1. A 58-year-old male recreational cricketer pauses mid-run complaining of sudden central chest tightness and left arm heaviness while you — a 2nd-year BPT student — are recording his jump-landing mechanics. He is pale, anxious, and mildly short of breath. Observed movement clue: during landing his trunk leans to the right and left arm is held close to chest. Pulse is 102/min, BP 150/92, respiratory rate 22. No prior ECG available. Your supervisor is 10 metres away. You must decide how to act to protect life and collect movement clues for later analysis without delaying urgent care. The clinical challenge: distinguish exertional acute coronary syndrome vs musculoskeletal strain and plan immediate, safe steps that reflect haemodynamic priorities (preload/afterload, cardiac output).

Options:
A. Stop activity, call for immediate medical help/EMS, place patient supine with legs flat, loosen clothing; record vital signs; prepare to begin BLS if needed.
B. Ask the patient to sit and rest while you obtain a brief focused history about chest pain and past cardiac disease; delay EMS until history complete.
C. Continue motion analysis to capture gait/landing compensation and then notify supervisor.
D. Give oral analgesic and monitor for 30 minutes before deciding.

Structured reasoning:

- Accuracy of principles: A aligns with cardiac emergency guidelines—early EMS and BLS take precedence over data capture. B and D risk harmful delay. C prioritizes data over safety.
- Efficiency & safety: A is fastest to secure safety and manage haemodynamics (minimize exertion, maintain perfusion); B–D unsafe if ACS present.
- Resources & ethics: A uses minimal resources (phone, basic airway, positioning) and respects duty of care; delaying risks malpractice and ethical breach.
- Short vs long term: Immediate intervention prevents infarct progression (short-term) and improves long-term functional outcomes; data collection can be done later after stabilisation.

2. While observing a 72-year-old woman's sit-to-stand transfer in a geriatric ward, you note rapid, shallow breathing, peripheral cyanosis of fingers, and a new S3 gallop audible from the doorway. She reports fatigue and ankle swelling over 2 weeks. During transfer, she uses strong hip-hiking and increased trunk flexion to stand. Vital signs: pulse 96, BP 140/84. The task: relate observed movement (compensatory transfer, decreased thoracic expansion) to underlying congestive heart failure haemodynamics — preload, afterload, decreased stroke volume — and recommend immediate safe actions before therapy.

Options:
A. Postpone active transfers; alert medical team for bedside cardiac evaluation (ECG, BNP, CXR) and measure oxygen saturation; perform gentle bed mobility only.
B. Proceed with planned progressive resisted sit-to-stand exercises to strengthen quadriceps to improve function.
C. Encourage independent transfers but supply a walker to reduce energy cost.
D. Apply heat packs to lower limb swelling and continue therapy.

Structured reasoning:

- Accuracy: A respects cardiopulmonary red flags (S3, peripheral cyanosis, dyspnea) and prompts investigations (BNP, CXR) consistent with heart failure physiology. B/C risk increasing myocardial workload.
- Efficiency & safety: A is safest and efficient—reduces risk of decompensation. B/C could precipitate acute pulmonary edema.
- Resources & ethics: A needs nurse/physician input, pulse oximeter, oxygen availability. Ethically, do no harm and work within 2nd-year scope.
- Short vs long term: Immediate stabilization preserves safety; once medically optimized, physiotherapy can address deconditioning and transfer mechanics for long-term independence.

3. A 9-month-old infant at a community clinic demonstrates persistent head lag on pull-to-sit and asymmetric kicking. You're observing motor milestones as part of screening. The infant coughs intermittently and has mild wheeze; mother reports poor feeding. You must consider differential diagnoses: hypotonic neuromuscular disorder vs cerebral palsy vs systemic illness (infectious, metabolic). The challenge: decide immediate steps that are safe, recognise paediatric red flags, and indicate appropriate investigations for systemic causes (CBC, electrolytes, blood glucose, TORCH if needed).

Options:
A. Refer urgently to paediatrician for developmental assessment and baseline investigations including CBC, glucose, and consider sepsis workup.
B. Start tummy-time strengthening exercises and schedule follow-up in 2 weeks.
C. Reassure mother that variability is normal at 9 months and discharge.
D. Arrange an urgent neurology referral before medical investigations.

Structured reasoning:

- Accuracy: A is appropriate—systemic causes must be excluded and early paediatric assessment ensures safety. B may be useful later but misses potential medical issues.

- Efficiency & safety: A prevents missed serious diagnosis (e.g., metabolic crisis). C risks delayed identification of treatable systemic disease.
- Resources & ethics: A requires clinician collaboration and basic labs; ethically prioritize infant safety and timely referral.
- Short vs long term: Immediate investigation identifies treatable causes (short-term) and enables early intervention for neurodevelopmental outcomes (long-term).

4. During a postoperative ambulation session, a 65-year-old male who had an emergency open cholecystectomy 48 hours ago reports sudden calf pain while rising from chair. You observe unilateral calf swelling and altered gait with antalgic limp; vitals: HR 104, BP 130/80, RR 18. You must interpret biomechanics (reduced push-off, shortened step length) and link to DVT risk and pulmonary embolism haemodynamics. Decide safe next steps balancing mobilisation benefits vs risk of thromboembolism.

Options:
A. Stop ambulation immediately, elevate limb, notify surgical team, request Doppler ultrasound and D-dimer; avoid further weight bearing.
B. Proceed with planned gait training using anti-thrombotic stocking and compression.
C. Continue ambulation but reduce duration; document calf pain and reassess next day.
D. Apply heat and massage calf to relieve presumed muscle cramp then continue.

Structured reasoning:

- Accuracy: A best matches DVT suspicion; compression and Doppler are appropriate; massage/heat (D) contraindicated if DVT.
- Efficiency & safety: A quickly minimises embolic risk and triggers diagnostic pathway; B/C are unsafe without confirmation.
- Resources & ethics: A needs imaging and surgical input; prompt action prevents harm and respects scope.
- Short vs long term: Early detection/treatment of DVT prevents PE (short-term) and reduces chronic venous insufficiency risk (long-term).

5. You observe a 14-year-old school volleyball player with progressive exertional shortness of breath and syncope during high jumps. On movement analysis you note early fatigue of scapular stabilizers and increased lumbar lordosis on landing. Cardiac exam in corridor: loud holosystolic murmur and elevated JVP. The challenge: connect exercise intolerance and mechanical compensations to structural congenital heart disease or cardiomyopathy haemodynamics, and plan urgent but safe steps.

Options:
A. Stop sports participation, refer urgently for ECG, echocardiography, and cardiology

clearance before resuming.
B. Design a conditioning program to strengthen scapular muscles to improve landing mechanics and allow return to sport.
C. Permit limited practice with observation, provide salt restriction advice.
D. Initiate inhaled bronchodilator trial for presumed exercise-induced asthma.

Structured reasoning:

- Accuracy: A aligns with safety: syncope with exertion and murmur require cardiology workup (echo) to rule out hypertrophic cardiomyopathy, which has haemodynamic implications (outflow obstruction, angina, arrhythmia).
- Efficiency & safety: A avoids catastrophic event; B/C/D may neglect cardiac risk and be harmful.
- Resources & ethics: A requires cardiology and possible imaging; ethically mandatory to prevent sudden cardiac death.
- Short vs long term: Immediate restriction prevents fatal events; after diagnosis, tailored rehab and cardiac management provide long-term functional return when safe.

6. In a community screening, an adult manual labourer demonstrates a stooped posture and breathlessness after climbing a single flight of stairs. On gait observation there is reduced arm swing, forward trunk lean, and shallow chest expansion. He has a 30-pack-year smoking history. The challenge: separate COPD/ILD vs cardiovascular causes and use biomechanical clues (reduced rib excursion, accessory muscle use) to prioritise investigations (spirometry, spirometry reversibility, CXR, ABG).

Options:
A. Administer a bronchodilator challenge and schedule spirometry; advise smoking cessation and provide inhaler education.
B. Refer for cardiac evaluation with ECG and BNP; proceed with normal physiotherapy conditioning.
C. Start intense aerobic retraining immediately to improve endurance.
D. Recommend chest physiotherapy techniques (pursed-lip breathing, diaphragmatic breathing) and postpone further diagnostics.

Structured reasoning:

- Accuracy: A and D support primary respiratory suspicion; spirometry is essential to differentiate COPD from cardiac causes. B addresses cardiac differentials but should follow initial respiratory testing given history and mechanics.
- Efficiency & safety: A (spirometry + bronchodilator) is efficient and safe; starting intense exercise (C) risks exacerbation.

- Resources & ethics: A requires spirometer and patient education; ethically provide interventions within scope and refer when needed.
- Short vs long term: Smoking cessation and bronchodilator therapy improve immediate symptoms and long-term disease trajectory.

7. A 4-year-old child in outpatient clinic has frequent falls when running and a waddling gait. You notice proximal thigh muscle weakness on observation of climbing stairs and Gower's sign present while the child rises. Mother reports delayed motor milestones. The differential includes Duchenne muscular dystrophy vs benign hypotonia. The challenge: decide safe immediate actions, initial investigations (CK level, genetic testing referral), and avoid dangerous physical stress.

Options:
A. Refer urgently for CK level and paediatric neurology/genetic consult; avoid high-intensity eccentric exercise.
B. Begin an intensive lower limb strengthening plan with resistance bands to correct the gait.
C. Reassure family and advise normal play; schedule review in 6 months.
D. Begin corticosteroid therapy immediately to treat presumed muscular dystrophy.

Structured reasoning:

- Accuracy: A is correct—CK and neurology referral are first steps; B risks muscle damage, D is a medical intervention outside a BPT student scope.
- Efficiency & safety: A prevents iatrogenic harm from inappropriate exercise; B/C delay necessary diagnostics.
- Resources & ethics: A needs lab access and specialist referral; ethically, avoid harmful treatments and obtain parental consent for investigations.
- Short vs long term: Early diagnosis allows medical therapies (steroids, cardiopulmonary monitoring) to improve long-term outcomes; cautious physiotherapy can be planned after diagnosis.

8. While assisting in orthopaedic rounds, you observe a 45-year-old female post-mastectomy who demonstrates shoulder droop, scapular winging and restricted shoulder abduction. She reports pins-and-needles in the medial forearm and a low grade fever post-op day 1. The movement pattern suggests protective guarding and possible axillary nerve compromise or infection. The task: discern surgical complication (wound infection, lymphatic leak, nerve injury) from simple postsurgical immobility and plan immediate assessments.

Options:
A. Inspect wound for erythema/discharge, check temperature and ask for surgical review for wound infection and nerve assessment.

B. Start aggressive shoulder ROM exercises to prevent adhesive capsulitis.
C. Apply vigorous lymphatic massage to reduce swelling.
D. Reassure patient and discharge with home exercise sheet.

Structured reasoning:

- Accuracy: A conforms to safety—early detection of infection/nerve injury prevents deterioration. B/C might exacerbate infection or surgical complications.
- Efficiency & safety: A quickly identifies reversible complications. B risks wound stress; C may spread infection.
- Resources & ethics: A requires nurse/surgeon input; ethically prioritize patient safety and reportable complications.
- Short vs long term: Early surgical management reduces chronic shoulder dysfunction; delayed recognition leads to persistent disability.

9. In a pediatric ward you observe a 2-year-old with persistent cough and noisy breathing. During chest auscultation from the corridor you notice decreased air entry on one side and the child leans toward the unaffected side during play. Movement observation shows reduced use of one arm. The challenge: link asymmetric chest mechanics to lobar pneumonia vs pleural effusion and consider immediate tests (CXR, oxygen saturation) and safe physiotherapy actions.

Options:
A. Measure pulse oximetry, call paediatric team for CXR and start supplemental oxygen if SpO2<92%.
B. Begin percussion and postural drainage to mobilise secretions immediately.
C. Encourage vigorous play to improve ventilation on the affected side.
D. Schedule chest physiotherapy tomorrow after antibiotics.

Structured reasoning:

- Accuracy: A aligns with paediatric respiratory emergency management—assess oxygenation and get imaging. B may be appropriate later but must be guided by clinician; percussion without medical clearance in suspected effusion can be harmful.
- Efficiency & safety: A is the quickest to secure safety. C may fatigue the child and worsen hypoxia.
- Resources & ethics: A requires oximeter and prompt medical collaboration; ethically prioritize paediatric respiratory stability.
- Short vs long term: Prompt oxygen and imaging prevent respiratory deterioration (short-term); early targeted therapy improves recovery and lung growth.

10. While observing workplace ergonomics at a construction site, a 39-year-old worker with known hypertension and type 2 diabetes reports dizziness after lifting heavy loads. You note an exaggerated forward trunk flexion, reduced knee flexion during lifting, and breath-holding. BP measured standing is 160/100 and supine 150/92. The challenge: differentiate hypertensive exertional syncope, hypoglycaemia, or orthostatic intolerance and decide safe immediate steps before any exercise prescription.

Options:
A. Stop activity, check capillary blood glucose and orthostatic vitals; sit/lie supine and call for medical review.
B. Advise ergonomic correction and continue observation while worker resumes tasks.
C. Provide immediate sugary drink assuming hypoglycaemia then resume work.
D. Encourage worker to continue but with shorter rest breaks.

Structured reasoning:

- Accuracy: A systematically assesses both haemodynamic and metabolic causes; C assumes hypoglycaemia and might miss hypertensive crisis or cardiac ischemia.
- Efficiency & safety: A is safest and prevents harm by checking glucose and vitals; B/D unsafe.
- Resources & ethics: A needs glucometer and basic monitoring; ethically ensure worker safety and recommend medical follow-up.
- Short vs long term: Immediate assessment prevents acute harm; long-term ergonomics and medical control of HTN/DM reduce recurrence.