Clinicians may be \textit{called to see} a patient in the post-operative ward, following hours to days after an orthopaedic procedure. The surgery may have been elective, semi-elective or emergency, for traumatic or non-trauma condition. The problem may refer to:

- **Altered consciousness**
  - Analgesia (including epidural).
  - Related condition or injury (eg. head injury).
  - Unrelated condition eg. CVA.

- **Pain**
  - Related to the procedure, splints or dressings.
  - Related condition or injury.
  - Unrelated condition; pleurisy, IHD.

- **Fever**
  - Related to the condition or procedure.
  - Unrelated condition eg. pneumonia, abdominal catastrophe.

- **Breathlessness**
  - Lung injury; cardiogenic pulmonary oedema, ARDS, pneumonia, pleural effusion, atelectasis.
  - PE, fat embolisation syndrome, sepsis.
  - Airway obstruction, secretions.
  - Severe anaemia, acidosis.
  - Anaphylaxis.

- **Hypotension and oliguria**
  - Bleeding, sepsis, drugs, volume depletion (following rewarming).
  - Renal impairment, acute on chronic.

**INITIAL ASSESSMENT**

Open the airway and ensure patient breathing supplemental oxygen via non-re-breather mask. Measure the respiratory rate. Examine the chest and note air entry, breath sounds and added sounds. Measure HR, CRT and blood pressure. Secure IV access and draw bloods for FBC, U&E, glucose. X-match as appropriate. Obtain (BM) glucometer reading. Give IV crystalloid as appropriate. Measure the conscious level (AVPU or GCS). Expose the patient (Care with heat loss and patient dignity), look for patient’s colour, obvious blood loss, swelling, peripheral pulses and deformity.

Call for help at this stage if the patient is critically ill, unstable or deteriorating.

**FULL PATIENT ASSESSMENT**

Review the medical, nursing and observation chart (eg. MEWS). Read the surgical and anaesthetic notes. What procedure? What anaesthetic? Observe trends in TPR and BP and especially fluid intake, surgical drainage and urine output. What drugs is the patient receiving, before admission? Since operation?

Return to the patient and obtain as comprehensive history as possible. Determine the pain score. Perform thorough physical examination; general
condition, position in the bed, temperature, systems exam, occult traumatic injuries to trunk (trauma patient), distended abdomen, wounds, dressings, surgical drains output, peripheral pulses, swollen leg etc.

Order special tests as appropriate:
- CXR
- ABGs
- Blood cultures, CRP, sputum culture.
- CT (eg. CTPA).

Review the results of routine investigations

DECISIONS AND PLANNING
ie. Monitoring, referral and disposal

Depends upon the patient’s condition, severity and trends, response to treatment. Options include:
- Continue present treatment.
- Further investigations, immediate or deferred.
- Contact Outreach team (bleep 1111).
- Chest physiotherapy.
- Obtain senior opinion within/without the specialty (Eg.SpR medicine).
- Refer to critical care (SpR in referring specialty to make the referral).

NOTES
(1) THROMBOEMBOLISM
A common problem in orthopaedic patients, especially in those with procedures about the hip. Risk is increased with a history of thromboembolism, obesity, malignancy, older age, congestive heart failure, oral contraceptive use, varicose veins, smoking, use of GA (in contrast to epidural anaesthesia), increased blood viscosity, immobilization, paralysis and pregnancy.

(i) DVT: see swollen leg chapter
(ii) Pulmonary Embolism: PE should be suspected in postoperative patients with acute onset of pleuritic pain, tachypnea (90%) and tachycardia (60%). Initial workup includes ECG, chest radiograph, and ABGs. Normal PaO₂ does not exclude PE. CTPA (pulmonary angiography) is the gold standard. Continuous IV Heparin infusion (5000-U loading dose over 5 minutes, followed by infusion of 5000u in 50ml saline at 2.8 ml/hr adjusted to maintain APTT ratio of 1.5 to 2.5). Treatment is initiated for the patient with suspected or proven PE followed by Warfarin 3-6 months. Most important factor for survival is early diagnosis.

(2) ADULT RESPIRATORY STRESS SYNDROME (ARDS)
Acute hypoxic respiratory failure secondary trauma, shock, burns, pancreatitis, sepsis, fat embolism, aspiration, pulmonary contusion. Tachypnea, dyspnea, hypoxaemia and decreased lung compliance are manifestations of ARDS. It’s clinical diagnosis after a long-bone fracture is made using ABGs. Support with supplementary oxygen, CPAP and controlled
fluids. Refer to critical care. Early stabilization of long-bone fractures (particularly the femur) decreases the risk of pulmonary complications.

(3) FAT EMBOLISM
Usually seen 24-72 hours after trauma (3-4% of patients with long-bone fractures). Fatal in 10-15% cases. Onset may be heralded by tachypnoea, tachycardia, mental status changes, and upper extremity petechiae. May be caused by bone marrow fat and/or chylomicron changes as a result of stress. It results in ARDS.

(4) BLOOD LOSS
Excessive bleeding can cause hypovolemic shock and disseminated intravascular coagulation. Shock is the manifestation of decreased blood flow to the tissues and it causes: pale, cool extremities, oliguria and tachycardia. Most orthopaedic procedures are associated with blood loss. Average hip and knee blood loss is 1000-2000 mL per procedure with average decrease in haematocrit of 10%. The most important predictor for transfusion is the preoperative haematocrit. Follow the trust guidelines for transfusion (symptomatic anemia, Hb<8g/dL).

(5) WOUND INFECTION
Musculoskeletal sepsis is the most devastating surgical complication of operative treatment and remains a challenging diagnosis. Postoperative infection is suspected clinically and only confirmed by (CDC criteria): 1) pus present in the wound, 2) bacteria isolated from the wound, 3) spontaneous wound breakdown or surgical intervention due to suspected infection; if culture is performed, it must be positive, 4) evidence of infection at reoperation or at radiologic or histopathologic examination (restricted to deep infections) or 5) diagnosis of infection by a surgeon. Infection rates vary depending on index procedure and are highest after open fractures. Infection can complicate a joint replacement at any stage, even years after the surgery. Suspect infection with persistent pain, stiffness and progressive, concentric joint space narrowing with elevated ESR and CRP. Before starting empirical antibiotics, try obtaining a sample from pus, exudates or joint fluid. The disorders caused by infection result in severe suffering and systemic disturbance. Some are life threatening. Most need IV antibiotics. Refer to antibiotic policy. Always refer to Orthopaedics.

(6) PAIN CONTROL
Postoperative pain represents a complication of surgery that causes significant patient suffering and delays recovery and discharge. Mild to moderate pain may be expected after procedures such as carpal tunnel release, hardware removal and other hand and foot operations. Treatment includes NSAIDS and/or Paracetamol + Codeine. COX-2 are no longer recommended due to increased cardiac risk. Moderate to severe pain can follow procedures such as THR, TKR, ACL reconstruction, shoulder procedures, acetabular ORIF. PCAs may be available the first night. Epidural anaesthesia and peripheral nerve blocks decrease postoperative pain. Morphine IM prn may be necessary. Tight dressings and/or compartment syndrome may produce severe pain, see below.
(7) NEUROVASCULAR DAMAGE

1. VASCULAR COMPLICATIONS
Damage to vascular structures during orthopaedic procedures occurs relatively infrequently; when it does occur, however, recognition and prompt intervention are essential. They are a result of laceration, compression or traction of vessels during orthopaedic procedures. Injuries manifest themselves primarily as haemorrhage or ischemia. Early diagnosis leads to adequate treatment involving vascular surgeons when necessary.

2. NERVE COMPLICATIONS.
Most iatrogenic nerve injuries are neuropraxias and recover spontaneously after 3-6 weeks. Neuromas can occur following nerve injury and Reflex Sympathetic Dystrophy/Complex Regional Pain Syndrome may occur also from a peripheral nerve injury.

3. ACUTE COMPARTMENT SYNDROME
Painful condition of upper or lower limb caused by raised pressure within fascial compartments. Complicates up to 10 per cent of tibial fractures. May follow surgical procedures, especially if dressings pain (sometimes extreme) and sensation of tightness are early signs. Symptoms and signs of arterial insufficiency are late signs. Diagnosis is clinical, may be confirmed on measurement of compartment pressures. Loosen tight dressings and realign affected limb. Refer orthopaedics; urgent fasciotomy indicated for pressures > 40mmHg or within 20mmHg of diastolic blood pressure. Late diagnosis with irreversible tissue ischaemia may cause chronic pain, nerve palsies and dysfunction. May lead to litigation.