (HBS style):

What is the correct anatomical position and why is it important in clinical communication?

How would you explain the difference between sagittal, coronal and transverse planes to a patient using a simple demonstration?

Propose a short teaching intervention (2–3 activities) to prevent this error in future demonstrations.
Learning objectives: Recall anatomical position and planes; communicate anatomical terminology clearly; design brief educational activity.
Teaching note / model answers:

Anatomical position: standing erect, face forward, arms by sides, palms forward.

Use body demonstrations (raise arm forward = sagittal; raise sideways = coronal; rotate trunk = transverse).

Intervention ideas: quick checklist for demonstrators, peer-checking before demos, 1-minute patient-friendly script with gestures.
Bloom level: Understanding → Applying

Case 2 — "Pain at the Elbow — Which Axis?"

Vignette: A 28-year-old tennis player complains of lateral elbow pain when serving. On examination, the physiotherapist documents reduced forearm pronation and painful elbow flexion. The intern notes movement using "wrong axis" terminology in the patient record.
Key data: Movements: elbow flexion/extension (sagittal plane around a mediolateral

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axis), pronation/supination (transverse plane around a longitudinal axis).
Discussion questions:

Identify the planes and axes for the movements described.

How can incorrect axis/plane recording affect clinical reasoning and communication in a multidisciplinary team

Create a concise documentation template to ensure correct movement descriptors.
Learning objectives: Map movements to planes/axes; appreciate documentation impact; design clinical note template.
Teaching note:

Elbow flexion/extension — sagittal plane about a mediolateral axis. Pronation/supination — transverse plane about a longitudinal axis.

Mislabeling can lead to incorrect exercise prescription. Template: Movement name + plane + axis + ROM + provocation.
Bloom level: Applying → Analyzing

Case 3 — "The Fractured Femur: Blood Supply Dilemma"

Vignette: An elderly patient with an extracapsular femoral fracture is admitted. The surgeon asks the physiotherapist about the risk of avascular necrosis (AVN) of the femoral head. The intern incorrectly suggests high risk for extracapsular fractures.
Key data: Intracapsular fractures (neck of femur) disrupt retinacular arteries → higher AVN risk; extracapsular (intertrochanteric) less likely to cause AVN.
Discussion questions:

Explain the vascular supply to the femoral head and why intracapsular fractures have higher AVN risk.

How does this anatomical knowledge change post-op physiotherapy planning

Draft a short patient explanation (2–3 sentences) about prognosis based on fracture location.
Learning objectives: Describe bone blood supply; apply to prognosis and rehab planning; communicate risk to patient.
Teaching note:

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Main supply: medial femoral circumflex artery (retinacular branches) → vulnerable in intracapsular fractures.

Rehab implications: weight-bearing precautions, monitor for complications, coordinate with orthopedics. Patient line: "Because your fracture is outside the hip joint capsule, the blood supply to the head is less likely to be affected — recovery prognosis is better."
Bloom level: Understanding → Evaluating

Case 4 — "Label the Cell — The Missing Organelles"

Vignette: A lab practical includes a cell diagram with two labels missing (mitochondrion and Golgi). Several students swap them. The instructor suspects conceptual gaps in cell function knowledge.
Key data: Roles of organelles: mitochondria (ATP production), Golgi (protein processing/packaging), nucleus (genetic control), membrane (selective barrier).
Discussion questions:

On the provided diagram, identify correct placement of mitochondrion and Golgi and justify by function.

Design a 5-minute active learning microtask that helps students remember organelle functions.

How might cell-level understanding influence understanding of tissue repair in physiotherapy?
Learning objectives: Identify organelles and functions; design microlearning activity; connect cellular function to tissue healing.
Teaching note:

Mitochondria: abundant in cells with high energy demand (muscle). Golgi near ER; packages proteins. Microtask example: "organelles speed-match" card shuffle plus 1 clinical example per organelle. Link to tissue repair: ATP for cell division, Golgi for collagen secretion.
Bloom level: Remembering → Applying

Case 5 — "Joint Trouble — Synovial vs Fibrous"

Vignette: A 45-year-old clerk has progressive stiffness in the wrist after repetitive typing. The clinician must explain why synovial joints are more prone to inflammation than fibrous joints.

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Key data: Synovial joints: synovial membrane, fluid, capsule → mobility and susceptibility to inflammatory processes. Fibrous joints: immobile, dense connective tissue.
Discussion questions:

Compare structural differences and clinical implications of synovial vs fibrous joints.

Propose three ergonomic or therapeutic interventions to reduce wrist synovial irritation.

Create a patient handout sentence explaining synovial inflammation in plain language.
Learning objectives: Differentiate joint types; propose preventive strategies; patient communication.
Teaching note:

Synovial joints allow movement but have tissues (synovium) that can inflame. Interventions: ergonomic keyboard, scheduled micro-breaks, ROM and strengthening exercises. Plain sentence: "Your wrist has a movable joint with a thin lining that can get irritated from overuse — we'll reduce stress and strengthen surrounding muscles."
Bloom level: Understanding → Applying

Case 6 — "Muscle Role Mix-up in a Sprain"

Vignette: After an ankle inversion sprain, a patient reports "my peroneals are the main flexors" — the student therapist must correct muscle role misconceptions and plan rehab accordingly.
Key data: Peroneals (fibularis longus/brevis): evertors/assist plantarflexion; tibialis anterior: dorsiflexor/inverter. Roles: agonist, antagonist, synergist, fixator.
Discussion questions:

Identify correct muscle actions and explain the likely injured structures in inversion sprain.

Outline a 2-week progressive exercise plan emphasizing correct muscle function (3 stages).

How do concepts of agonist/antagonist guide exercise selection?
Learning objectives: Recall muscle actions; design short rehab plan; apply

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muscle role concepts.
Teaching note:

In inversion sprain, lateral ligaments and evertors may be overloaded. Exercise plan: stage 1 — immobilized protection + isometrics; stage 2 — gentle ROM + eccentric peroneal strengthening; stage 3 — proprioception and plyometrics. Use agonist/antagonist pairs to ensure balanced strengthening.
Bloom level: Applying → Analyzing

Case 7 — "Nerve Conduction: The Lost Reflex"

Vignette: A patient postsurgery shows decreased patellar reflex. The intern suspects "nerve damage" but isn't sure whether sensory, motor, or root level lesion is responsible.
Key data: Patellar reflex mediated by femoral nerve (L2–L4) — afferent Ia fibers from muscle spindle → spinal reflex arc. Distinguish peripheral nerve vs root vs central lesions.
Discussion questions:

Map the components of the patellar reflex arc and predict lesion sites for decreased reflex.

What further tests or signs would help localize the lesion? (list 3)

How would reflex findings change immediate physiotherapy approach?
Learning objectives: Describe reflex arc; localize lesions; adjust clinical management.
Teaching note:

Reflex arc: muscle spindle → afferent fiber → spinal cord synapse → efferent motor fiber → quadriceps contraction. Decreased reflex could be due to peripheral neuropathy, L3–L4 root lesion, or pharmacologic suppression. Tests: sensory exam, muscle power testing, MRI/nerve conduction if needed. Physio: avoid aggressive stretching if nerve root lesion suspected; focus on gentle activation and refer.
Bloom level: Understanding → Evaluating

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Case 8 — "Integrative Diagram Challenge — Limb Correlation"

Vignette: The class is given a blank diagram of the upper limb showing bones but no soft tissues. Students must label muscles and nerves and explain functional correlations for a reaching movement. This is run as a 15-minute HBS case challenge.
Key data: Bones: humerus, radius, ulna; muscles: deltoid, biceps, triceps, brachioradialis; nerves: radial, musculocutaneous, median, ulnar. Movement: reaching forward + supination.
Discussion questions / tasks:

Label the diagram (muscles & nerves) and annotate which muscles are agonists/antagonists in forward reach.

Explain how nerve innervation supports coordinated reach and which nerve injury would impair supination.

Propose a 3-item in-class assessment rubric for this task.
Learning objectives: Integrate anatomy across systems; link structure to function; create assessment rubric.
Teaching note:

Agonists for forward reach: anterior deltoid, biceps (assist), serratus anterior for scapular motion. Antagonists: posterior deltoid, triceps. Supination impairment: radial nerve (if proximal) less so — actually supination primarily by biceps (musculocutaneous) and supinator (radial) — damage to musculocutaneous impacts powerful supination. Rubric: accuracy of labels (50%), correct functional annotation (30%), clarity of explanation (20%).
Bloom level: Analyzing → Creating