



## MS AKT Practice Paper 1

A suite of practice papers is available to help medical students prepare for the UK Medical School Applied Knowledge Test (MS AKT). Please note that while this practice paper reflects the style and type of questions that students will encounter in the MS AKT, it is not blueprinted to the MLA Content Map.

This practice paper comes with and without the answer options.

We would like to recognise the contribution of medical schools, and members of the AKT working groups in particular, for their help in preparing these which we hope students will find a valuable resource.

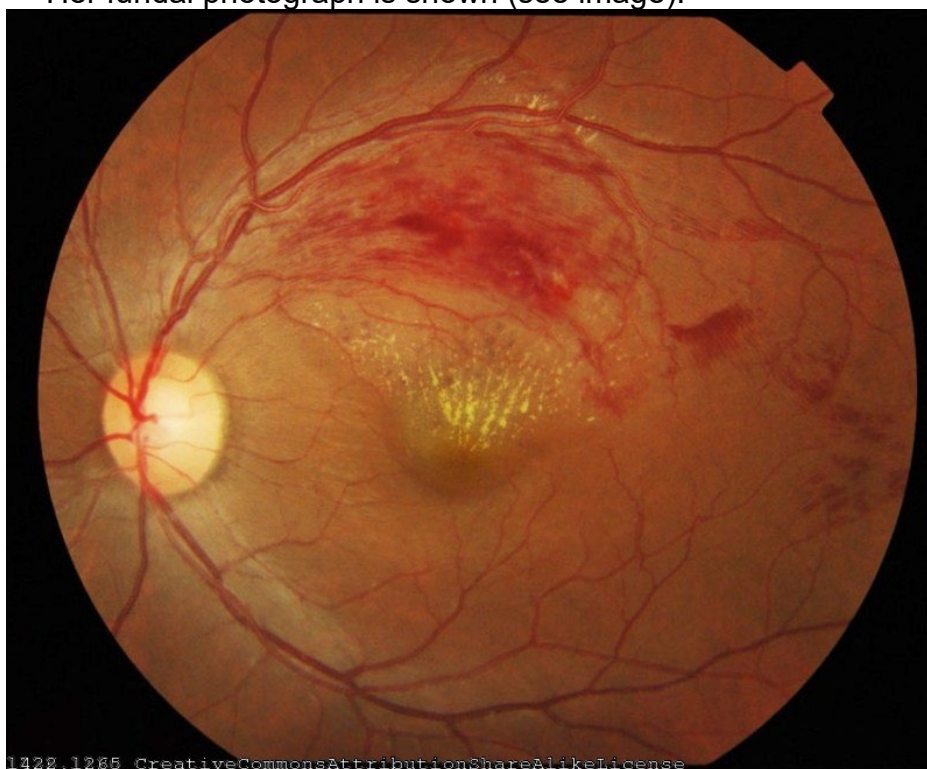
Please note the practice papers are reviewed on an annual basis and updated accordingly. Items that may have appeared in earlier versions may now have been retired as part of this exercise. Should you have any questions about the clinical content of the practice exam please speak to the Assessment Lead in your school in the first instance.

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1. A 67 year old woman attends the emergency department with sudden onset of blurred vision. She is otherwise in good health with no history of eye disease and is taking no medication.

Her right eye is normal. Visual acuity in her left eye is reduced and her left pupil reacts sluggishly to light.

Her fundal photograph is shown (see image).



What is the most likely cause of her visual loss?

- A. Branch retinal artery occlusion
- B. Branch retinal vein occlusion
- C. Central retinal artery occlusion
- D. Central retinal vein occlusion
- E. Optic neuritis

**Correct answer: B) Branch retinal vein occlusion**

**Justification: The image shows the typical appearance of a branch retinal vein occlusion.**



2. A 78 year old man develops increasing confusion on the ward at night. He is wandering around naked asking for his wife, shouting, and threatening staff and patients. He was admitted earlier in the day with a productive cough and fever. He has idiopathic Parkinson disease.

His temperature is 37.6°C, pulse 100 bpm, BP 132/71 mmHg and oxygen saturation 95% breathing air. His capillary blood glucose is 5 mmol/L.

Attempts to calm him with nursing measures do not improve the situation and he begins hitting staff.

What is the most appropriate treatment?

- A. Amitriptyline
- B. Haloperidol
- C. Immediate release carbidopa-levodopa
- D. Lorazepam
- E. Risperidone

**Correct answer: D) Lorazepam**

**Justification:** This patient has delirium due to his LRTI, is aggressive, and is a danger to staff, other patients and himself. He requires sedation. Haloperidol is contra-indicated by his Parkinson's disease and the most appropriate agent is a benzodiazepine such as lorazepam.



3. A 78 year old woman has had back pain for 2 weeks and bilateral leg weakness for 2 days. She had surgery for breast cancer 14 years ago. She had a minor fall at home a few days ago.

She has weakness of hip flexion bilaterally with brisk knee reflexes, extensor plantar responses and reduced sensation to pinprick in her feet.

What is the most likely diagnosis?

- A. Lumbar disc prolapse
- B. Mechanical back pain
- C. Osteomalacia
- D. Osteoporotic vertebral collapse
- E. Spinal cord compression

**Correct answer: E) Spinal cord compression**

**Justification: This patient has back pain and rapidly progressive bilateral lower limb weakness with upper motor neurone signs in her legs. This presentation is very suggestive of spinal cord compression, likely due to bony metastases from her breast cancer.**



4. A 28 year old man has polyuria and polydipsia. He has bipolar disorder for which he has taken lithium carbonate for 2 years.

Initial investigations:

|                    |               |            |
|--------------------|---------------|------------|
| Sodium             | 145 mmol/L    | (135–146)  |
| Potassium          | 3.9 mmol/L    | (3.5–5.3)  |
| Serum osmolality   | 296 mOsmol/kg | (275–295)  |
| Urinary osmolality | 356 mOsmol/kg | (350–1000) |
| Fasting glucose    | 5.8 mmol/L    | (3.0–6.0)  |
| Serum lithium      | 0.75 mmol/L   | (0.5–1.2)  |

What is the most appropriate next investigation?

- A. 24-h urinary cortisol
- B. Glucose tolerance test
- C. Serum corrected calcium
- D. Short Synacthen test
- E. Water deprivation test

**Correct answer: C) Serum corrected calcium**

**Justification:** It is likely that this patient has nephrogenic diabetes insipidus secondary to lithium therapy but this is more common with long-term use and it is essential to exclude hypercalcaemia (e.g. due to hyperparathyroidism) here before progressing to a water deprivation test.



5. A 65 year old woman is seen in clinic 2 weeks following a stroke.

CT scan of the head shows a left frontal lobe infarct.

She is currently taking aspirin, atorvastatin and ramipril.

Investigations:

ECG: atrial fibrillation, heart rate 68 bpm, otherwise normal.

What is the most appropriate long-term anti-thrombotic therapy?

- A. Apixaban
- B. Aspirin
- C. Aspirin and dipyridamole
- D. Clopidogrel
- E. Ticagrelor

**Correct answer: A) Apixaban**

**Justification: Patients with a stroke and AF should start anticoagulation as secondary prevention, typically a DOAC agent such as apixaban started after 2 weeks of initial therapy with aspirin. This is covered in both NICE AF (2021 update) and stroke (2022 update) guidelines:**

<https://www.nice.org.uk/guidance/NG128/chapter/recommendations>

<https://www.nice.org.uk/guidance/NG196/chapter/recommendations#stroke-prevention>

6. A 49 year old man has 3 days of cough and fever. He undergoes haemodialysis three times per week.

His temperature is 38.6°C, pulse 90 bpm, BP 122/80 mmHg, respiratory rate 30 breaths per minute and oxygen saturation 95% breathing 15 L/min oxygen via a non-rebreather mask. His JVP is 4 cm above the sternal angle. He has inspiratory crackles in the right mid and lower zone and left upper zone. His blood capillary glucose is 12 mmol/L.

Investigations:

|            |             |           |
|------------|-------------|-----------|
| Sodium     | 131 mmol/L  | (135–146) |
| Potassium  | 5.7 mmol/L  | (3.5–5.3) |
| Urea       | 16.7 mmol/L | (2.5–7.8) |
| Creatinine | 327 µmol/L  | (60–120)  |

Chest X-ray: see image



What is the most appropriate initial treatment?

- A. Haemodialysis
- B. Intravenous 10 mL 10% calcium gluconate
- C. Intravenous 1000 mL 0.9% sodium chloride over 1 h
- D. Intravenous co-amoxiclav and clarithromycin
- E. Intravenous furosemide



**Correct answer: D) Intravenous co-amoxiclav and clarithromycin**

**Justification: This patient has severe pneumonia with evidence of multifocal consolidation on the chest X-ray. He requires treatment with antibiotics first. The other interventions are not indicated.**





7. A 67 year old man is due to have a CT scan of the chest, abdomen and pelvis with intravenous contrast as assessment for possible lymphoma. He had a renal transplant 5 years previously. He takes prednisolone, tacrolimus and lisinopril.

His BP is 131/86 mmHg.

Investigations:

|            |                               |           |
|------------|-------------------------------|-----------|
| Urea       | 12.9 mmol/L                   | (2.5–7.8) |
| Creatinine | 165 µmol/L                    | (60–120)  |
| eGFR       | 39 mL/min/1.73 m <sup>2</sup> | (>60)     |

What is the most appropriate treatment to give before the scan?

- A. Intravenous 0.9% sodium chloride
- B. Intravenous acetylcysteine
- C. Intravenous furosemide
- D. Intravenous hydrocortisone
- E. Intravenous mannitol

**Correct answer: A) Intravenous 0.9% sodium chloride**

**Justification:** The patient is due to receive IV contrast and has existing CKD. He is at an increased risk of contrast-induced nephropathy. Volume expansion with 0.9% sodium chloride infusion (1 mL/kg) is recommended and shown to reduce the incidence of contrast nephropathy. Some units still recommend oral acetylcysteine (although trial data is lacking), but IV acetylcysteine is no longer used due to a risk of anaphylactoid reactions. There is no indication for additional steroids. IV furosemide may increase the risk of contrast-induced nephropathy. IV mannitol is no longer used as there is no evidence of benefit.



8. A 78 year old woman is admitted after being found collapsed at home. She has been lying on the floor overnight. She has hypertension and takes amlodipine. A urinary catheter is passed and she passes 60 mL of urine over the next 2 hours.

Her temperature is 35.8°C, pulse 88 bpm and irregular, and BP 102/60 mmHg.

Investigations:

|           |             |           |
|-----------|-------------|-----------|
| Sodium    | 136 mmol/L  | (135–146) |
| Potassium | 5.8 mmol/L  | (3.5–5.3) |
| Urea      | 20.9 mmol/L | (2.5–7.8) |

|                 |            |          |
|-----------------|------------|----------|
| Creatinine      | 180 µmol/L | (60–120) |
| Creatine kinase | 870 U/L    | (25–175) |

Urinalysis: glucose negative, ketones negative, blood 2+, protein 1+, leucocytes positive (catheter sample).

She is treated with trimethoprim for presumed urosepsis.

What is the most likely additional cause for her acute kidney injury?

- A. Glomerulonephritis
- B. Hypovolaemia
- C. Renal arterial emboli
- D. Rhabdomyolysis
- E. Ureteric obstruction

**Correct answer: B) Hypovolaemia**

**Justification:** This patient has an AKI with hypotension and oliguria, likely due to hypovolaemia following a long lie without hydration and has probable urosepsis. The level of CK is compatible with minor soft tissue injury: rhabdomyolysis would normally be associated with a CK of >10,000. There are no indicators of glomerulonephritis and the urinalysis abnormalities are compatible with a catheter sample +/- urosepsis. Renal emboli are rare and usually associated with loin pain. Ureteric obstruction is unlikely as the patient is still passing some urine.



9. A 76 year old woman has become increasingly confused over the previous 2 weeks. She has hypertension for which she takes bendroflumethiazide, doxazosin, amlodipine, ramipril and atenolol.

Her BP is 108/71 mmHg.

Investigations:

|            |             |           |
|------------|-------------|-----------|
| Sodium     | 121 mmol/L  | (135–146) |
| Potassium  | 3.5 mmol/L  | (3.5–5.3) |
| Urea       | 10.0 mmol/L | (2.5–7.8) |
| Creatinine | 105 µmol/L  | (60–120)  |

Which medication is most likely to be responsible for her presentation?

- A. Amlodipine
- B. Atenolol
- C. Bendroflumethiazide
- D. Doxazosin
- E. Ramipril

**Correct answer: C) Bendroflumethiazide**

**Justification: Of the medications listed, bendroflumethiazide is most likely to cause hyponatraemia.**



- 10.** A 92 year old woman has severe neck, chest and back pain following a fall. She has bruising around her right eye.

Investigations: Full blood count and clotting screen: normal

Chest X-ray: lung fields clear, left sided 4th and 5th rib fractures

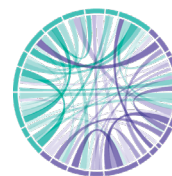
CT scan of head: no intracranial injury or bleed, mild small vessel disease, right orbital fracture

What is the most appropriate next investigation?

- A.** Cervical spine X-ray
- B.** CT angiography
- C.** CT scan of chest
- D.** CT scan of neck
- E.** MR scan of brain

**Correct answer: D) CT scan of neck**

**Justification: The history suggests a possible cervical spine fracture. This is best detected by a CT scan of the neck.**



- 11.** A 64 year old woman develops an acutely painful right knee 3 weeks after a prosthetic right knee replacement.

Her temperature is 38.2°C and pulse 103 bpm. Her right knee is inflamed with serous fluid discharging from the lower end of the wound.

What is the most likely causative organism?

- A.** Corynebacterium species
- B.** Enterococcus species
- C.** Pseudomonas aeruginosa
- D.** Staphylococcus aureus
- E.** Streptococcus pyogenes

**Correct answer: D) Staphylococcus aureus**

**Justification: Staphylococcus aureus is responsible for 20-25% of prosthetic joint infections, with coagulase negative staph next (not included on list). The other bacterial causes would be rare.**



- 12.** A 52 year old man has 3 months of fatigue. He has ulcerative colitis and takes mesalazine. He drinks 20 units of alcohol per week.

His temperature is 36.8°C and pulse 80 bpm. He has 3 cm hepatomegaly.

Investigations:

|           |           |          |
|-----------|-----------|----------|
| Albumin   | 36 g/L    | (35–50)  |
| ALT       | 65 IU/L   | (10–50)  |
| ALP       | 580 IU/L  | (25–115) |
| Bilirubin | 18 µmol/L | (<17)    |
| γGT       | 230 IU/L  | (9–40)   |

Ultrasound scan of abdomen: bile duct wall thickening and dilatation

What is the most appropriate next diagnostic investigation?

- A. CT scan of abdomen
- B. Endoscopic retrograde cholangiopancreatography
- C. Liver biopsy
- D. MR cholangiopancreatography
- E. Percutaneous transhepatic cholangiography

**Correct answer: D) MR cholangiopancreatography**

**Justification:** The patient has a classic cholestatic pattern of blood test abnormalities. Primary sclerosing cholangitis often has limited symptoms at presentation, and bilirubin and albumin are often normal. There is a strong association with UC. Ultrasound shows evidence of abnormal bile ducts. MRCP is the typical initial diagnostic investigation as it is non-invasive: this usually shows typical beaded appearance of the bile duct.



**13.** A 60 year old woman has 6 weeks cough productive of blood streaked sputum.

Investigations:

CT scan of chest: mass in left lower lobe.

Needle biopsy: nuclei that are enlarged, hyperchromatic and pleomorphic.

What is the most likely diagnosis?

- A. Adenoma
- B. Carcinoma
- C. Hamartoma
- D. Sarcoidosis
- E. Tuberculosis

**Correct answer: B) Carcinoma**

**Justification: This is because nuclear enlargement, hyperchromasia and pleomorphism are features that suggest carcinoma in all sites of the body.**



- 14.** A 65 year old woman has an infective exacerbation of COPD and has been treated with nebulised bronchodilators, antibiotics and steroids.

She is alert. Her temperature is 37.8°C, pulse 108 bpm, BP 100/75mmHg, respiratory rate 26 breaths per minute and oxygen saturation 88% breathing 15 L/minute oxygen via a non-rebreather mask.

Investigations:

Arterial blood gas on 15 L/min oxygen

pH 7.28 (7.35–7.45)

PO<sub>2</sub> 7.2 kPa (11–15)

PCO<sub>2</sub> 8.9 kPa (4.6–6.4)

Bicarbonate 31.3 mmol/L (22–30)

Lactate 1.2 mmol/L (1–2)

What is the most appropriate next management step?

- A.** Continuous positive airway pressure
- B.** Invasive ventilation
- C.** Nasal high flow oxygen
- D.** Nasopharyngeal airway
- E.** Non-invasive ventilation

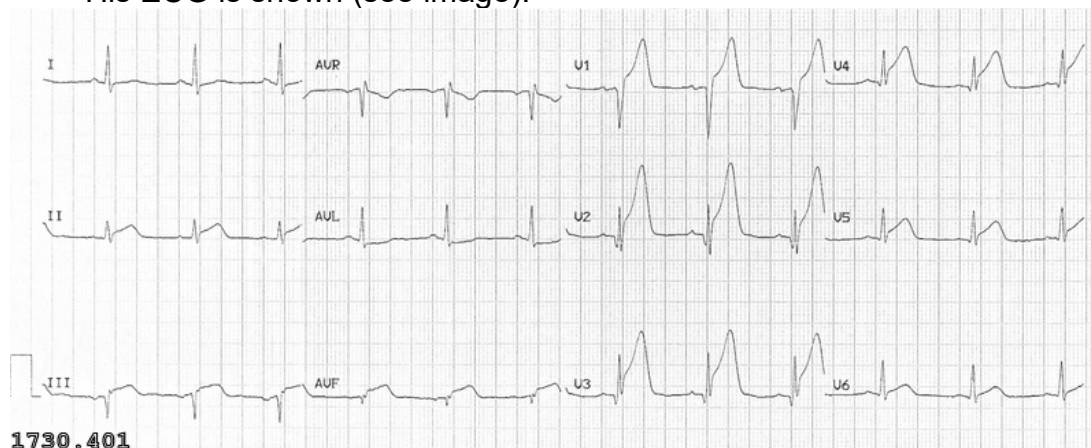
**Correct answer: E) Non-invasive ventilation**

**Justification: This patient has acute type-2 respiratory failure: respiratory acidosis needs to be corrected with ventilation in an alert patient.**



15. A 79 year old man attends the Emergency Department with 2 hours of chest pain and light-headedness.

His ECG is shown (see image).

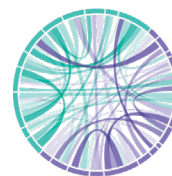


What is the most likely explanation for the ECG findings?

- A. Aortic dissection
- B. Hyperkalaemia
- C. Myocardial infarction
- D. Pericarditis
- E. Pulmonary embolism

**Correct answer: C) Myocardial infarction**

**Justification: The ECG shows typical changes of an anterior STEMI.**



- 16.** A 50 year old woman has acute onset of breathlessness. She underwent a laparoscopic cholecystectomy 10 days ago.

Her temperature is 37.4°C, pulse 104 bpm, BP 122/80 mmHg, respiratory rate 24 breaths per minute and oxygen saturation 94% breathing air. Her chest is clear. She has minimal tenderness over the right hypochondrium.

What is the most likely diagnosis?

- A.** Myocardial infarction
- B.** Pancreatitis
- C.** Pneumonia
- D.** Pulmonary embolus
- E.** Subphrenic abscess

**Correct answer: D) Pulmonary embolus**

**Justification:** This patient has acute dyspnoea with a low O<sub>2</sub> saturation despite tachypnoea, and also has a tachycardia and clinically clear chest. Following abdominal surgery, pulmonary embolism is the most likely diagnosis.



17. A 39 year old man has had fever, chills and generalised weakness for 1 month. He has a systolic heart murmur. He is an intravenous drug user.

Investigations:

White cell count  $15 \times 10^9/L$  (4.0–11.0)

C reactive protein. 88 mg/L (< 5)

Blood culture results are awaited.

What further investigation will help to establish the diagnosis?

- A. Chest X-ray
- B. ECG
- C. Echocardiogram
- D. HIV testing
- E. Urine dipstick analysis

**Correct answer: C) Echocardiogram**

**Justification:** The presentation is very suggestive of infective endocarditis and the patient requires an urgent echocardiogram to establish the diagnosis (Duke major criterion). The other investigations are important (CXR to exclude septic lung emboli from the TcV; ECG for first degree heart block (aortic root abscess); urinalysis for haematuria (nearly always seen in IE); HIV testing (IVDU)) but are not key to making the central diagnosis.



- 18.** A 16 year old girl attends the emergency department after an episode of loss of consciousness following a fall. She had consumed an excessive amount of alcohol at a party before the fall.

She has a dirty scalp wound and cannot remember recent events. Her pulse is 68 bpm, BP 110/80 mmHg and oxygen saturation 98% breathing air. She opens her eyes to command and is confused. Her capillary blood glucose is 6.0 mmol/L.

Her wound is cleaned and sutured.

What is the most appropriate immediate management plan?

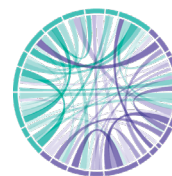
- A.** Admit and observe for 24h
- B.** CT scan of head
- C.** Discharge with head injury instructions
- D.** Refer to neurosurgeon
- E.** X-ray of skull

**Correct answer: B) CT scan of head**

**Justification:** For people 16 and over who have had some loss of consciousness or amnesia since the injury, a CT head scan within 8 hours of the head injury is recommended. A child of 16 doesn't need a tetanus booster

**NICE guideline [NG232] Published: 18 May 2023**

<https://www.nice.org.uk/guidance/ng232/chapter/recommendations>



- 19.** A 47 year old woman has had 1 year of increased urinary frequency, urgency and nocturia. She leaks urine if she cannot get to the toilet promptly. She had three normal pregnancies with no complications.

The perineum appears normal and there is no uterine prolapse. Incontinence is not provoked by coughing or straining.

Urinalysis is negative. A post-micturition ultrasound scan of bladder shows minimal residual urine volume.

Her symptoms do not improve following 6 weeks of bladder training.

What is the most appropriate next management step?

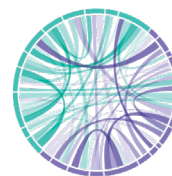
- A.** Botulinum toxin type A injection into bladder wall
- B.** Oral duloxetine
- C.** Oral oxybutynin
- D.** Percutaneous sacral nerve stimulation
- E.** Topical oestrogen

**Correct answer: C) Oral oxybutynin**

**Justification:** If behavioural therapies such as bladder training for 6 weeks are ineffective at controlling symptoms, anticholinergics are the next step treatment for overactive bladder with urge incontinence.

**NICE guidance (updated in 2025):**

<https://cks.nice.org.uk/topics/incontinence-urinary-in-women/management/managing-urinary-incontinence/>



**20.** A 72 year old woman has 6 months of constipation.

Investigations:

Creatinine 70  $\mu\text{mol/L}$  (60–120)

Calcium 2.90 mmol/L (2.2–2.6)

Phosphate 0.65 mmol/L (0.8–1.5)

24 h urinary calcium 7.0 mmol (2–6)

Parathyroid hormone 11.2 pmol/L (1.6–8.5)

Vitamin D 65 nmol/L (>60)

What is the most likely diagnosis?

- A. Familial hypocalciuric hypercalcaemia
- B. Multiple myeloma
- C. Primary hyperparathyroidism
- D. Tertiary hyperparathyroidism
- E. Vitamin D intoxication

**Correct answer: C) Primary hyperparathyroidism**

**Justification:** The biochemical pattern of hypercalcaemia, hypophosphataemia, elevated PTH and hypercalciuria point towards primary hyperparathyroidism. Tertiary hyperparathyroidism occurs with severe renal impairment. Primary Hyperparathyroidism is commoner in older female patients: in most cases symptoms are typically either mild or absent.



**21.** A 52 year old man attends his GP for health screening. He is well with no previous medical history.

His pulse is 80 bpm and irregular, and BP 128/84 mmHg.

Investigations:

Sodium 136 mmol/L (135–146)

Potassium 3.9 mmol/L (3.5–5.3)

Urea 4.9 mmol/L (2.5–7.8)

Creatinine 80 µmol/L (60–120)

HbA1C 40 mmol/mol (20–42)

Thyroid function tests are normal.

ECG shows atrial fibrillation, heart rate 76 bpm.

What is the most appropriate medication?

- A. Apixaban
- B. Aspirin
- C. Bisoprolol
- D. Diltiazem hydrochloride
- E. No medication

**Correct answer: E) No medication**

**Justification:** The patient has an incidental finding of AF and is asymptomatic with a satisfactory resting heart rate. He does not require any rate-modulating medication. His CHA2DS2-VASc score is 0 and he does not require antithrombotic therapy.

**NICE topics revised 2025:**

<https://cks.nice.org.uk/topics/atrial-fibrillation/>



**22.** An 80 year old man attends the emergency department with 2 hours of epistaxis that has not stopped despite compression. He has hypertension.

A bleeding site is visible in the anterior nasal cavity. His BP is 160/95 mmHg.

What is the most appropriate initial management option?

- A. Anterior pack
- B. Antihypertensive medication
- C. Cautery
- D. Cryotherapy
- E. Ice pack

**Correct answer: C) Cautery**

**Justification:** Minor bleeding from an accessible site can be treated with cautery using a silver nitrate stick or electrocautery. Anterior pack is for profuse bleeding with site difficult to localise. Anti hypertensives will only prevent further attacks of epistaxis. Cryotherapy and ice pack of little advantage and secondary.





- 23.** A 65 year old man has abdominal distension and vomiting 48 hours after a sigmoid colectomy with primary anastomosis for bowel cancer. He has not passed any flatus for 24 hours. He is taking regular paracetamol and as required intravenous morphine.

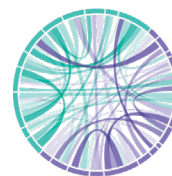
His temperature is 37.6°C, pulse 96 bpm and BP 122/85 mmHg. His abdomen is distended with tenderness over the wound but no rebound or guarding. There are no bowel sounds.

What is the most appropriate initial management?

- A.** Give intravenous piperacillin with tazobactam
- B.** Give Microlax® enema
- C.** Insert a nasogastric tube
- D.** Start regular intravenous morphine
- E.** Take to theatre for laparotomy

**Correct answer: C) Insert a nasogastric tube**

**Justification:** The patient has evidence of a paralytic ileus. The initial treatment would involve making patient nil by mouth and inserting a nasogastric tube. Morphine would make the condition worse. There is no indication for antibiotics. An enema would not be appropriate and unlikely to be of benefit. There is no indication for immediate surgery as further investigations will be required to identify treatable causes.



**24.** A 23 year old man attends the sexual health clinic with a painful swelling in his groin and pain when opening his bowels. He had unprotected anal sex with a new male partner 4 weeks ago.

He has a perianal ulcer and tender inguinal lymphadenopathy.

What is the most likely diagnosis?

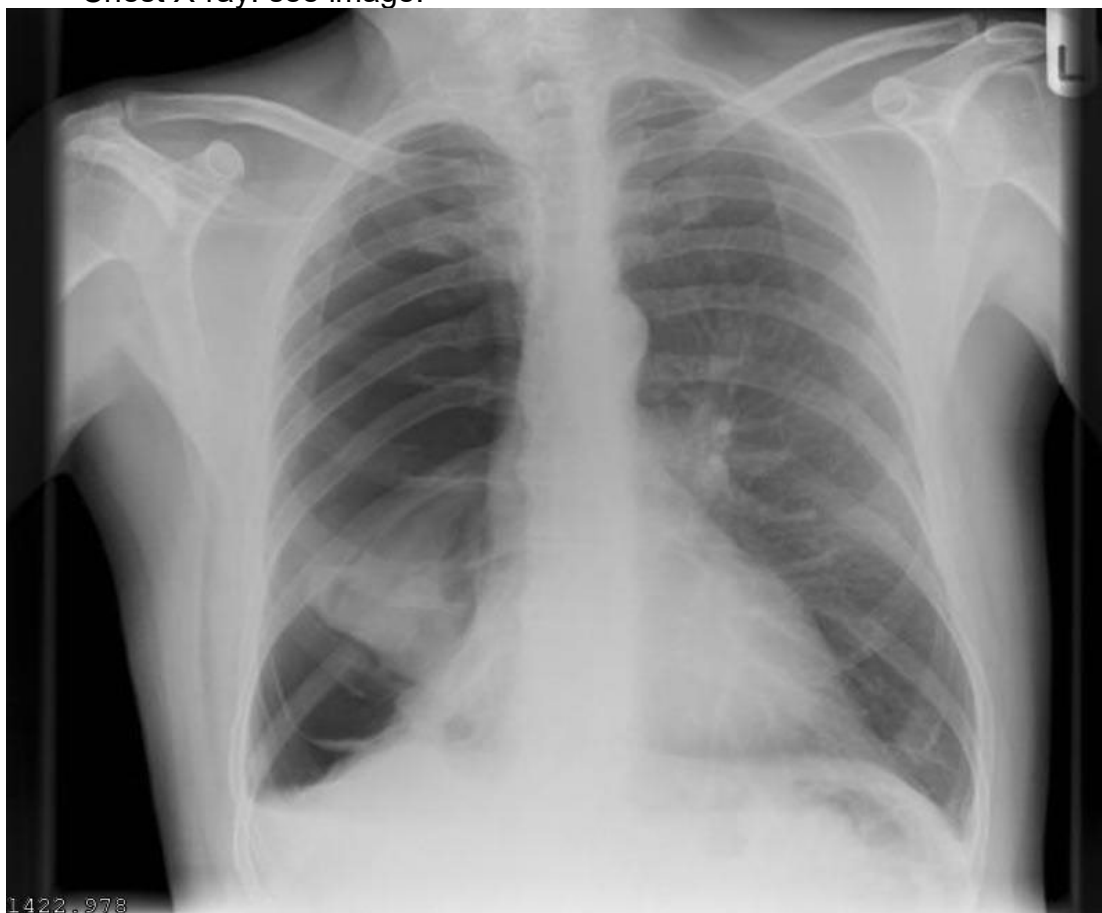
- A. Genital herpes
- B. Gonorrhoea
- C. HIV seroconversion
- D. Lymphogranuloma venereum
- E. Secondary syphilis

**Correct answer: D) Lymphogranuloma venereum**

**Justification: Proctitis and lymphadenopathy make LGV the most likely, and is endemic in MSM population in UK.**

25. A 63 year old man has pain of sudden onset in the right side of his chest radiating to the right shoulder and increasing breathlessness. He has mild COPD and has had a hacking cough for 2 days.

Chest X-ray: see image.



What is the most likely cause of his acute deterioration?

- A. Diaphragmatic hernia
- B. Lobar pneumonia
- C. Oesophageal rupture
- D. Pneumothorax
- E. Pulmonary embolus

**Correct answer: D) Pneumothorax**

**Justification: The chest X-ray shows a large right-sided pneumothorax.**



- 26.** A 25 year old man attends the emergency department after vomiting a large quantity of blood.

At endoscopy, there is a deep ulcer in the posterior wall at the junction of the first and second parts of the duodenum, with a bleeding vessel in its base.

From which artery is the bleeding most likely to be arising?

- A.** Gastroduodenal
- B.** Left gastric
- C.** Short gastric
- D.** Splenic
- E.** Superior mesenteric

**Correct answer: A) Gastroduodenal**

**Justification:** The gastroduodenal artery runs posterior to the first and second parts of the duodenum and may be a source of major haemorrhage in peptic ulcer disease.



**27.** A 27 year old woman has a long history of irregular menstruation. She does not take any medication.

Her BMI is 29.4 kg/m<sup>2</sup>.

Investigations:

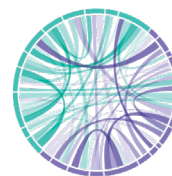
|                                  |                     |           |
|----------------------------------|---------------------|-----------|
| LH (pre-menopausal female)       | 15 U/L (follicular) | (1–11)    |
| FSH                              | 6 U/L (follicular)  | (2–8)     |
| Testosterone                     | 3.5 nmol/L          | (0.2–2.9) |
| Cortisol post 1 mg dexamethasone | 40 nmol/L           | (<50)     |
| Prolactin                        | 425 U/L             | (100–500) |

What is the most likely diagnosis?

- A. Androgen secreting tumour
- B. Cushing syndrome
- C. Polycystic ovary syndrome
- D. Premature ovarian failure
- E. Prolactinoma

**Correct answer: C) Polycystic ovary syndrome**

**Justification:** The increased ratio of LH:FSH along with oligomenorrhoea and BMI in the overweight range indicates PCOS is most likely. A mild elevation in prolactin is sometimes seen in PCOS.



- 28.** A 30 year old woman attends her GP 3 months after a diagnosis of iron deficiency anaemia. She was advised to take oral iron supplements and has been taking these regularly. She has some looseness of her stools. Her periods are scanty on a combined oral contraceptive.

Investigations:

Haemoglobin 92 g/L (115–165)

MCV 70 fL (80–96)

Ferritin 8 µg/L (12–200)

What antibody test is most likely to confirm the underlying cause?

- A. Anti-gastric parietal cell
- B. Antimitochondrial
- C. Antinuclear
- D. Anti-smooth muscle
- E. Anti-tissue transglutaminase

**Correct answer: E) Anti-tissue transglutaminase**

**Justification: Coeliac disease is the most likely diagnosis here with an iron deficiency anaemia and no significant source of blood loss.**



**29.** A 75 year old man is admitted with weakness in his legs. He has a squamous cell lung cancer treated by radiotherapy 18 months ago.

He is cachectic. He has 4 out of 5 strength in hip flexion and knee flexion bilaterally. Sensation and reflexes are normal, and sphincter function is preserved. His BMI is 17 kg/m<sup>2</sup>.

MR scan of spine shows destructive bony lesions of T12 and of L2, L3 and L4 vertebral bodies.

What treatment is most appropriate to preserve neurological function?

- A. Chemotherapy
- B. External beam radiotherapy
- C. Intravenous bisphosphonate
- D. Radiation brachytherapy
- E. Surgical decompression of the spinal cord

**Correct answer: B) External beam radiotherapy**

**Justification:** The history and examination findings suggest early cord compression from metastatic lung cancer. He has multiple lesions and is too frail for surgery. Radiotherapy is best treatment option.



**30.** A 34 year old woman has had headaches for 3 months. Her mother developed hypertension at the age of 38 years.

Her BP is 180/92 mmHg. Fundoscopy is normal.

Investigations:

|                                |                      |
|--------------------------------|----------------------|
| Sodium                         | 136 mmol/L (135–146) |
| Potassium                      | 3.3 mmol/L (3.5–5.3) |
| Chloride                       | 97 mmol/L (95–106)   |
| Urea                           | 4.0 mmol/L (2.5–7.8) |
| Creatinine                     | 94 µmol/L (60–120)   |
| Plasma aldosterone:renin ratio | 50 (<25)             |
| Cortisol (9am)                 | 307 nmol/L (200–700) |

Urinalysis is normal.

What is the most likely diagnosis?

- A.** Essential hypertension
- B.** Glucocorticoid excess
- C.** Pheochromocytoma
- D.** Primary hyperaldosteronism
- E.** Primary hypoadrenalism

**Correct answer: D) Primary hyperaldosteronism**

**Justification: FHx of hypertension and biochemistry suggest mineralocorticoid excess with a high PRA ratio.**





- 31.** A 20 year old man has had 2 days of visible haematuria. Three days before the haematuria started, he developed tonsillitis and was treated with phenoxymethylpenicillin.

His BP is 112/54 mmHg.

Investigations:

Urea            3.2 mmol/L    (2.5–7.8)

Creatinine    61  $\mu$ mol/L    (60–120)

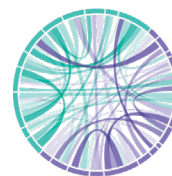
Urinalysis: glucose negative, ketones negative, blood 3+, protein 3+, nitrites negative, leucocytes negative.

What is the most likely cause of his haematuria?

- A. Alport nephropathy
- B. Drug reaction
- C. Granulomatosis with polyangiitis
- D. IgA nephropathy
- E. Postinfectious glomerulonephritis

**Correct answer: D) IgA nephropathy**

**Justification: IgA characteristically causes visible haematuria a few days after URTI (post-infectious GN has lag time of around 2 weeks before haematuria occurs and would be a less benign presentation if associated with visible haematuria).**



- 32.** A 38 year old man has had 2 months of epigastric pain that radiates into his back. It is worse at night and sometimes wakes him up. It is better after eating. He has been very busy at work. He occasionally misses lunch, which worsens the pain. He has not lost weight. He smokes 10 cigarettes per day and drinks two bottles of wine per week.

Examination is normal.

What is the most likely diagnosis?

- A.** Cholecystitis
- B.** Chronic pancreatitis
- C.** Duodenal ulcer
- D.** Gastric ulcer
- E.** Gastric carcinoma

**Correct answer: C) Duodenal ulcer**

**Justification: Duodenal ulcers tend to be made worse with stress and the pain is often worse at night radiating into the back - it is relieved by eating and patients tend to put weight on - in contrast to a gastric ulcer which is made worse with eating and people often lose weight.**



- 33.** A 26 year old woman has had 12 months of back pain, located in the low lumbosacral region. She has intermittent bilateral thigh pain. The back pain disturbs her sleep. It is improved by activity but not relieved by resting. She finds it difficult to bend down to pick things up from the floor.

Which clinical feature is most specific for inflammatory back pain?

- A.** Improvement with activity
- B.** Nocturnal pain
- C.** Radiation to leg
- D.** Stiffness during the day
- E.** Young age

**Correct answer: A) Improvement with activity**

**Justification:** Inflammatory back pain (IBP) is typically improved with activity and not relieved by rest, as opposed to mechanical pain which is worse with activity and is relieved by rest. IBP can wake the patient in the early hours of the morning and sacroiliitis can radiate to the thigh, but these features are much less specific. Morning stiffness is specific for inflammatory back pain but not persistent daytime stiffness. IBP can occur at any age although mechanical pain is less common in young people.



- 34.** A 68 year old man has had a swollen tender knee for 3 days and cannot weight bear. He has had previous episodes of big toe swelling. He has chronic kidney disease stage 4.

Investigations:

Fluid analysis of knee aspirate:

White cell count 55 000/mL, 95% neutrophils

Gram stain negative

Copious 10  $\mu$ m intracellular needle shaped crystals

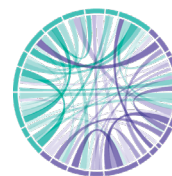
What is the best initial treatment for his acute knee pain and swelling?

- A. Arthroscopic joint washout
- B. Intravenous flucloxacillin
- C. Oral allopurinol
- D. Oral naproxen
- E. Oral prednisolone

**Correct answer: E) Oral prednisolone**

**Justification:** The presentation is likely due to an acute attack of gout.

Although infection is not completely excluded at this stage it is less likely as G stain is negative and there are several positive features of gout in the history. IA or oral steroids, colchicine or NSAIDs are all effective treatments for acute gout. NSAIDs are contraindicated in CKD of this stage. Allopurinol will not help the acute attack.



**35.** An 18 year old man is in the intensive care unit with septic shock as a result of a compound fracture of his leg. His urine output has been <30 mL for the past 2 hours.

His pulse is 125 bpm, BP 85/40 mmHg and JVP 4 cm above the sternal angle. There are basal crackles on auscultation of the chest.

Investigations:

ECG shows sinus rhythm, 125 bpm.

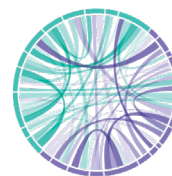
He is being treated with intravenous 0.9% sodium chloride at 125 mL/h and antibiotics.

What is the most appropriate additional intravenous treatment?

- A.** 500 mL 0.9% sodium chloride over 15 min
- B.** 500 mL Hartmann solution over 15 min
- C.** Dopamine hydrochloride
- D.** Furosemide
- E.** Noradrenaline/norepinephrine

**Correct answer: E) Noradrenaline/norepinephrine**

**Justification: Description of adequate (if not over) hydration, needs vasoconstriction.**



- 36.** A 34 year old man has had pain in his right shoulder and upper arm for 6 weeks that worsens when elevating his arm above his head. He does not recall any injury.

There is no deformity, tenderness or reduced range of movement. There is pain on abduction of the right shoulder that is worse with the arm in internal rotation and when abduction is resisted. He is treated with ibuprofen.

What is the most appropriate next step in management?

- A. MR scan of shoulder
- B. Refer for orthopaedic opinion
- C. Refer for physiotherapy
- D. Ultrasound scan of shoulder
- E. X-ray of shoulder

**Correct answer: C) Refer for physiotherapy**

**Justification: Clinically the diagnosis is right supraspinatus tendinopathy and no further investigation is required to confirm the diagnosis. Most cases can be managed in primary care and a referral to orthopaedics is not required. The most appropriate management is either general advice and home exercises or referral to a physiotherapist.**



**37.** A 65 year old woman has advanced carcinoma of the breast with cerebral and liver metastases, and is rapidly deteriorating. She is recognised to be dying. She has become confused and agitated.

What is the most suitable initial treatment?

- A. Diamorphine hydrochloride
- B. Glycopyrronium
- C. Hyoscine hydrobromide
- D. Midazolam
- E. Mirtazapine

**Correct answer: D) Midazolam**

**Justification:** Terminal restlessness is a common and distressing condition that requires active management. The diagnosis of dying has already been made and reversible causes of her deterioration will thus have been considered and excluded. Terminal restlessness should be managed with Midazolam by PRN subcutaneous injections / continuous subcutaneous infusion via a syringe driver.

**NICE guideline [NG31] Published: 16 December 2015**



**38.** A 80 year old man has progressive memory loss over 2 years.

He scores 20/30 on the Montreal Cognitive Assessment.

The doctor suspects early Alzheimer disease and requests an MR scan of brain.

In which part of the brain are changes most likely?

- A. Basal ganglia
- B. Frontal lobe
- C. Medulla oblongata
- D. Parietal lobe
- E. Temporal lobe

**Correct answer: E) Temporal lobe**

**Justification:** In early Alzheimer disease, the most likely area of the brain to show changes on an MRI scan is the temporal lobe, particularly the hippocampus. The hippocampus is crucial for memory formation, and its early involvement corresponds with the progressive memory loss characteristic of Alzheimer disease. Atrophy in this region is commonly observed and serves as a key indicator supporting the diagnosis of Alzheimer disease.





**39.** A 43 year old woman is admitted to hospital with an overdose of amitriptyline taken 4 hours ago. She has a history of chronic headache.

Her pulse is 105 bpm and BP 95/40 mmHg. She is drowsy and her pupils are dilated.

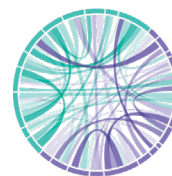
ECG shows significant QRS prolongation.

What is the most appropriate immediate management?

- A. Activated charcoal
- B. Intravenous amiodarone
- C. Intravenous atropine
- D. Intravenous magnesium
- E. Intravenous sodium bicarbonate

**Correct answer: E) Intravenous sodium bicarbonate**

**Justification: Bicarbonate is the treatment of the choice in patients with prolonged QRS complexes following a tricyclic antidepressant overdose.**



**40.** A 76 year old man undergoes an abdominoperineal resection for a low rectal carcinoma. He has severe COPD and hypertension.

What is the most appropriate method for providing analgesia during the early postoperative period?

- A. Epidural anaesthesia
- B. Intramuscular opioid
- C. Oral non-steroidal analgesia
- D. Patient controlled intravenous analgesia
- E. Spinal anaesthesia

**Correct answer: A) Epidural anaesthesia**

**Justification:** This is because for major abdominal surgery in respiratory disease opioid, by whatever route, should be avoided. Epidural is best because it can be topped up and titrated; spinal anaesthesia cannot. Transcutaneous electrical nerve stimulation has been used for post-operative pain, but trial results are contradictory. Intramuscular injection is difficult to titrate.



- 41.** A 75 year old woman becomes breathless while receiving the third unit of a blood transfusion. She was admitted with melaena and her haemoglobin was 65 g/L (115–150). She has ischaemic heart disease and takes aspirin and lisinopril.

Her temperature is 37.3°C, pulse 96 bpm, BP 120/80 mmHg, respiratory rate 30 breaths per minute and oxygen saturation 90% breathing air. Chest auscultation reveals bibasal inspiratory crackles and occasional wheeze.

She is treated with high flow oxygen and the blood transfusion is stopped.

What is the most appropriate additional treatment?

- A.** Intramuscular adrenaline/epinephrine
- B.** Intravenous chlorphenamine maleate
- C.** Intravenous furosemide
- D.** Intravenous hydrocortisone
- E.** Nebulised salbutamol

**Correct answer: C) Intravenous furosemide**

**Justification:** This patient has Transfusion-Associated Circulatory Overload (TACO). Treatment is with an IV loop diuretic.



- 42.** A researcher is seeking to examine whether long-term mobile phone use is linked to the risk of developing vestibular schwannoma (acoustic neuroma).

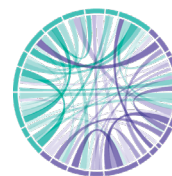
The information on mobile phone usage is collected from participants with vestibular schwannoma and a comparable group of participants without vestibular schwannoma, selected from the general practice register.

What type of study design is being used?

- A.** Case–control study
- B.** Case series
- C.** Cohort study
- D.** Cross-sectional study
- E.** Ecological study

**Correct answer: A) Case–control study**

**Justification: This is a typical description of a case-control study.**



**43.** A 56 year old woman has home blood pressure readings averaging 160/90 mmHg. She has type 1 diabetes mellitus.

Investigations:

|                                   |                               |        |
|-----------------------------------|-------------------------------|--------|
| Urinary albumin: creatinine ratio | 42 mg/mmol                    | (<3.5) |
| eGFR                              | 43 mL/min/1.73 m <sup>2</sup> | (>60)  |

Hypertension is confirmed on 24 hour ambulatory monitoring.

What class of antihypertensive drug is most appropriate?

- A.** ACE inhibitor
- B.** Alpha blocker
- C.** Beta blocker
- D.** Calcium channel blocker
- E.** Thiazide-like diuretic

**Correct answer: A) ACE inhibitor**

**Justification:** There is good evidence for renal function protection in diabetic nephropathy with ACE-1 in addition to its hypertensive properties.



**44.** A 70 year old man has had a dry cough and breathlessness on exertion for 3 months. He has lost 4 kg in weight. He has ischaemic heart disease and atrial fibrillation. He takes apixaban, ramipril and amiodarone. He has never smoked cigarettes.

His temperature is 37.5°C, pulse 70 bpm, respiratory rate 18 breaths per minute and oxygen saturation 91% breathing air. He has fine bibasal inspiratory crackles. There is no finger clubbing.

Investigations:

|                                |                      |            |
|--------------------------------|----------------------|------------|
| Haemoglobin                    | 141 g/L              | (130–175)  |
| White cell count               | $14.0 \times 10^9/L$ | (3.0–10.0) |
| Erythrocyte sedimentation rate | 65 mm/hr             | (<20)      |

Chest X-ray shows reticular opacities in both bases.

What investigation is most likely to confirm the diagnosis?

- A. Blood cultures
- B. Bronchoscopy
- C. Echocardiography
- D. High resolution CT scan of chest
- E. Induced sputum for microscopy and culture

**Correct answer: D) High resolution CT scan of chest**

**Justification:** This is because the patient has pulmonary fibrosis as a complication from amiodarone therapy. This classically does not cause clubbing. Patients present with cough and dyspnoea. Fever and reactive blood changes (raised WCC, ESR) are not uncommon. An HRCT would confirm changes of interstitial lung disease. Blood cultures are indicated but this is unlikely to be an infective cause. Bronchoscopy is not indicated. The features are not those of heart failure so an echo will not confirm the diagnosis. An induced sputum is not indicated at this stage.



**45.** A 31 year old woman is admitted with 24 hours of confusion. She is having visual hallucinations of snakes and mice on the floor. Her partner says that she often drinks 80 units of alcohol per week. He has not seen her for the past week. She has depression and takes fluoxetine.

Her temperature is 37.6°C, pulse 100 bpm and BP 162/98 mmHg. She is disorientated in time and place but has no focal neurological deficit.

What is the most likely diagnosis?

- A. Delirium tremens
- B. Fluoxetine overdose
- C. Hepatic encephalopathy
- D. Korsakoff psychosis
- E. Wernicke encephalopathy

**Correct answer: A) Delirium tremens**

**Justification:** The patient has typical features of delirium tremens with confusion, visual hallucinations, tachycardia and pyrexia on the background of heavy alcohol use. This normally occurs on reduction or abstinence, which may not be clear from the history.



**46.** A 61 year old woman is admitted with 2 days of confusion. She has hypertension and takes nifedipine. She smokes 20 cigarettes per day.

She is confused but has no focal neurological deficit. Her pulse is 75 bpm, BP 139/87 mmHg and JVP 2 cm above the sternal angle.

Investigations:

|        |            |           |
|--------|------------|-----------|
| Sodium | 117 mmol/L | (135–146) |
|--------|------------|-----------|

|           |            |           |
|-----------|------------|-----------|
| Potassium | 4.2 mmol/L | (3.5–5.3) |
|-----------|------------|-----------|

|      |            |           |
|------|------------|-----------|
| Urea | 1.9 mmol/L | (2.5–7.8) |
|------|------------|-----------|

|            |           |          |
|------------|-----------|----------|
| Creatinine | 57 µmol/L | (60–120) |
|------------|-----------|----------|

|                  |               |           |
|------------------|---------------|-----------|
| Serum osmolality | 252 mOsmol/kg | (285–295) |
|------------------|---------------|-----------|

|                  |               |            |
|------------------|---------------|------------|
| Urine osmolality | 585 mOsmol/kg | (100–1000) |
|------------------|---------------|------------|

What mechanism best explains the development of hyponatraemia?

- A. Increased sodium secretion in the distal tubule
- B. Increased water absorption in the collecting duct
- C. Increased water ingestion
- D. Reduced cortisol secretion
- E. Reduced sodium reabsorption in the proximal tubule

**Correct answer: B) Increased water absorption in the collecting duct**

**Justification:** The picture is of syndrome of inappropriate ADH secretion with hyponatraemia and inappropriately concentrated urine. ADH stimulates synthesis of aquaporin-2 channels in the apical membrane of the collecting duct which promotes water absorption. This leads to a dilutional hyponatraemia.





**47.** A 43 year old woman has a sudden severe headache that started 24 hours ago. She has autosomal dominant polycystic kidney disease.

Her temperature is 36.8°C, pulse 92 bpm and BP 140/100 mmHg.  
Neurological examination is normal.

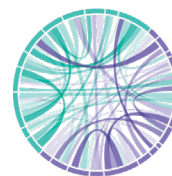
CT scan of head is normal.

What is the most appropriate next step in management?

- A. Erythrocyte sedimentation rate
- B. Lumbar puncture
- C. MR scan of brain
- D. Refer to outpatient headache clinic
- E. Start amlodipine

**Correct answer: B) Lumbar puncture**

**Justification: This is because APKD is associated with subarachnoid haemorrhage. A lumbar puncture should be performed. MRA would be reasonable, but not MRI.**



- 48.** A 74 year old man has progressively worsening muscle aches that are now causing him to struggle to get up from a chair or raise his arms above his head. He has oesophageal cancer, treated surgically, and ischaemic heart disease. He takes bisoprolol, clopidogrel, ramipril and simvastatin.

Investigations:

|                                |                            |            |
|--------------------------------|----------------------------|------------|
| Haemoglobin                    | 125 g/L                    | (130–175)  |
| White cell count               | $7.8 \times 10^9/\text{L}$ | (3.0–10.0) |
| Platelets                      | $391 \times 10^9/\text{L}$ | (150–400)  |
| Erythrocyte sedimentation rate | 105 mm/hr                  | (<20)      |

What is the most appropriate therapeutic change?

- A. Start co-codamol
- B. Start ibuprofen
- C. Start prednisolone
- D. Stop bisoprolol
- E. Stop simvastatin

**Correct answer: C) Start prednisolone**

**Justification: Classical PMR history, presentation and raised inflammatory markers.**



- 49.** A 59 year old woman has had 6 months of pain affecting her hips and lower back. She is from Libya and has lived in the UK for 10 years. She has chronic kidney disease stage 3 and hypertension. She takes lisinopril and simvastatin.

She has weakness of hip flexion bilaterally. There is no muscle or bony tenderness.

Investigations:

|            |                               |           |
|------------|-------------------------------|-----------|
| Urea       | 7.8 mmol/L                    | (2.5–7.8) |
| Creatinine | 122 µmol/L                    | (60–120)  |
| Calcium    | 2.1 mmol/L                    | (2.2–2.6) |
| eGFR       | 41 mL/min/1.73 m <sup>2</sup> | (>60)     |

|                      |          |          |
|----------------------|----------|----------|
| Alkaline phosphatase | 230 IU/L | (25–115) |
|----------------------|----------|----------|

|                     |             |           |
|---------------------|-------------|-----------|
| Parathyroid hormone | 14.5 pmol/L | (1.6–8.5) |
|---------------------|-------------|-----------|

What additional investigation is most likely to confirm the diagnosis?

- A. Creatine kinase
- B. Erythrocyte sedimentation rate
- C. Serum 25-OH cholecalciferol
- D. Ultrasound scan of neck
- E. X-ray of thoracic and lumbar spine

**Correct answer: C) Serum 25-OH cholecalciferol**

**Justification:** The clinical features suggest osteomalacia. She has hypocalcaemia and proximal muscle weakness. The low serum calcium is not adequately explained by CKD. Serum vitamin D would establish the diagnosis. 24 hour urinary calcium is sometimes performed in primary hyperparathyroidism but not in a secondary case such as this. The presentation is not one of myositis and this is unlikely to be significantly elevated. Ultrasound of neck is another primary hyperparathyroidism test. The lumbar spine X-ray is most likely to show osteopenia but does not give diagnostic features (unlike in children).